IBEW 22 / NECA

LABOR MANAGEMENT COOPERATIVE COMMITTEE

RENEWABLE ENERGY LAB & SOLAR PAVILION

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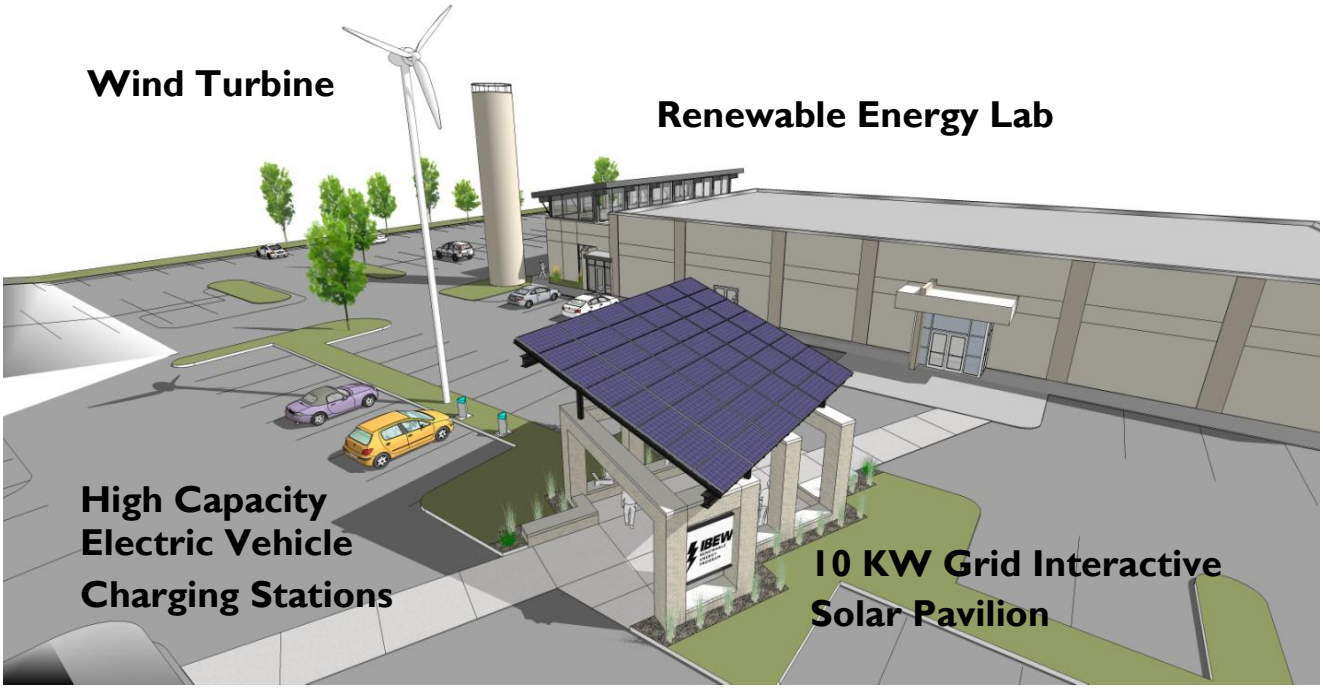
PROJECT NARRATIVE

The increased focus, awareness, and market potential for renewable energy, energy efficiency, and electric vehicle infrastructure has made it essential that skilled electricians and technicians have the necessary lab space to learn and practice with these new technologies. The Labor Management Cooperative Committee (LMCC) of the IBEW Local Union 22 and the Nebraska Chapter of the National Electrical Contractors Association is seeking to develop an energy efficiency and renewable energy training facility addition to the L Street campus in Omaha, Nebraska and the Training Facility and Meeting Hall in Columbus NE.

LOCAL 22 "L" STREET CAMPUS

The LMCC proposes to build a Zero Net Energy lab training space on their L Street Campus. The Renewable Energy Lab will be built connected to the current classroom/lab spaces in the Hall. This new space will be used as a laboratory and classroom for education and training in electric vehicle infrastructure and charging, photovoltaic technology (PV), wind (both utility and small scale) and energy management technologies.

Electric Vehicle charging stations will be located on the traffic island between the Hall and Electrical Industry Center near the Solar Pavilion. This will allow for prominent display of technology. This pavilion will be a demonstration of the advanced energy capabilities of the organization to the industry and public. It will also create a link between the two buildings and provide a hands-on learning space. A small scale wind turbine installation will be included in close proximity to the charging stations and pavilion for demonstration and training purposes. This wind training will be an enhancement of the facilities current utility scale wind tower training program.



