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# DER-VET Task Force

## ESIC Working Group 1: Grid Services and Analysis

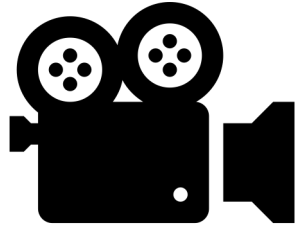
Miles Evans | EPRI

Andrew Etringer | EPRI

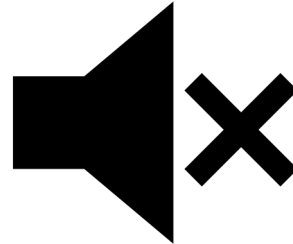
January 6, 2022



# Webcast Reminders



This webcast is being recorded. **Your participation provides consent to the recording.**



Please mute your phones when you are not speaking. To un-mute, press \*6 or push the un-mute icon in WebEx.



Abide by Antitrust Guidelines



Chat to “Everyone” for maximum interaction



The slides and recordings will be posted to [www.der-vet.com/esictf/](http://www.der-vet.com/esictf/)

# Agenda:

- DER-VET Software Update
- CHP Validation Paper
- Task Force 2022



# DER-VET Software Update

# DER-VET and Log4j vulnerability

Is DER-VET susceptible to the Java Log4j vulnerability?

No.

*For DER-VET in particular, there is no impact. DER-VET does not use any Java code or libraries, and we do not host our app as a website (so there are no servers to worry about). All of the Desktop App (GUI) and command-line (Python) versions of DER-VET that EPRI has released do not have any Log4j vulnerabilities.*

# DER-VET: New Release is coming soon

- **Bug Fixes** (Mostly Python backend)
  - **Known Bugs (under development):**
    - MACRS depreciation value cannot exceed 20 years
    - Enable user service to apply min charge and discharge constraints
    - FR energy throughput cost does not handle RTE
    - DR not compatible with bill reduction services
    - Coupled sensitivity analysis feature can have errors
    - Variable O&M in Pro Forma should include energy throughput from ancillary services
    - GUI Battery cannot be saved in certain circumstances

*Thank you for reporting these bugs with us.*

*Please do send any new bug reports to us and we will address them.*

# DER-VET: New Release is coming soon

## ▪ Python Backend New Capabilities

- New Technologies for thermal loads: CHP / Boiler / Chiller

*Note: these technologies will not be a part of the GUI in this release*

- Fuel Costs: improved methods
  - [www.der-vet.com/esictf/](http://www.der-vet.com/esictf/) (ESIC Task Force Meeting on 12/02)
- Support for more recent Python versions
  - Python 3.6 has reached it's EOL

# DER-VET: New Release is coming soon

## ■ GUI Improvements

- Effort to refactor code using ‘DRY’ principle
  - Removes code redundancy
  - New features can be added easier and faster
  - Reduces the likelihood of bugs
- Simplification of project import/export
  - Single JSON file
  - Python script to translate older format to new format
- Made all technologies single-page
  - For better user experience



# DER-VET: New Release is coming soon

DER-VET
Project Overview
Model Components
Summary

Overview

**Technologies**

PV: Installation 1

Battery: BESS 1

Services

Site Information

Reliability

Finances

Miscellaneous Inputs

External Incentives

Retail Tariff

**Limit Daily Cycling?**  Yes  No

Constrain the battery storage system's daily discharge energy. When selected, this input limits the amount of discharge energy a battery can do in any 24-hr period to a maximum of its rated energy capacity \* daily cycle limit.

Cycle Degradation

**Include degradation due to cycling?**  Yes  No

When selected, this will calculate degradation due to cycling based on the cycle life curve and combine this degradation with the calculated calendar degradation. \* Note: Not compatible with deferral service.

**Calendar Degradation Rate**  % / year

The calendar degradation combines with cycling degradation to get total degradation. \* Note: Not compatible with size optimization.

