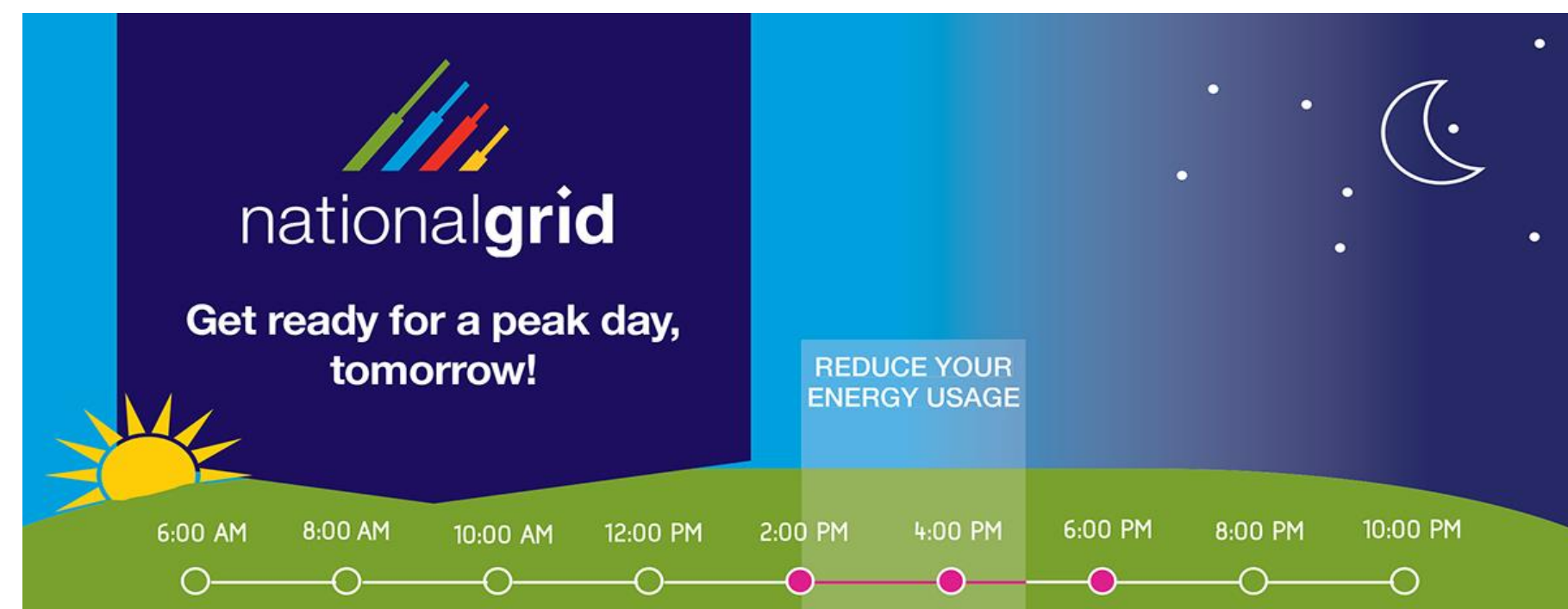


# Saving Energy and Cost During Peak Periods

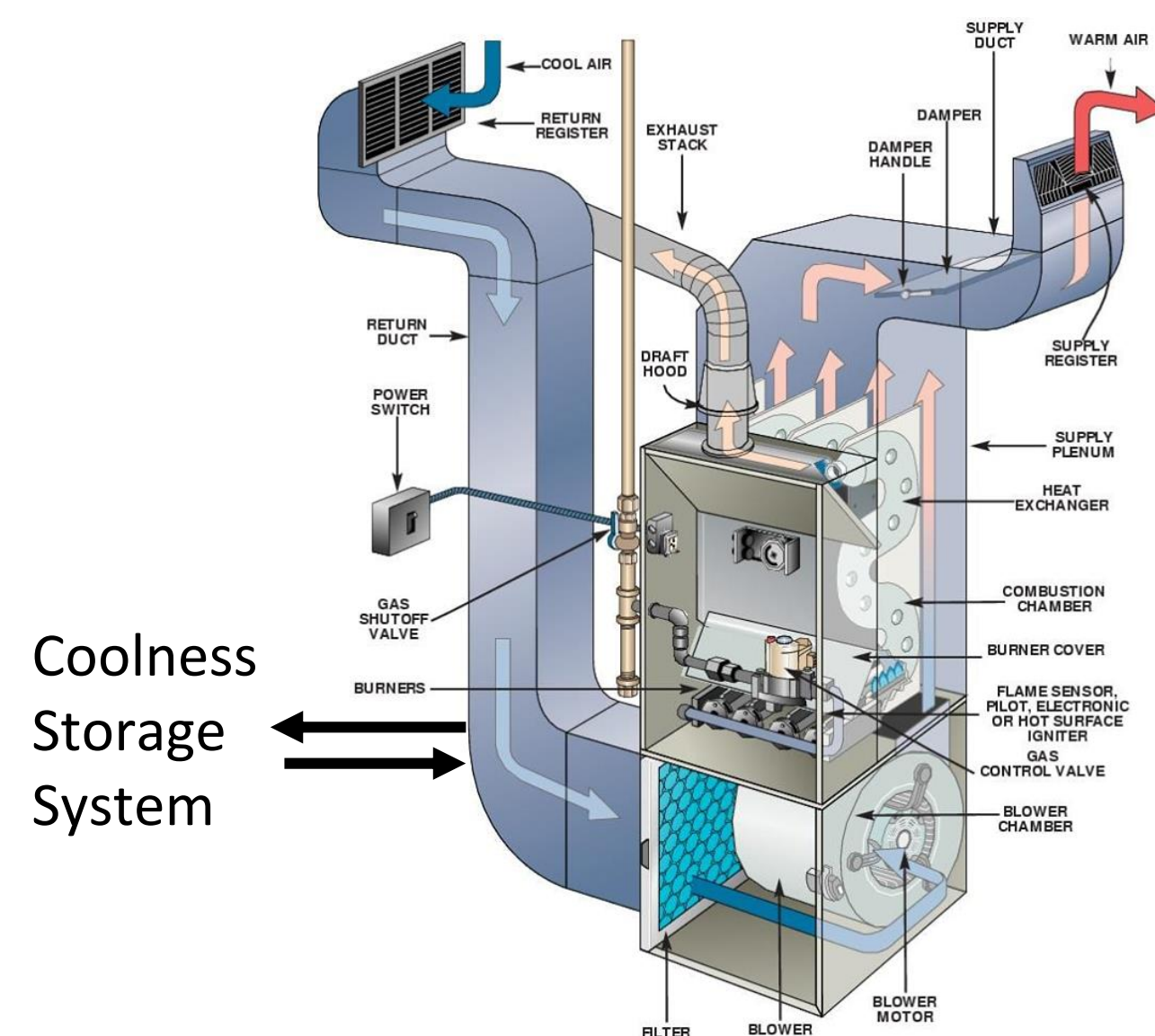
Geraldine Benn (ME), Christine Flores (ME), and Alison LaBarge (ME)  
 Advisor: Professor Selçuk Güçeri (ME)

## Purpose and Background

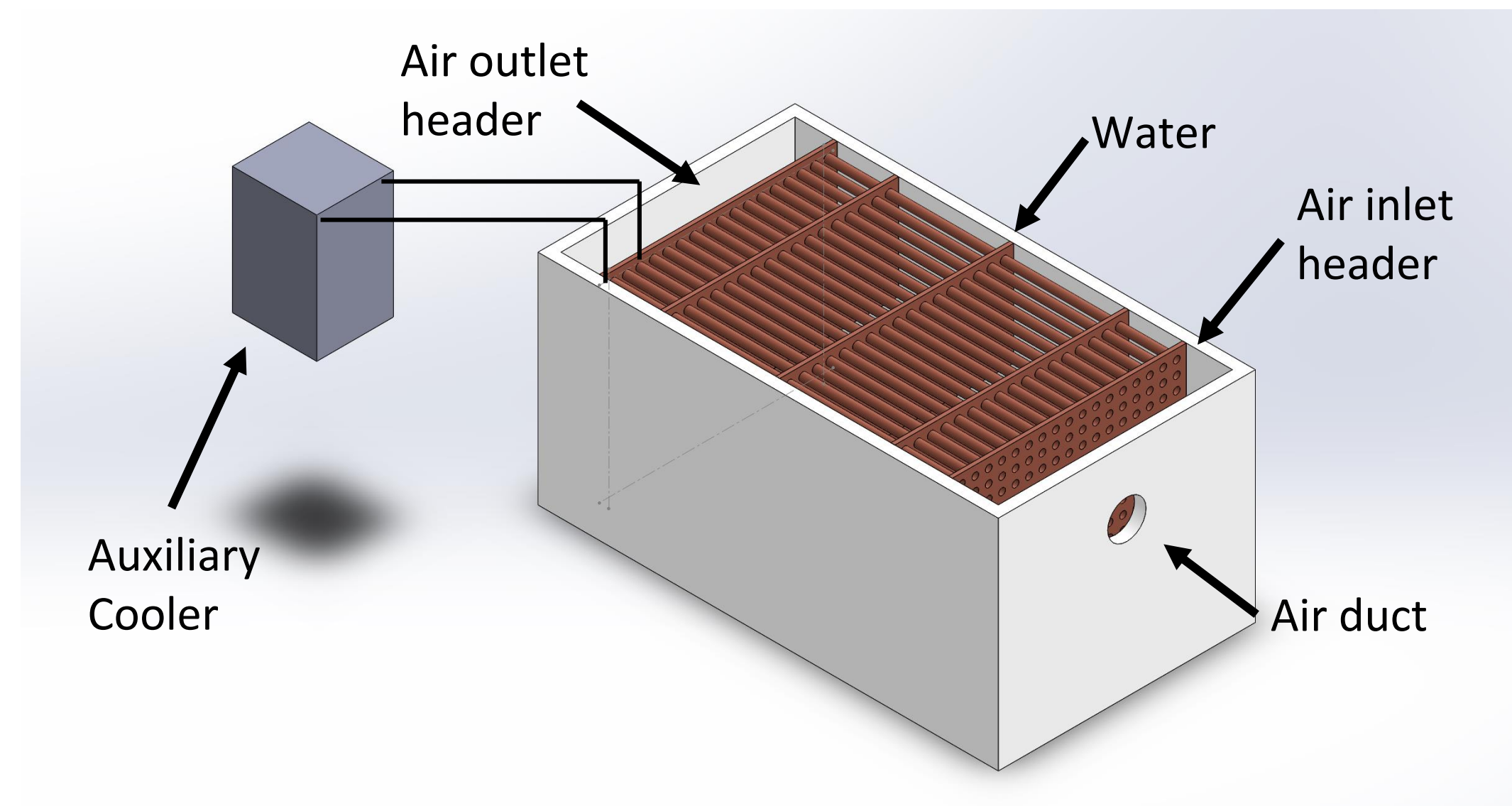
Peak periods result in significantly higher energy costs due to increased air conditioning use. This results in significant strain on the power grid. Utility companies invest in expensive and inefficient “peaker plants” to meet demand, which result in price increases of up to 6.2 times the average rate. To encourage customers to save energy during peak periods, utility companies notify customers. Our goal is to decrease energy costs and mitigate strain on the power grid during peak periods.