Project Overview

The LMCC has conceptually approved a 2,500 square foot high bay open plan lab space with a 50 square foot utility room and a 250 square foot storage closet. This two-story addition on the north side of the existing "Meeting Hall" will be designed and built for Zero Net Energy performance.

Zero Net Energy is the concept that a building will use a combination of high efficiency and onsite renewable energy production to "zero out" its energy consumption from the grid. It is considered one of the highest achievements in sustainable design.

Two over-arching principles apply when designing a space for Zero Net Energy. First, energy requirements for the space should be reduced as much as feasible through energy efficient design and product selection. The new lab space will be constructed with high R-value insulated exterior walls and high performance glazing for windows and doors. The proposed roof of the new addition is a shed design which has clerestory windows open to the east, south, and west. This will allow natural daylight and passive solar thermal gain into the lab space. The floor of the new addition would be concrete slab on grade to provide the thermal mass component of the passive solar heating system. The glazing and construction will be such that rays from the low winter sun will warm the space, while the higher summer sun rays will be reflected away from the interior of the structure. Additional energy saving measures would include components such as low wattage LED lighting and a state of the art geothermal heating and cooling system.

In the Zero Net Energy design process, once the efficiency of the building is maximized, onsite renewable energy is then added to supplement the power the space still requires. A fixed angle, grid-interactive, net-metered crystalline-type photovoltaic system will be incorporated through the design of the Solar Pavilion. This array will serve the remaining energy needs of the space when not in training mode. Additional PV system components may be added to the roof of the existing Hall structure to provide a greater degree of renewable energy production.

The electric vehicle charging stations will be grid interactive and high capacity type design. The interactive performance data for vehicle charging stations will be an essential step in the infrastructure development for electric vehicle penetration in the market. The facility will be useful to car dealerships to show how charging works for consumers, at the same time, the utilities will be able to use the information provided by the charging station to adapt their grid performance parameters.

All of the information from the solar panels, the charging stations, the wind turbine, the atmospheric conditions, and the energy consumption of the building will be fed through an intelligent facilities management interface. This component will monitor and demonstrate the energy production and consumption of the Lab. This unique training piece will prepare technicians and consumers with a real world demonstration of Zero Net Energy design and electric vehicle charging and infrastructure. Data from the project will be collected and monitored via computer and can be shared with industry partners such as utilities, environmental project groups and government officials for statistical analysis. This information could also be displayed on the IBEW Local 22 website.

Exterior view of Renewable Energy Lab

Interior view of Renewable Energy Lab

SOLAR PAVILION

The Solar Pavilion and Wind Turbine will serve as the renewable energy training centerpiece and provide a connection point between the existing Electrical Industry Center and the Hall. Beyond the training elements, the Solar Pavilion will be a visual demonstration to the public and the industry at large of the IBEW's commitment and leadership for renewable energy systems.

The Solar Pavilion will be built with PV systems that have a total rated capacity of 8-10kW. The PV modules will be mounted on the top of the structure and will have fixed mounting with south facing orientation. Independent circuits of DC output voltage from the PV panels will be routed to a switch board in the new renewable energy lab. Similarly, output power from the wind turbine will also be routed to the switch board. This will allow for configurability to various training modules in the lab space or switched to serve the building energy load.

When in the training position, the DC output circuits from the solar and wind will feed into an enclosure with terminal blocks. From the terminal blocks, students will select and terminate conductors to each training station with jumpers. This will provide a means for quick and safe routing and re-routing of solar produced voltage throughout the lab. Once the circuit conductors are at the training station, they will enter a modular training board designed specifically for the coursework of the training program. This feature will allow students to have true hands-on learning experiences with the various equipment and configurations. Module features could include commercial and residential inverters, required disconnects, meter enclosures, battery charge controller configurations and more. Hands-on training experience is critical when working with this equipment. Even as the manufacturers may change features, the underlying concepts remain the same.

When the load selection switches are in the position to feed the building with renewable energy, approximately two strings will be routed to each of two 5kW inverters. The inverters will have a built in DC disconnect on the input, will feed out to an AC disconnect, out to an exterior disconnect required by the electric utility company, and back into the lab's panel-board via a 40/3 input breaker.