**State of Health**  %

State of health at end of life (percentage of original energy capacity that will trigger a replacement of the equipment)

Cycle Depth Upper Limit	Cycle Life Value	
<input type="text" value="0.1"/>	<input type="text" value="63000"/>	x
<input type="text" value="0.15"/>	<input type="text" value="42000"/>	x
<input type="text" value="0.2"/>	<input type="text" value="31500"/>	x
<input type="text" value="0.3"/>	<input type="text" value="17500"/>	x
<input type="text" value="1"/>	<input type="text" value="3500"/>	x

+ Add Cycle

**Include Housekeeping Calculations?**  Yes  No

Include Housekeeping Power" – Apply a constant AC power consumption that does not discharge

# DER-VET: New Release is coming soon

**DER-VET**
Project Overview **Model Components** Summary
▶
🗨️ ?

[Overview](#)

**Technologies**  
[PV: Installation 1](#)  
[Battery: BESS 1](#)

**Services**  
[Site Information](#)  
[Reliability](#)

**Finances**  
[Miscellaneous Inputs](#)  
[External Incentives](#)  
[Retail Tariff](#)

10	12	9	21			1	0.062392	Energy	Winter Peak	<a href="#">Edit</a>
10	12	22	24			1	0.054152	Energy	Winter Offpeak	<a href="#">Edit</a>
10	12	1	24			0	0.054152	Energy	Winter Weekend	<a href="#">Edit</a>
1	12	1	24			2	7.016	Demand	Demand Charge	<a href="#">Edit</a>
99	22	33	44				3.33			<a href="#">Edit</a>
1	12	-3	27			2	2.32	Demand		<a href="#">Edit</a>

Add Billing Period
Add OpenEI Tariff
Import Tariff

Export Tariff

Some billing periods contain errors

Done



# CHP Validation Paper

# CHP Validation Paper

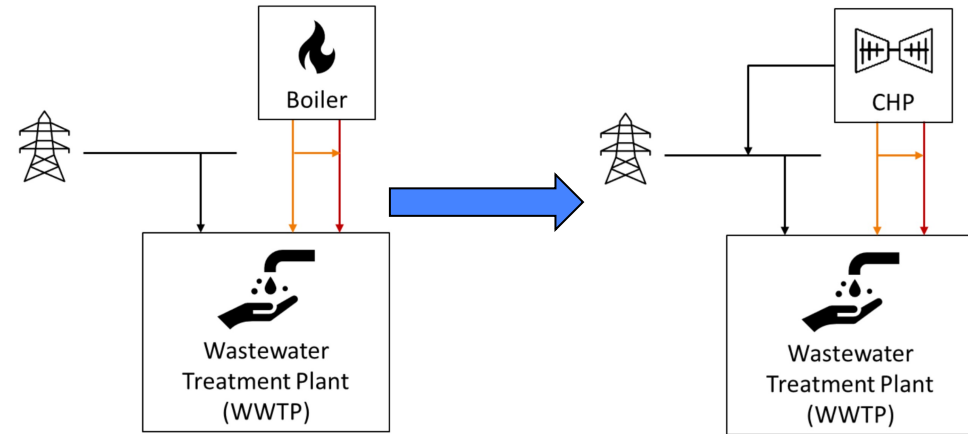
- Available **free** to the public on epri.com
- EPRI deliverable number **3002021882**
- Formulation and realistic validation case studies

<https://www.epri.com/research/products/000000003002021882>

# Case Study 1 - WWTP

## ■ CHP

- offsets need for boiler (capital cost savings)
- reduces electricity costs (demand and energy charge reduction)
- increases fuel costs



