DER-VET Task Force

ESIC Working Group 1: Grid Services and Analysis

Miles Evans | EPRI
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September 2, 2021

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- To allocate customers/suppliers/territories;
- To suppress a technology;
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- 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.

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Agenda

- DER-VET update
- Degradation Reference Case

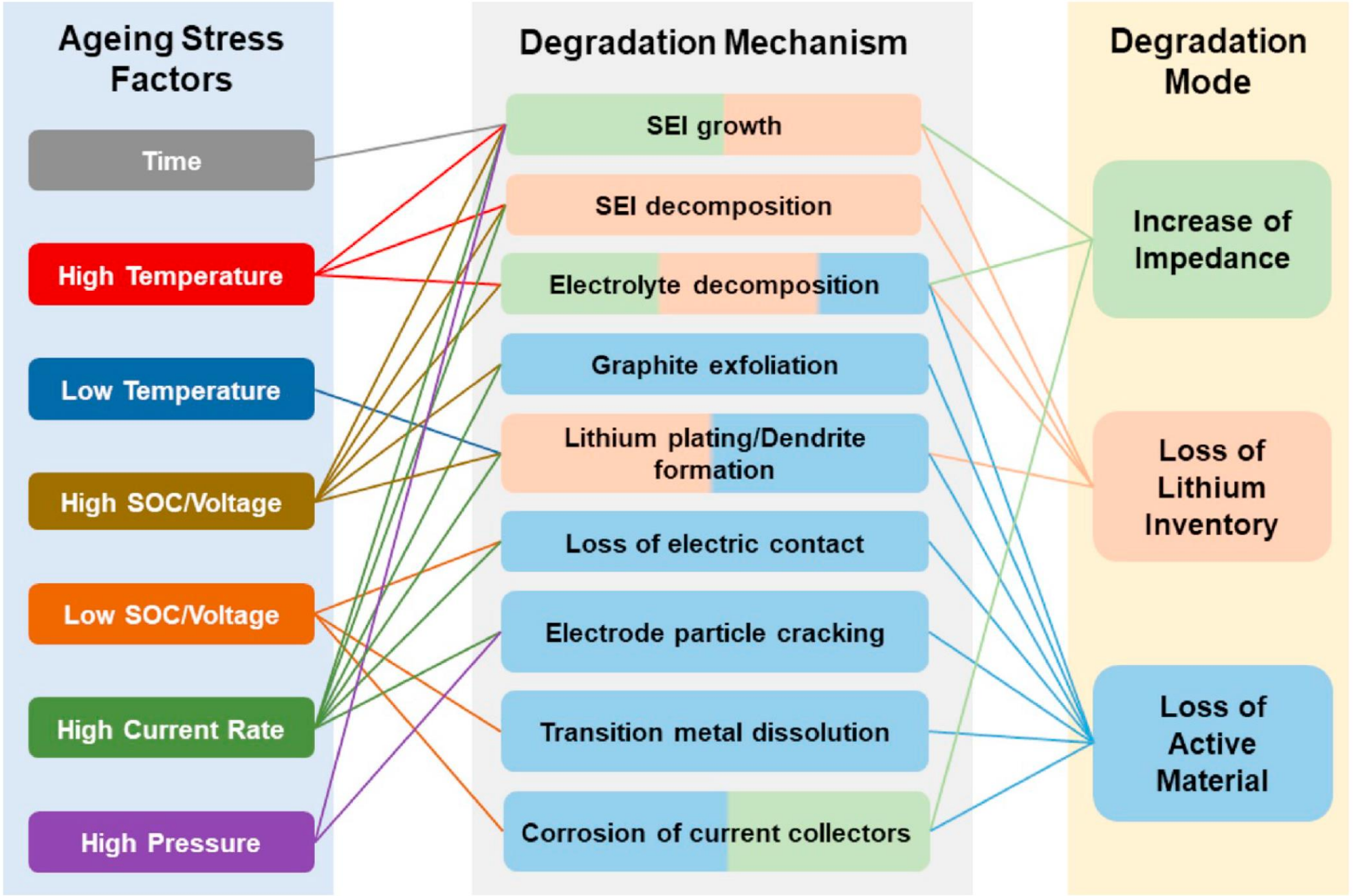
DER-VET Software Update

DER-VET Version 1.1.2 (bug fixes to v1.1.1)
* *Release in mid-September*

Items that will be addressed in the update:

- Project reset can occur with save buttons
- Top Navigation Bar size of DER-VET logo
- User Services time series input bug
- Calendar degradation input type change for Batteries

Degradation Reference Case

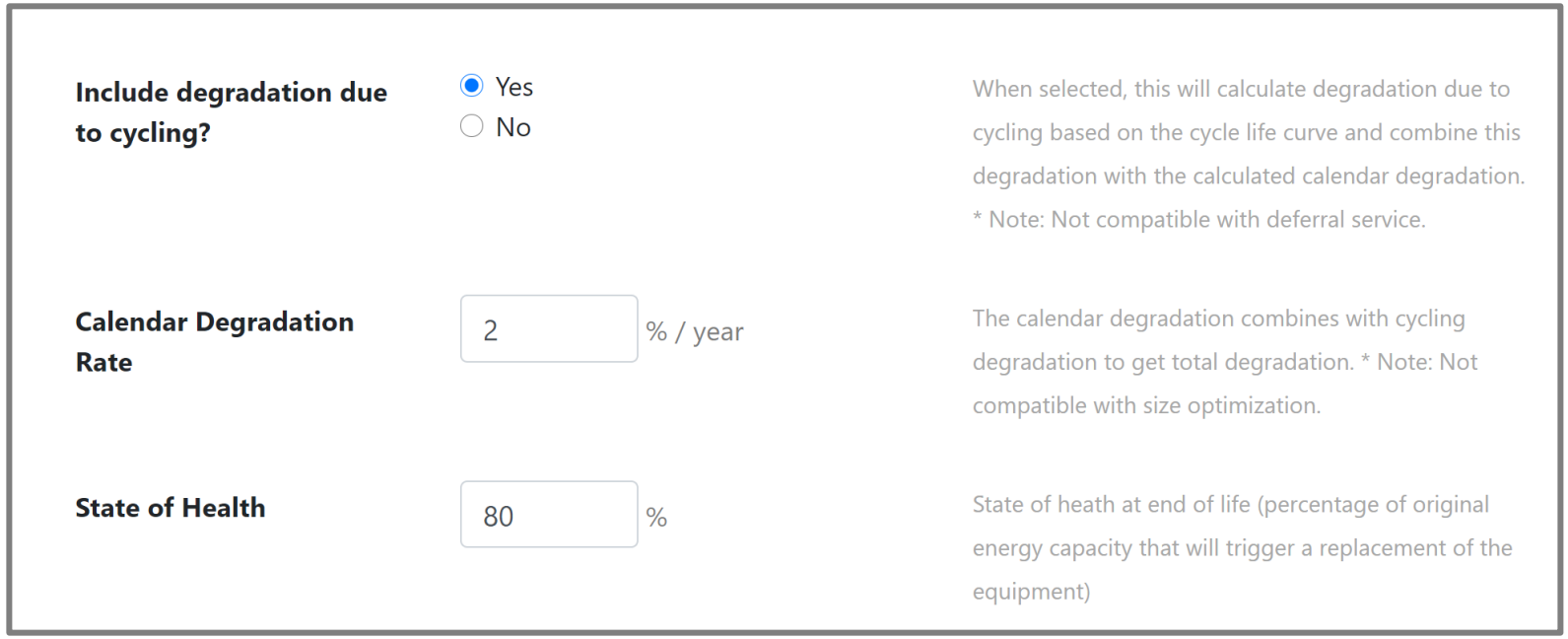


Li, Y., Liu, K., Foley, A. M., Zülke, A., Berecibar, M., Nanini-Maury, E., Van Mierlo, J., & Hoster, H. E. (2019). Data-driven health estimation and lifetime prediction of lithium-ion batteries: A review. *Renewable and Sustainable Energy Reviews*, *113*(July). https://doi.org/10.1016/j.rser.2019.109254

https://www.sciencedirect.com/science/article/pii/S136403211930454X?casa_token=52W1saqTpgwAAAAA:u7gtyFH2JzrIRqJYr82qAE8fxZbIhO7IysH7m5gHiKH0KbFT1mAHarHCR-XZmbTH5L_1NY9MP44

Degradation Reference Case

- Based on CAISO Market case
  - No ancillary services – just energy shifting
- Degradation is turned on
- Calendar degradation rate = 2%/yr