Solar Pavilion and wind turbine

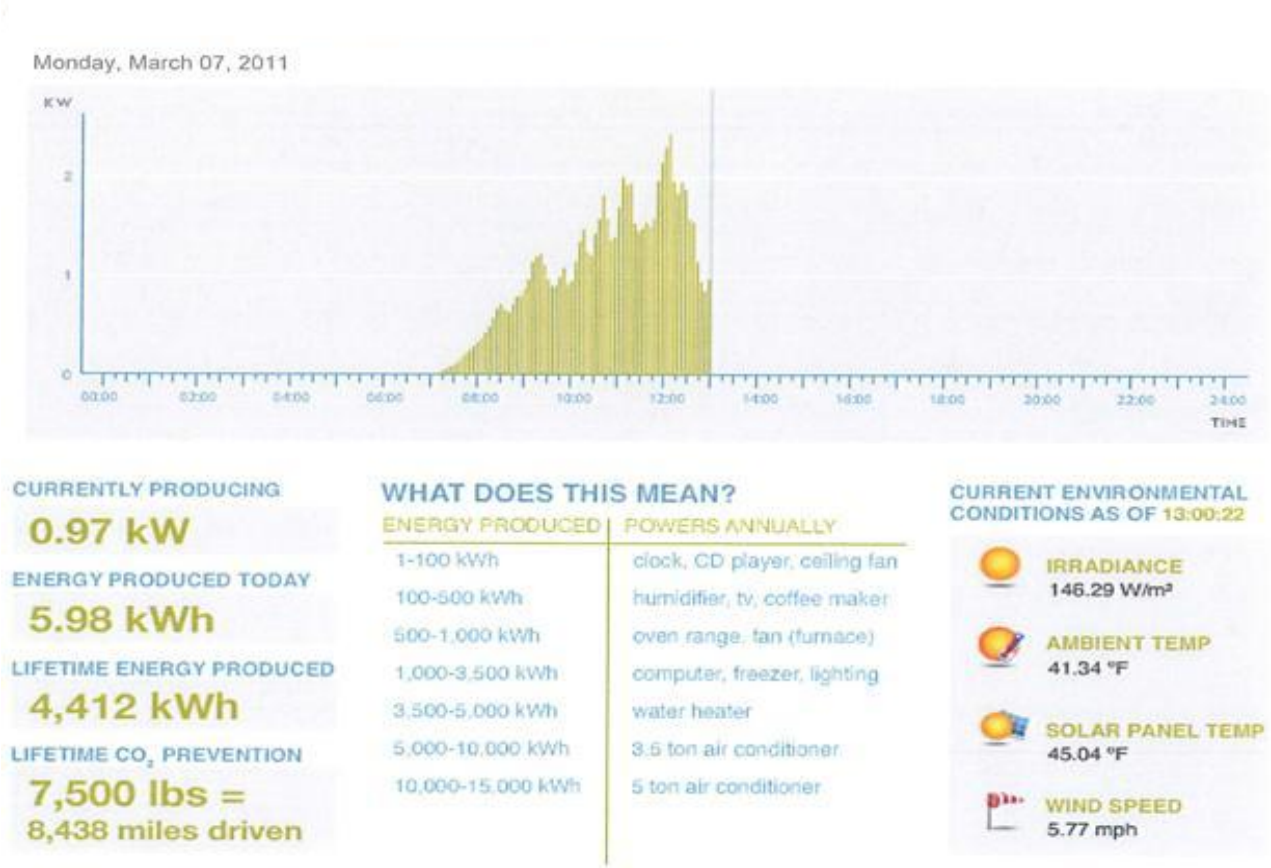
Skystream 3.7KW Wind Turbine

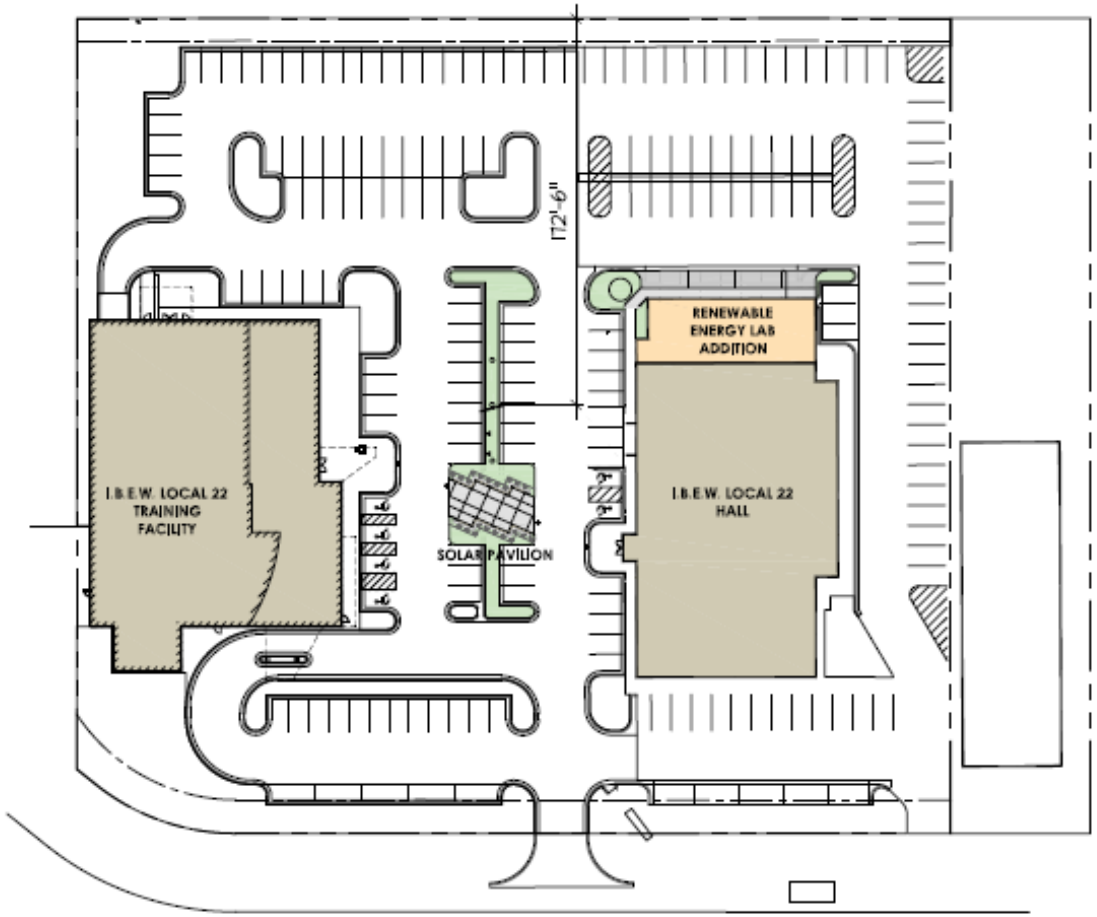
LOCAL 22 COLUMBUS TRAINING FACILITY

A third component to the LMCC Renewable Energy Plans includes the Local 22 Columbus Training Facility location in downtown Columbus Nebraska. The IBEW currently occupies this space which has recently had the 1st floor remodeled and includes a general meeting space, office spaces and several classrooms. The facility has a 2,800 square foot 2nd floor space which is currently unfinished.

Front Elevation of Columbus Facility

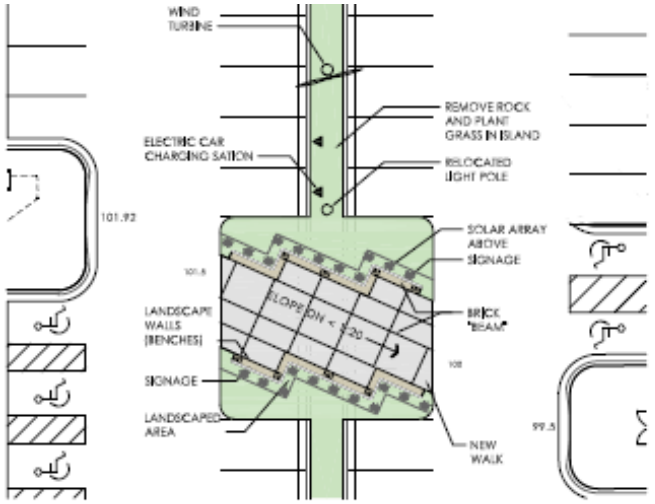
This project would renovate the 2nd floor space into a laboratory function similar to the lab space in Omaha. Another element of this project would be to add solar panels integrated into a renovated front elevation, on the roof or both. An important feature of the project would be the ability to monitor the energy output of the solar arrays. All of the information could be connected to the network for data collecting and monitoring via computer. This information could be displayed on the IBEW website. In addition to display on the web the new front elevation could include a live display highlighting statistics regarding the energy produced by the solar panels for public view. See renderings below.





