Environmental Challenge International (ECi) Student Competition

Air & Waste Management Association Annual Conference & Exhibition
June 25-28, 2018, Hartford, CT

Power@C-Ucan Exercise

The Purpose

Students from around the globe will be landing in Hartford, Connecticut for this year's Environmental Challenge International. This contest gives student teams experience with proposing effective solutions to a simulated environmental problem--a problem based on real-world needs, site conditions and events. The teams will also get the chance to present their solution to a panel of environmental professionals at A&WMA's 2018 conference.

Although the challenge is somewhat qualitative, teams will be expected to address a wide range of concerns related to the environment, energy, and health. Teams will be evaluated based on a variety of issues, such as, how the problem is interpreted, how conclusions were determined, and how well the team can communicate its reasoning and judgements. So, in addition to the scientific and technical aspects of this competition, resolution of political, public perception and community issues along with appropriate regulatory approaches will be important.

As you work through the exercise, don't forget to have fun! This environmental challenge "gives everyone attending the conference a chance to participate and gets the professionals of tomorrow interacting with the professionals of today."

The Challenge

The objective of Connecticut's Comprehensive Energy Strategy (CES), prepared by the Connecticut Department of Energy and Environmental Protection (DEEP), is to advance the State's goal to create a cheaper, cleaner, more reliable energy future for Connecticut's residents and businesses.[1] Since the issuance of the first CES in 2013, the State has advanced policies and programs that have put the State on a path to reduce energy costs, improve system reliability, and minimize environmental impacts for its residents and businesses. Connecticut has achieved significant progress and its most recent draft revision of the CES seeks to continue the transformation of how energy is produced, distributed, and consumed in the State and achieve Connecticut's long-term vision of a zero-carbon economy.[2]

[1] Connecticut Department of Energy and Environmental Protection, 2017 Comprehensive Energy Strategy; draft: July 26th 2017.
[2] Ibid.

Considering the stated objective and their desire to support the State in the accomplishment of the CES vision and energy goals, the Connecticut University Campus Alliance Network (C-Ucan) is seeking guidance and recommendation on appropriate options to consider and subsequently implement, for the expansion of their electric power requirements, while enhancing the reliability of their systems at several of its higher education campuses. One of the campuses under consideration for expansion is located in downtown Hatford, a short distance from the West Meadows landfill site[3], one is located in the rural, northwest hills of Coldbrook, CT and a third facility is proposed for the shoreline area, in the Bridgeless Harbor area.

The environmental manager for C-Ucan, Telly MeMore, is interested in exploring opportunities appropriate for each facility to provide the additional electric power demand, expected to be approximately 2 megawatts at peak load for each facility. He has previously evaluated traditional sources of power and heat from the grid suppliers and considered expanding the existing steam generating units, however for this project he is very interested in considering alternative sources of supply, including renewables, fuel cell technology and options for conservation of existing resources to mitigate the total additional energy requirements.

Recent experience with the 2014 polar vortex and the winter 2017 extended cold snap have led to concerns regarding the future stability and reliability of traditional power generation and delivery in the northeast and Connecticut. With the planned retirement of nuclear generating plants, Pilgrim and Indian Point and non-gas fired plants, the region could be looking at increased dependency and reliance on oil and natural gas.[4] ISO New England echoed these concerns in their "2017 Regional Electricity Outlook" stating the following:

Resources powered by oil, coal, and nuclear energy have been critical for keeping the lights on during recent winters, but these units have begun to close, citing profitability and other factors. About 4,200 MW— an amount equal to almost 15% of the region's current generating capacity—will have shut down between 2012 and 2020 and is being replaced primarily by new natural-gas-fired plants. The upcoming closures of just two of those resources—Brayton Point Station in May 2017 and Pilgrim Nuclear Power Station by May 2019—will remove 2,200 MW of non-gas-fired capacity. Over 5,500 MW of additional oil and coal capacity are at risk for retirement in coming years, and uncertainty surrounds the future of 3,300 MW from the region's remaining nuclear plants.[5]

Therefore, the idea of on-site generation based on a renewable and reliable generation means seems a prudent alternative to consider.

News of the proposed campus expansions has created a stir in each of the three campus locations. Some citizens and politicians are in favor, some opposed, and some are waiting to see what is proposed. Mayor Even Hand of Hatford says that the new campus will bring jobs to the area and the old landfill area has been a depressed area for as long as anyone can remember. He is looking for the expanded campus to improve the area but not drive out the low-income population. He would like C-Ucan to ensure that they will look at all the technologies, especially reducing the amount of power needed through improved efficiency and conservation efforts.