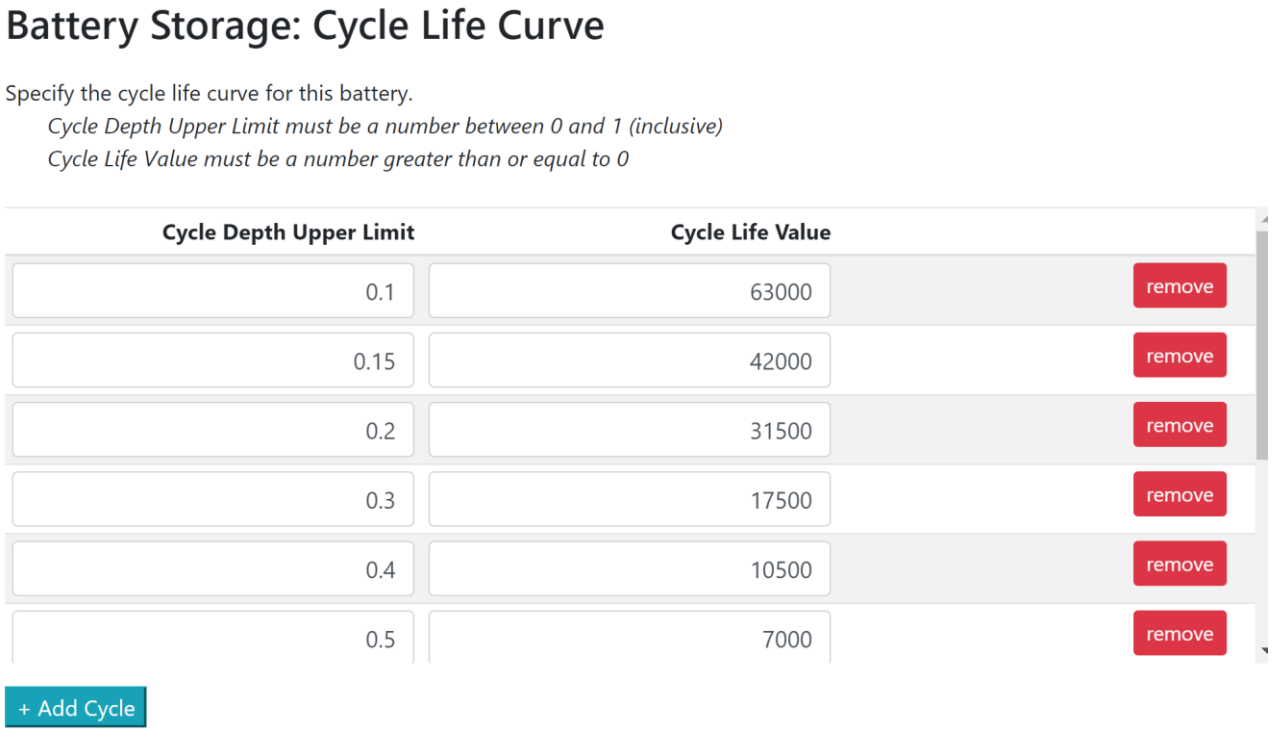


Degradation Reference Case

- Enter an expected lifetime then compare the expected lifetime to the dynamic degradation results.
- Re-run the case with the dynamic degradation results as the expected lifetime. Repeat as necessary.

