

Conclusion

Based on compared costs, combined with a study of state geography, it was decided that Compressed Air Energy Storage (CAES) was the most feasible and also the most cost effective storage technology available.

Team Members

Alvarez, Raquel
Austermann, Aric
Blagooee, Yao
Handzhiysky, Lachezar
Hotz, Thomas
Kronika, David
Masnaga, Masnaga
Medina, Omar
Olson, Brian
Rollins, Meaghan
Roraff, Jonathan
Singh, Jaya
Wilson, Jacob

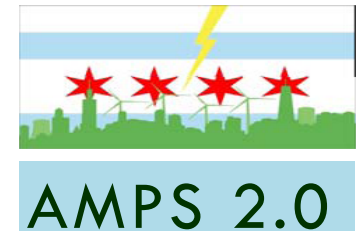
Faculty Advisors

Chmielewski, Don
Gottlieb, Myron

Program Coordinator

Keplinger, Jennifer

IIT ipro office
3241 South Federal Street
Hermann Hall, Suite 111
Chicago, Illinois 60616



Alternative Metropolitan Power Strategy 2.0

Sponsored By:



Problem

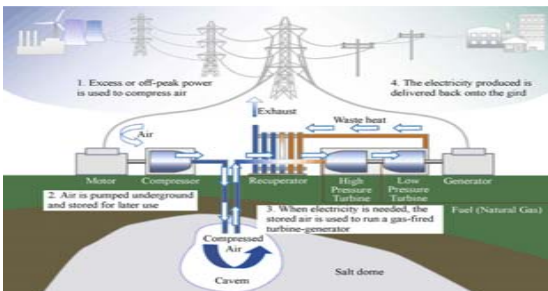
Due to the effects of climate change, a system of electrical production incorporating Wind Turbines, Nuclear Power Plants, and a Power Storage System is needed to reduce carbon emissions in the city of Chicago.

Objectives

- Propose a solution that would supply Chicago electricity need without carbon emission.
- Evaluate Chicago electricity needs and determine the most cost efficient power production and storage technology to meet the demand

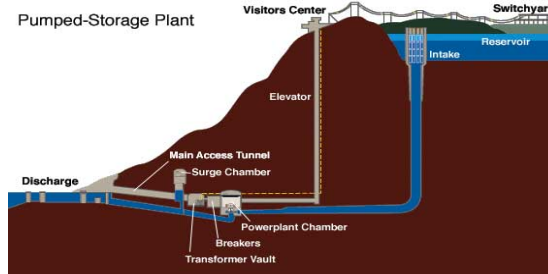
Available Storage technologies

Adiabatic Compressed Air Energy Storage (CAES) consist of storing energy by compressing air during off peak hours.

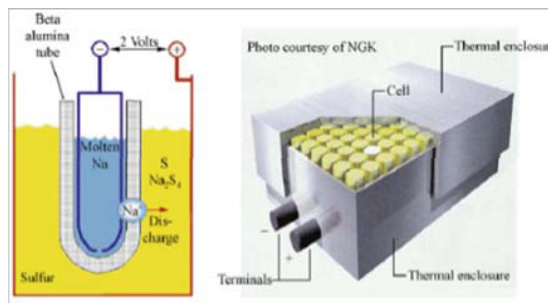


Pumped Hydro Storage (PHS) consists of storing energy in form of water at high elevation during

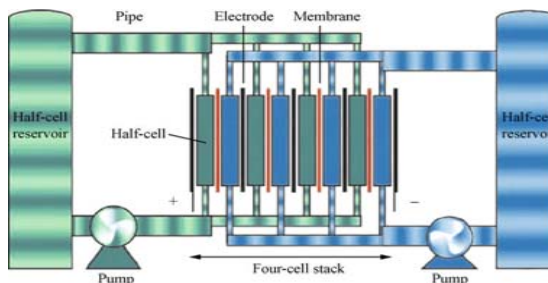
off peak hours.



Batteries (Lead Acid, Nickel Cadmium, etc) convert stored chemical energy into electrical energy.



Flow Batteries (Vanadium Redox, etc) convert stored chemical energy into electrical energy.



Thermal Energy Storage convert and store electrical energy into heat using resistors.

System Breakdown

The system would operate with 80% entirely nuclear baseline, and the remaining 20% would be supplemented by wind and storage.

Cost of different technologies

Storage system	Cost (\$billion/year)
CAES	1.24
PHS	1.25
Vanadium Redox	2.37
Thermal	2.81
Traditional batteries	10

Rejected Storage systems

- Flywheel.
- Capacitor and Super capacitor
- Thermal Energy System (TES)
- Fuel cells
- Solar fuel