In Coldbrook they appreciate and relish in their beautiful vistas and rolling hills. The Panorama Preservation Society lead by Gale Wind is very active and any scenery changes would be carefully and

[3] http://www.crra.org/pages/facts_hartford_landfill.htm
[4] https://cleantechnica.com/2018/01/08/northeast-cold-snap-acid-test-renewable-energy-not/
[5] https://www.iso-ne.com/static-assets/documents/2017/02/2017_reo.pdf

vociferously addressed. They have had their successes and their setbacks in defending against the blight of changes to the countryside.

Bridgeless Harbor is home to many on shore, near shore and marine endangered species, with land at a premium from competing uses. There is little area for new building on the shore that is unencumbered with endangered species. No selected renewal or conventional power source has yet been identified, but the area being considered for the campus expansion is in the harbor area. The harbor area has habitat for endangered plants (Agalinis acuta), insects (Cicindela puritana), birds (Saltmarsh Sparrow), and fish (Shortnosed Sturgeon). Citizens for Environmental Cause's spokesperson Holly Branch (C-Ucan Volleyball National Champion Team Captain) have been advocating for restoring habitat and loves her alma matter. She wants to figure out how to make it work.

Telly MeMore has to solicit input and in the end agreements in order to move the campus expansions forward. He cannot afford legal and environmental delays.

Your Assignment

The C-Ucan Environmental Manager and project lead Telly MeMore has issued a request for proposals for interested bidders to develop, assess and implement potential options that will provide a minimum of two (2) additional megawatts of net power at each facility. While the preferences of C-Ucan management and Mr. Telly MeMore in particular gravitate towards the renewable lowest carbon footprint options, they recognize that economics and net cost per megawatt of power are also major factors in the selection process. The successful bidder for this project will need to present a proposal that addresses the potential options for each campus, the benefits and cons of each and ultimately make a supported recommendation for each campus. Consideration should be given to the capital cost and operational cost of each option, regulatory requirements and approvals that may be associated with each option and the long-term benefit to C-Ucan, local and regional environment, campus residents and neighbors. This proposal plan will guide decision making as C-Ucan pushes the project forward in negotiations with the local zoning and planning authorities, the DEEP, Connecticut Siting Council, the public and neighbors. To be successful in your presentation, you must tactfully and eloquently articulate issues, knowns, unknowns, and recommendations for the completion of the project at each campus, if different options are viable for each.

There is no easy answer that will satisfy all concerns and the recommendation for all three campuses may be different, nor will it be possible to fulfill all of the objectives and goals or please everyone completely. You must do your best to provide the most robust recommendation to C-Ucan administrators and Mr. Telly MeMore such that they can make an informed decision and garner support for the projects from the administration, potential financial supporters, students and the public. Your recommended plan should articulate how to address the concerns of regulatory agencies, local planning boards and community groups and ensure the project provides the most tangible environmental, economic, and social benefits.

At a minimum, you should consider two or three alternative solutions that weigh environmental, social, and economic interests. You should have a preferred solution to present to Mr. Telly MeMore and the C-Ucan client. In addition, keep the following questions in mind and address them in your solution:

- What are appropriate options for each campus location?
- How do each of these options conform with Connecticut's overall Energy Strategy and C-Ucan objectives and goals?
- What are physical and logistical limitations to implementing these options at the existing locations?