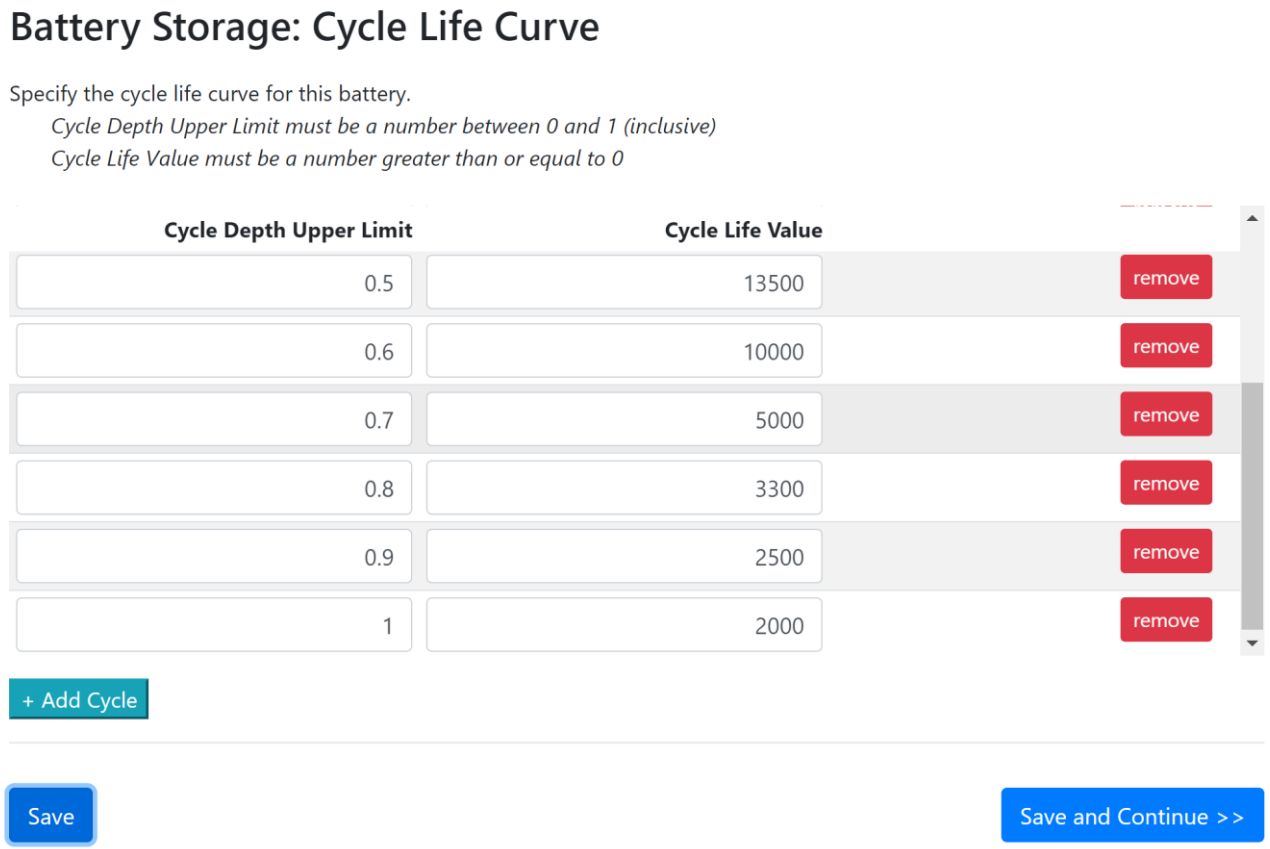
Degradation Reference Case – Cycle Life Curve

- Each entry represents the number of cycles at that depth of discharge it would take to degrade the battery from its beginning of life to its end of life
- In json or command line, you can change the EOL condition used to make this table. Default = 80%
- Default curve based on an aggregation of public LFP cycle life curves