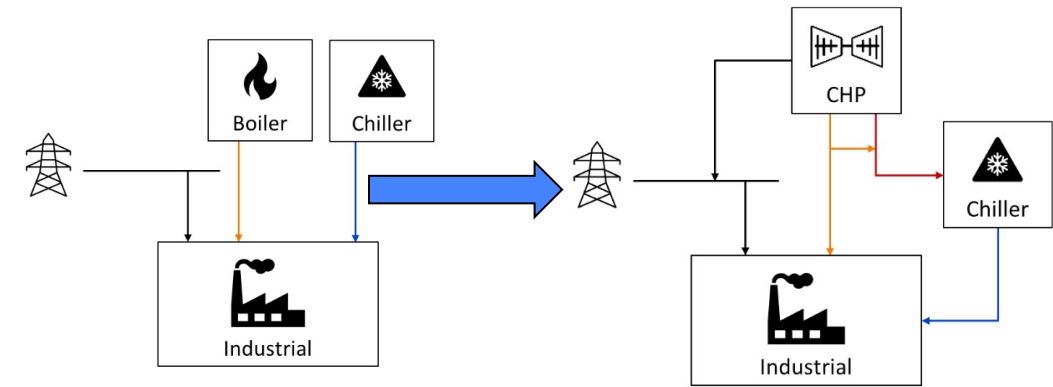
	Base Case	Change Case with CHP
Grid-connected	Yes	Yes
Boiler	Yes 6 MMBtu/hr $\eta = 80\%$	No
CHP	No	Yes 1.75 MW $\frac{P}{H} = 1$ $MSR = 1$
Chiller	Not applicable	Not applicable

**CHP fully covers site thermal loads**

# Case Study 2 - Industrial

## ■ CHP

- Powers the chiller with heat directly instead of electricity
- Reduces electricity costs
- Offsets the need for a boiler

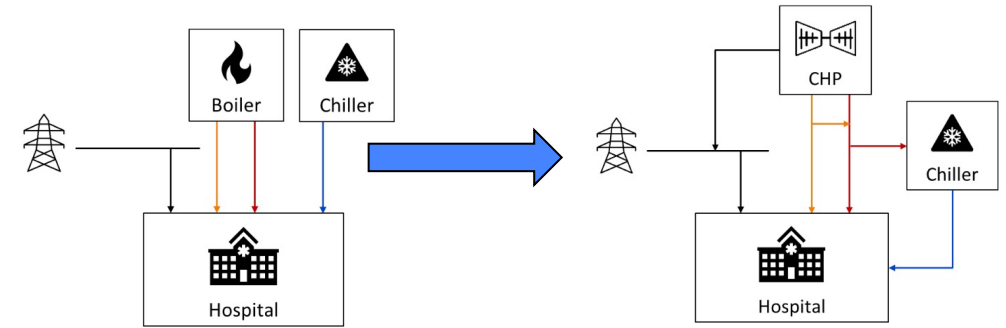


	Base Case	Change Case with CHP
<b>Grid-connected</b>	Yes	Yes
<b>Boiler</b>	Yes 35 MMBtu/hr $\eta = 80\%$	No
<b>CHP</b>	No	Yes, gas turbine 6 MW $\frac{P}{H} = 0.5$ $MSR = 10^4$
<b>Chiller</b>	Yes, electric chiller 560 ton COP = 5	Yes, absorption chiller powered by CHP COP = 1.42

**CHP and heat-powered chiller cover site thermal loads**

# Case Study 3 - Hospital

- Boiler cannot be totally offset
- CHP
  - Reduces boiler use
  - Powers chiller instead of electricity
  - Reduces electricity costs



	Base Case	Change Case with CHP
<b>Grid-connected</b>	Yes	Yes
<b>Boiler</b>	Yes 25 MMBtu/hr $\eta = 80\%$	Yes 9 MMBtu/hr $\eta = 80\%$
<b>CHP</b>	No	Yes, gas turbine 3.3 MW $\frac{P}{H} = 0.45$ $MSR = 10^2$
<b>Chiller</b>	Yes, electric chiller 3400 ton COP = 5	Yes, absorption chiller powered by CHP COP = 1.42



# Task Force 2022





**Next Meeting Feb 3, 2022  
11 AM Pacific Time**

A blue-tinted photograph of four people, two men and two women, standing in a row. They are dressed in professional attire, including lab coats and a hard hat. The image is semi-transparent, allowing the text to be overlaid. The text "Together...Shaping the Future of Energy™" is centered in white. The EPRI logo is visible on the lab coats and the hard hat.

Together...Shaping the Future of Energy™