**REopt – Mines Location** (1250 12th Street, Golden, CO)

* There is an *extreme* variation of NPV when looking at the Resilience model versus only the PV model

The NPV goes from +$60k in the PV and Battery Financial model to **-$22M** in the Resilience model. This difference between the two models is driven almost entirely by the *Net CAPEX + Replacement + O&M* costs. Presumably, the battery required to withstand the outage (~400 kW / ~58,000 kWh) costs $22M to buy/maintain. According to [Energy Sage](https://www.energysage.com/solar/solar-energy-storage/what-do-solar-batteries-cost/), a battery costs $400 - $700 / kWh, which matches with the $22M price tag of our 58,000 kWh battery.

* In terms of “whether the results make sense”, it is difficult for me to conceptualize many of the numbers that are output by SAM/REopt

For example, take the figure of 2,600,000 kWh / year for a secondary school. How does that compare to other colleges/universities? I couldn’t find a clear answer. Penn State (where I went to undergrad) has a monthly electric consumption of 25,000,000 kWh per *month* (which totals ~115x the hypothetical park at Mines). Penn State is a much larger campus, but I don’t believe it would be 115x larger.

*Notes on chosen inputs:*

**Electricity Rate**: Intermountain Rural Elec Assn – *Commercial Service - Three Phase (E3)*

* The [OpenEI link](https://openei.org/apps/USURDB/rate/view/5b44f5fd5457a33c0fa907ea) of this rate says it’s available for residential/non-residential customers, and the three-phase power rate is more appropriate for a secondary school ([link](https://www.fluke.com/en-us/learn/blog/power-quality/single-phase-vs-three-phase-power))

**Net Metering**: 25 kW, according to [DSIRE](https://programs.dsireusa.org/system/program/detail/271)

**Wholesale Rate ($/kWh)**: $0.12, taken from the [Intermountain Rural Elec Assn 2017 amendments](https://irea.coop/wp-content/uploads/2017/04/ProposedRRAmendmentsMay2017.pdf)

**System capital cost ($/kW)**: $1,800. Taken from the visual in Slide 7 of this [NREL report](https://www.nrel.gov/docs/fy19osti/72133.pdf). In REopt, it is unclear to me whether the $/kW is in AC or DC. My assumption was DC.

**Land Acres:** .935 – This was to be consistent with SAM inputs (the *Land area* was an uneditable input to SAM)

**MACRS:** 5%, according to [DSIRE](https://programs.dsireusa.org/system/program/detail/676)

**O&M cost (PV):** $13, according to [this website](https://analysis.newenergyupdate.com/pv-insider/us-solar-maintenance-costs-plummet-tech-gains-multiply) which cited an NREL report (Also, $13 is the default for SAM)

**Generator inputs**: Accepted defaults in REopt