Degradation Reference Case – Cycle Life Curve

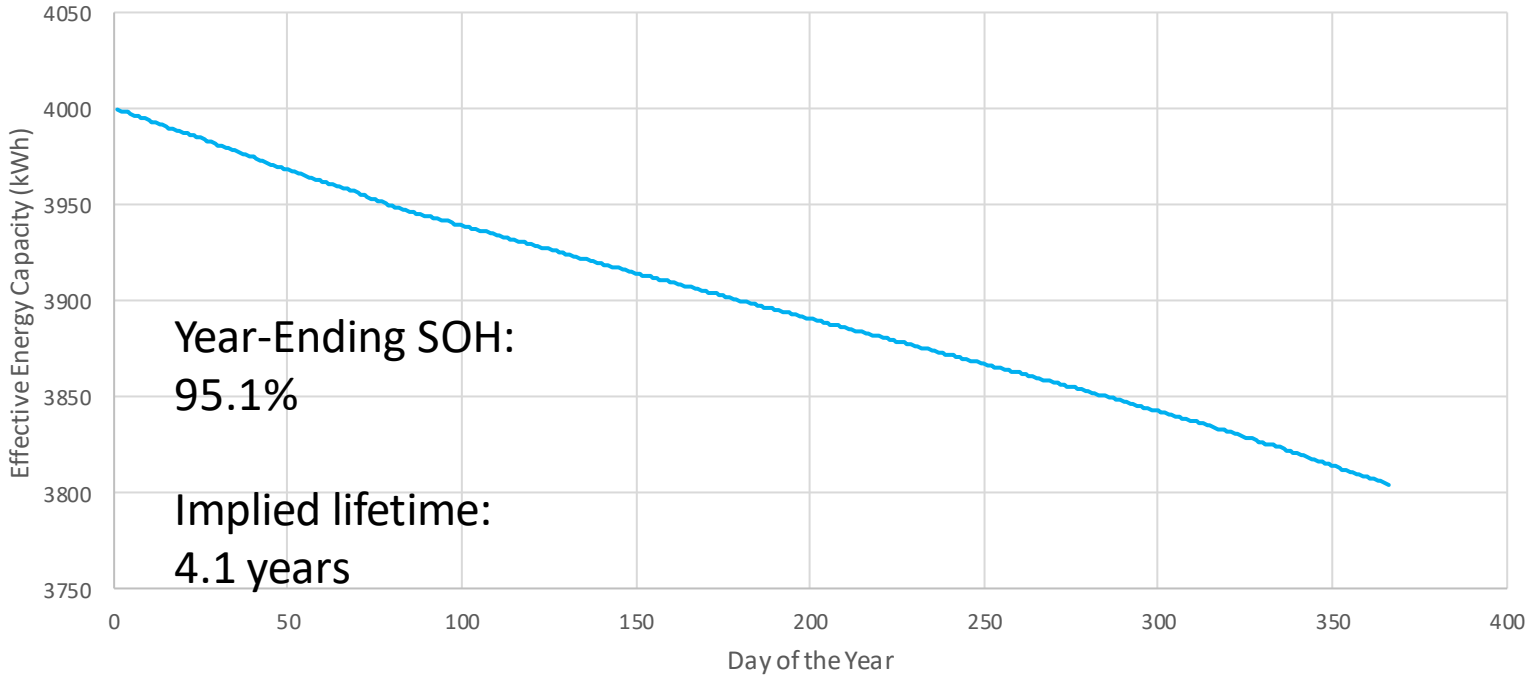
- This case contains a shorter-life cycle life curve than the default.
- Based on an older NMC cell



Degradation Reference Case - Results

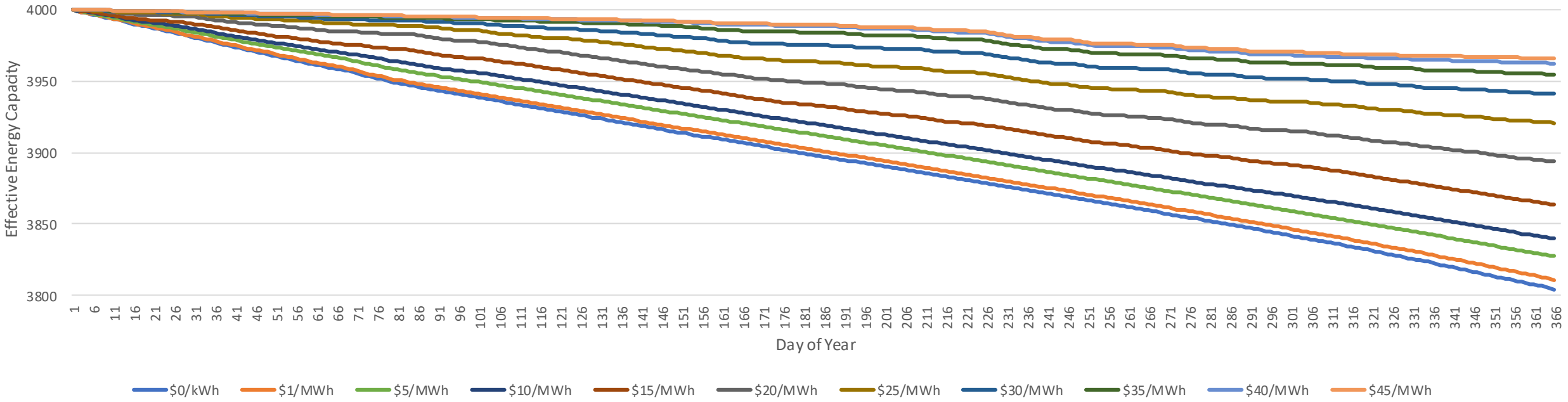
	A	B	C	D	E	F
1		degradatio	soh	effective energy capacity		
2	Optimizati	0		4000		
3	1	0.000555	0.99988	3999.556		
4	2	0.001609	0.99956	3998.713		
5	3	0.002264	0.99911	3998.189		
6	4	0.002819	0.99855	3997.745		
7	5	0.003373	0.99787	3997.301		
8	6	0.004428	0.9969	3996.458		
9	7	0.005286	0.99593	3995.772		
10	8	0.006143	0.99470	3995.085		
11	9	0.006898	0.99332	3994.482		
12	10	0.007756	0.99177	3993.796		
13	11	0.00841	0.99009	3993.272		
14	12	0.008965	0.98829	3992.828		
15	13	0.009823	0.98633	3992.142		
16	14	0.01068	0.98419	3991.456		
17	15	0.011735	0.98185	3990.612		
18	16	0.012592	0.97933	3989.926		
19	17	0.013647	0.97660	3989.082		
20	18	0.014202	0.97376	3988.639		
21	19	0.014756	0.97081	3988.195		
22	20	0.015511	0.9677	3987.591		
23	21	0.016369	0.96443	3986.905		
24	22	0.017226	0.96099	3986.219		
25	23	0.017981	0.95739	3985.615		
26	24	0.018636	0.95366	3985.091		
27	25	0.01929	0.94980	3984.568		
28	26	0.019845	0.9458	3984.124		