## Residential HVAC System



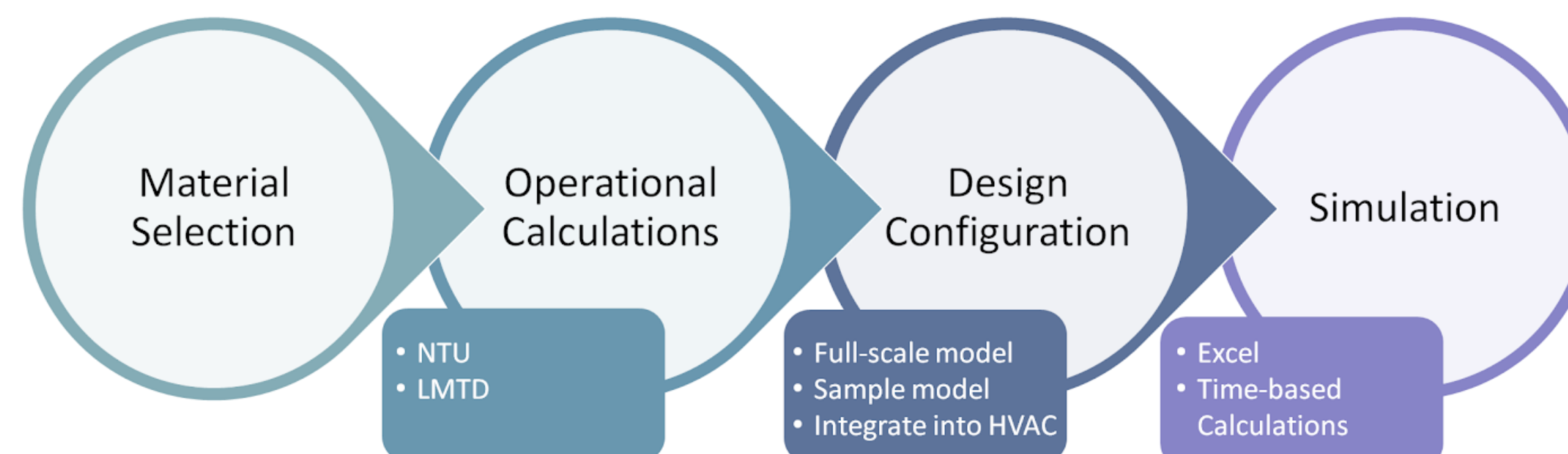
## Design: Coolness Storage System



- ❖ Shell and tube heat exchanger
- ❖ Septic tank: 750 gallon, 120 inches long, 67 inches wide, 57 inches tall
- ❖ 50% stationary water and 50% pipes
- ❖ Number of pipes: 255
- ❖ To be integrated into home’s HVAC system

