Parameters:

* Storage Expansion Alone
* Wind and load such that on a day with high wind, no storage is needed, but with no wind, no amount of storage can prevent a loss of load.
* 24 variables, originally 48, 1 for each bus, giving the maximal power charging/discharge. Capacity is set to 5 times this amount.
* Scenarios selected based on robust approach. In particular, we assume 24 buses and on the a-priori Operational Cost Risk in Yan et al. (confidence parameter set to .001 and varying risk parameters: .05, .1, .25, and .5).

Experiments: General

* We fixed VOLL to achieve relatively complete recourse and optimized to minimize cost.
* We looked at expansion costs, out-of-sample operational costs, number of days load shedding occurred, and the number of days that the worst case was worse than the objective function (for RO only).
* We also gave benchmarks for the SO and RO approaches, allowing for no storage and arbitrarily large storage to be built to find the value of building storage from a cost (for SO) and number of days for lost load (for RO).

Experiment: Compare the effects of different number of scenarios (RO)

* Results are consistent with that of Yan et al. Each fell well with its threshold for worst-case being activated, with it being a decreasing function as more scenarios were activated, which makes the method appropriate for predicting the worst-case scenario (assuming the distribution is accurate)
* **Look into coefficient of variance, standard deviation over mean.**

Experiment: Compare the effects of different number of scenarios (SO)

* The number of scenarios does seem to improve the out-of-sample cost for the model up to a certain point.
* Smaller number of scenarios seems to over-build storage, but there is not a clear pattern. Loss of load on average increases.
* Comparing to RO, the overall cost is lower, since less storage is being built.
* The setting of storage alone may not be appropriate for this model, with generation expansion or minimizing load shedding being more appropriate if we are looking to reduce loss of load.

Experiment: Clustering (SO)

* We also looked into the effects of clustering, grouping the 1458 scenario case into 12 or 24 clusters or varying sizes.
* We normalized the net load (load minus aggregated wind) to use as the data points.
* For this experiment, we took the data point closest to the mean of the cluster.
* Generally did not do well. If it out-performed the SO approach, it was not by much.
* On a couple occasion, the solution was at or near not doing any build.

Experiment: Clustering (RO)

* We also looked into the effects of clustering, grouping the 1458 scenario case into 12 or 24 clusters or varying sizes.
* We normalized the net load (load minus aggregated wind) to use as the data points.
* For this experiment, we solved an RO on the cluster, taking as the representative data point the worst-case in the last iteration.
* The results were somewhere between RO and SO, leaning heavily toward RO approach.
* Potential to serve as a hybrid method.

Personal conclusion,

* The Clustering (RO) approach seems promising as a hybrid method where there is a tolerance for expected loss of load days, but expansion cost is an important factor, but more work is needed.
* It may be appropriate to run one more round of experiments, using sum of load shedding as the objective function just so that we are comparing on one specific metric, but I also fear that I am running out of time (defense deadline for summer graduation is in less than three months).
* I am also looking for advice in terms on what to emphasize in the paper.