- …degradation_data.csv
- Labeling issue in columns B and C – look at column D



Degradation Reference Case - Sensitivity

- Adjust variable O&M cost to suppress cycling

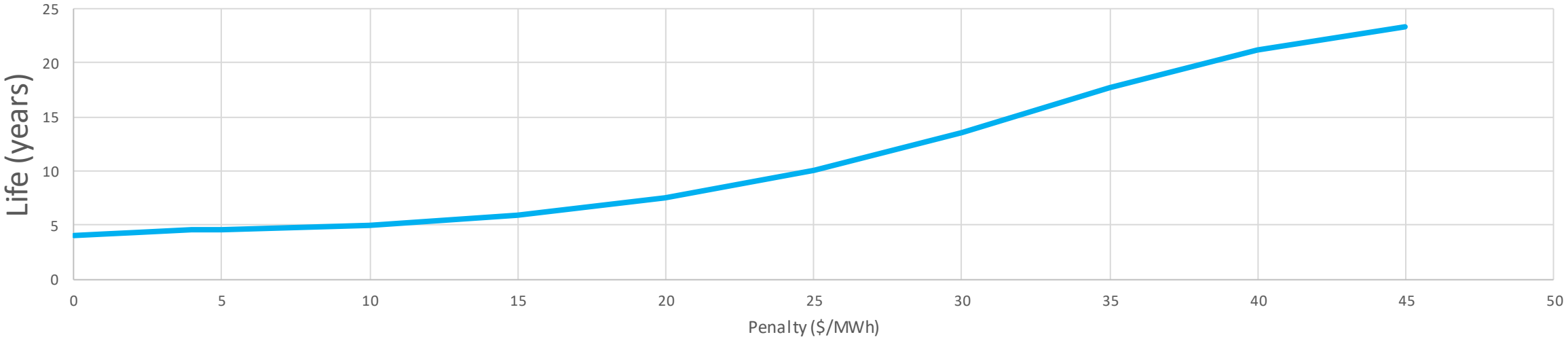


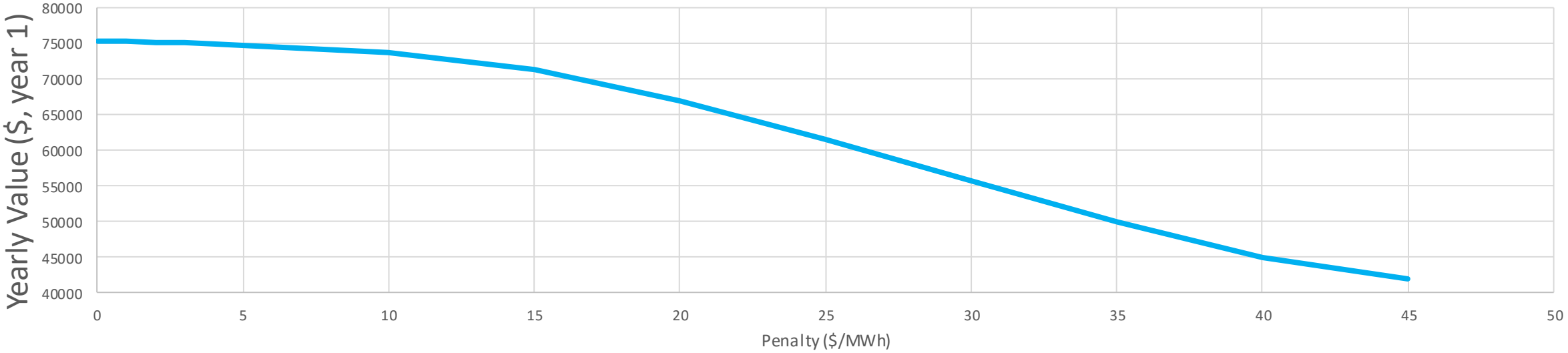
Variable O&M Costs