## Approach and Methodology

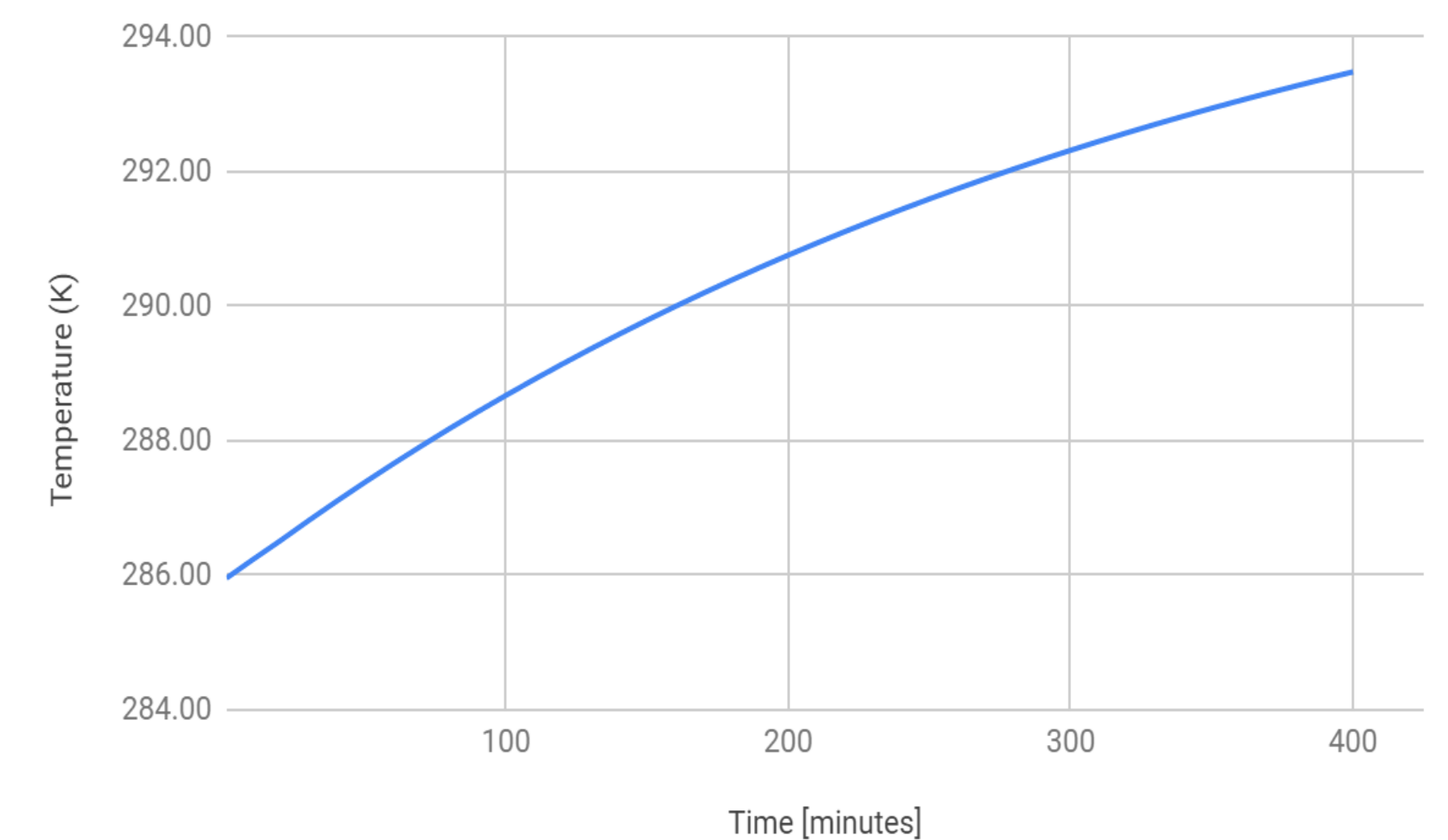
To assist with cooling loads during peak periods, we designed a cost-effective shell and tube heat exchanger to store “coolness.” The “cooling charge” is achieved during non-peak hours.



## Results

- ❖ Stores: **18 kWh** at 55°F
- ❖ Costs **\$3.96** to use, compared to **\$17.18** for a central air conditioning unit.

Temperature vs. Time of Water in Tank



## Conclusion

Overall, this system is 77% less expensive to run during a peak period than a traditional central air conditioning unit. The system should be used only during peak periods to maximize customer savings.

## Acknowledgements

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- ❖ Professor Selçuk Güçeri
- ❖ Tom Partington
- ❖ National Grid