SITE PLAN

0' 50' 100'



ENLARGED PAVILION PLAN

0' 20' 40'

SITE STATISTICS :

Zoned GI : General Industrial District

Area:	141,365 s.f.	3.245 acre
Parking stalls:	203 Existing	
	190 New	
	S.F.	%
Building Coverage:	27,391	19.4%
Impervious Coverage:	114,365	80.9% (90% allowed)

BUILDING STATISTICS :

Hall

1st floor	(Existing):	12,156 s.f.
	(Addition):	2,218 s.f.

IBEW A CRAFT CONNECTION NECA

RENEWABLE ENERGY LAB & SOLAR PAVILION

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HBA HOLLAND BASHAM ARCHITECTS

VIEW FROM "L" STREET LOOKING NORTH

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OVERALL AERIAL

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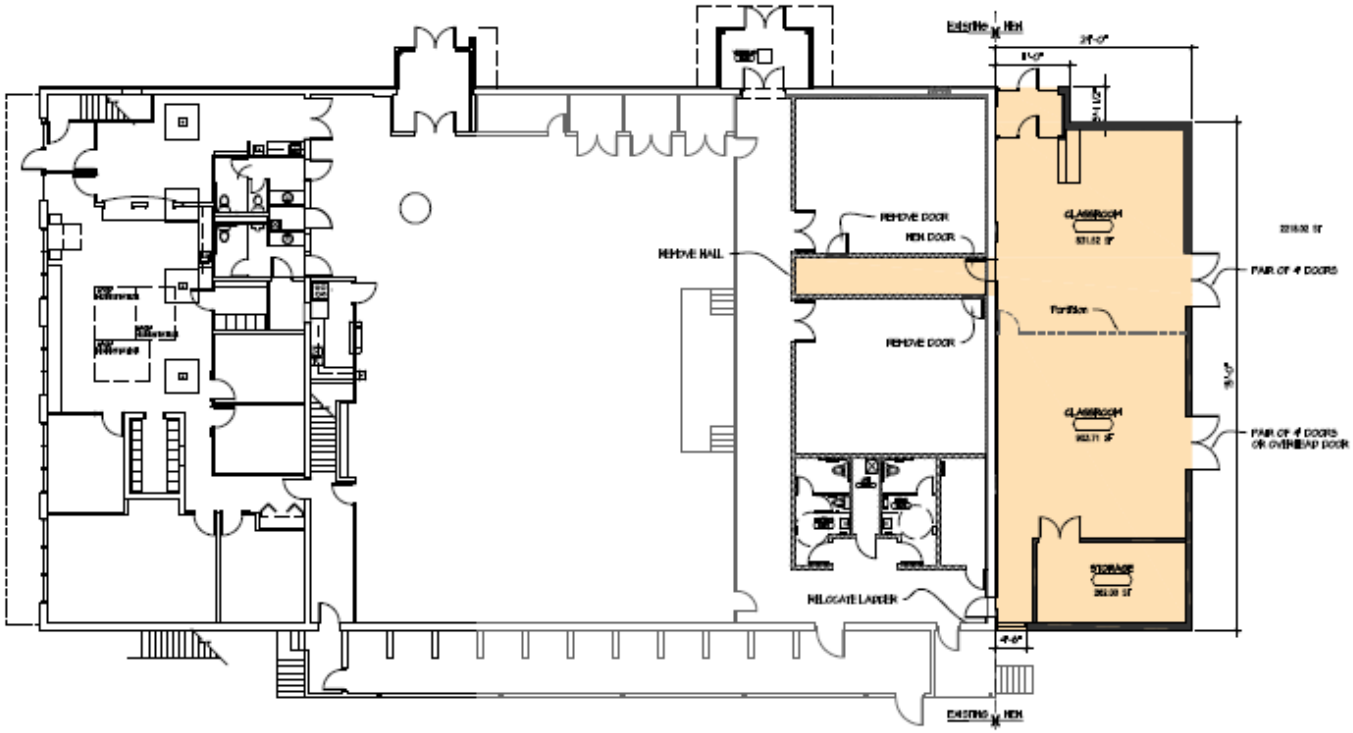

RENEWABLE ENERGY LAB
FLOOR PLAN

0' 8' 16' 32'

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