0 $ / MWh-year

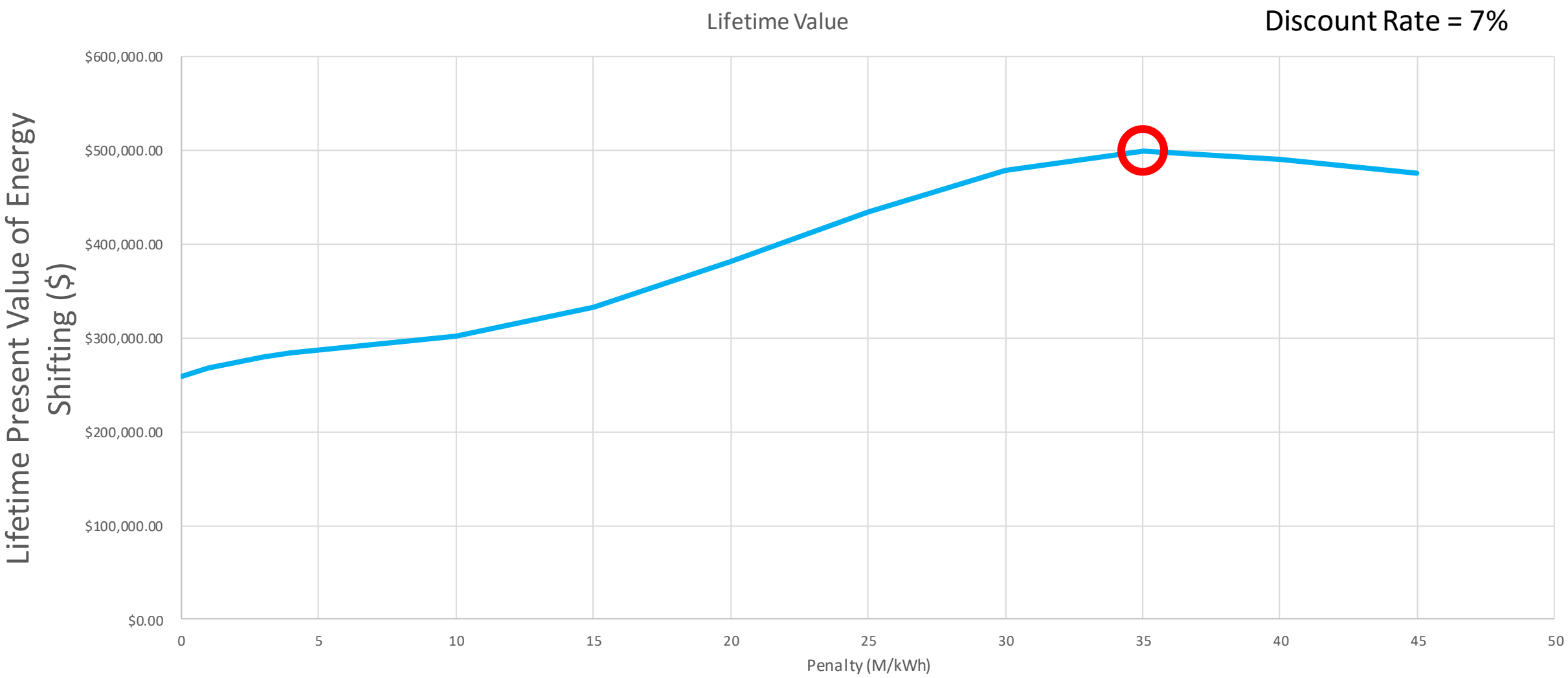
What is the variable cost of operations and maintenance for the battery storage system?

Degradation Reference Case - Sensitivity





Degradation Reference Case - Sensitivity



Degradation Reference Case - Results