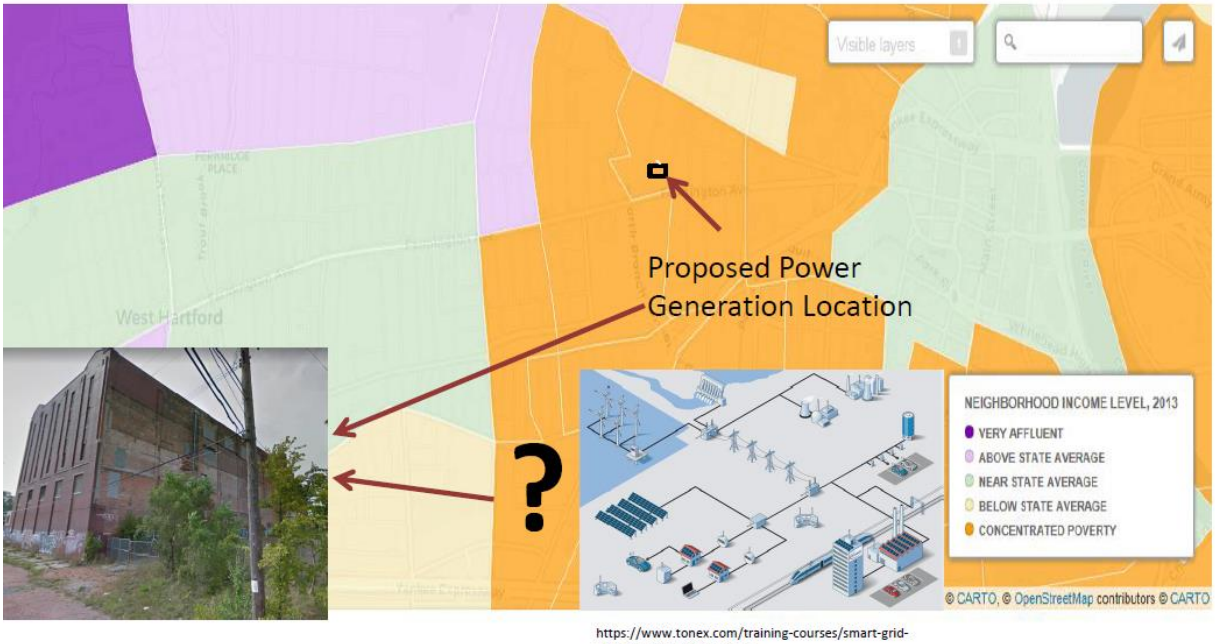
- What types of permits are needed, if any, for approval and construction of the proposed options?
- What are environmental net benefits/concerns associated with each option?
- How was the recommended option selected and why?
- What efforts will be made to mitigate environmental impact of the recommended solution?
- What are possible impacts of the recommended option on the campus, local residents/students and the local environment during construction and operation of the recommended option?
- What can be done proactively to build support and foster good relationships with regulatory agencies, approving boards and affected community?
- How will the recommended option resolve Mr. Telly MeMore's concern of the campuses' carbon footprint?

The C-Ucan administration is contemplating the expansion to of these campuses to be completed before the fall semester of the 2019 school year, thus the plan must also consider the schedule and timing of the recommended plan approval, construction and startup of the system to deliver the needed power no later than August 1, 2019.

Initial Background Information

Below are figures illustrating the locations of the C-Ucan campuses considered for the power enhancement projects. These figures also illustrate the acceptable locations and relative space available for siting of the additional power generation equipment, if needed. This information is provided for your reference and consideration in developing your recommendation and proposed plan to implement the project.

Hatford, C-Ucan Campus and Proposed Power Generation Location



https://www.tonex.com/training-courses/smart-grid-training-for-non-engineers

Coldbrook C-Ucan Campus and Proposed Power Generation Location

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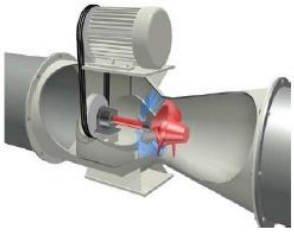
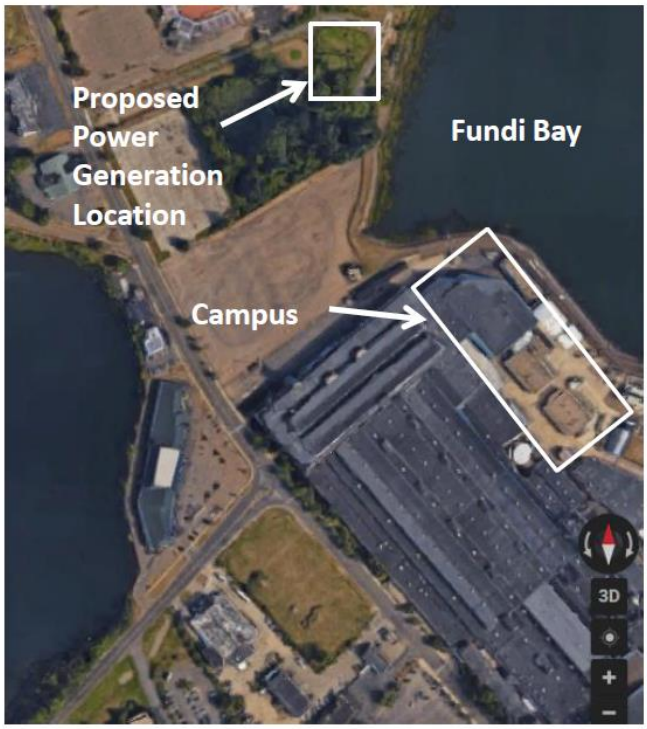


Bridgeless Harbor C-Ucan Campus and Proposed Power Generation Location



https://www.nationalgeographic.org/encyclopedia/tidal-energy/

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