

Conference Proceedings

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“Homebrew” Wind Turbines for Integration into Small-Scale Renewable Energy Systems

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Abstract

Inspired by their experiences installing integrated renewable energy systems and trainings at the Midwest Renewable Energy Association and the Centre for Alternative Technology, a small team in North Carolina developed the Handy Village Institute. Using the plans crafted and tested by Otherpower, the Institute has offered workshops in building small wind turbines to participants from other countries and regions of the United States. In 2018, participants included six members from three southern Louisiana Native American tribes, who will install the turbine they built to provide renewable energy at their tribal center.

Keywords: integrated renewable energy, cooperative, small wind, homebrew wind turbine, tribal renewable energy, land loss, climate change, Midwest Renewable Energy Association, Otherpower, Handy Village Institute, Centre for Alternative Technology, Native American tribes, motivate, enlighten, empower, Lowlander Institute, trade skills, electrical, woodworking, fiberglass, steel, metal, fabrication, power generation, design, theory

1. Introduction

The former Solar Village Institute offered renewable energy installations (solar, wind, hydro, biodiesel). However small wind was a problem, which required a team to install and maintain. But, the more significant problem was warranties that were not honored and the exit of manufacturers. Jack Martin and Chris Carter thought a coop arrangement might alleviate the team problem. Deborah Amaral and Chris attended trainings at the Center for Alternative Technology in Wales and wanted to offer similar trainings here in the US and the **Handy Village Institute** was born. Jack, Deborah and Chris took the Midwest Renewable Energy Association’s Homebrew Wind Turbine Workshop with Dan Bartmann of Otherpower, and attended the MREA Energy Fair and Small Wind Conference. We erected our turbine made in that workshop.

We then planned and executed our first Homebrew workshop. We build from scratch using 100% locally-generated Renewable Energy. Attendees learn theory and the skills (steel

fabrication-cutting, welding, grinding, electrical- coil winding and magnets, fiberglassing and woodworking for blades and tails). Our second turbine has been erected on a tower on an grass-fed beef farm which is partnering with the local energy coop (Randolph Electric Coop). While on display before being raised on the tower, a cow rubbed against, and damaged, one of the hand-carved blades. We repaired that within a few days.

At present, our wind coop owns six homemade machines which our team services. Our workshops have had attendees from Central America, the Caribbean, Africa and the United States. We have built up our team of instructors, craftspeople/makers, and maintainers. This year with the help of the Lowlander Institute we had six people representing three tribes from Louisiana build a machine. It will power their tribal center. We hope to be offering workshops for all six tribes of the region in the near future. One tribe is in the process of relocating due to rising waters, which has covered 98% of their homeland in the past 2 decades. We all desire local Renewable Energy.

2. Links

Other Power

<https://www.otherpower.com>

Lowlander Center

<https://www.lowlandercenter.org>

<https://www.lowlandercenter.org/news-and-updates/2018/5/15/alternative-energy-through-homemade-wind-turbines>

First Nations

Press

National Geographic

<https://news.nationalgeographic.com/2016/05/160525-isle-de-jean-charles-louisiana-sinking-climate-change-refugees/>

New York Times

<https://www.nytimes.com/interactive/2018/02/24/us/jean-lafitte-floodwaters.html>

Tribal Websites

<http://pactribe.tripod.com>

<http://www.isledejeancharles.com>

Video

https://www.youtube.com/watch?v=Ai9nxxn_Ykck

Handy Village Institute on YouTube

<youtu.be/F8JddQimaLQ>

<youtu.be/aBlpvo-1Zdk>

Home Power Hour Radio (Podcasts)

<https://wcomfm.org/programs/home-power-hour/>



The **Handy Village Institute** trains adults using trade skills to build small wind turbines. These scratch-built turbines can be used to generate electricity on a small farm or business scale.

We recently hosted six members from three Native American tribes from Southern Louisiana. Some have lost 98% of their land due to subsidence, storms, and sea level rise. They will be installing a renewable energy system at their new tribal center using the wind power generator participants made in our workshop.

The **Handy Village Institute** primarily offers workshops for adults seeking to gain knowledge about and experience in:

- practicing small-scale energy generation and storage,
- managing and using water, soil, and vegetation resources on their landscapes,
- engaging in working relationships with like-minded individuals.

With the intention of ensuring transmission of essential aspects of local human culture related to food, shelter, and furnishings.

Our experiences living off-grid, installing renewable energy systems, studying, practicing, teaching, traveling worldwide, and engaging with our community at home through times of abundance and disaster have inspired us to create a folk school in the Piedmont region of North Carolina.

June 2015 found the **Handy Village Institute** team at the Midwest Renewable Energy Association, building our own wind turbines in the "Homebrew" Wind Turbine workshop they offer each year before the Midwest Renewable Energy Fair. Dan Bartmann, of Otherpower, was our instructor, and we purchased the turbines that we built in this workshop, installing the larger one at our site in North Carolina. It has powered our off-grid system on those cloudy days and any nights when the wind blows.

We realized that the experience we had of using simple, often salvaged, parts and hand tools to fabricate a sturdy and reliable power generating machine teaches many different types of lessons that we were eager to share. During our first three years of offering Dan Bartmann's workshop at the **Handy Village Institute**, we have hosted guests from as far away as Africa and the Caribbean, as well as our own southeastern US.

Programs

Wind Turbines

- Wind turbine fabrication
- Wind turbine assembly
- Blade manufacturing
- Axile flow generator
- Frame making

Wind Towers

- Wind tower fabrication
- Wind tower assembly
- Cable and harness
- Wind tower erection

Shop Skills

- Cutting workshop
- Welding workshop
- Woodworking workshop

Small-Scale Energy Generation Systems

- Small solar-carriage
- Solar kit
- Light electric vehicle (LEV) charging
- Balance of systems (BOS) controller
- Storage
- Inverter
- Wiring

Homestead-Scale Resources

- Biogas
- Compost
- Vermiculture
- Blacksmithing
- Gardening/harvesting
- Greenhouses
- Foraging
- Fiber

Community Speaker Series

- Efficient appliances
- Small wind conference
- Renewable Energy Future
- Solar Pioneers
- Electric bike- Light Electric Vehicle
- Small Solar
- Integrated Utility Unit
- TINY Houses
- Water Management
- Biofuels
- Compost
- Garden Planning
- Greenhouses
- Poultry
- Aquaponics
- Foraging
- Blacksmithing



Our program provides hands-on experience in skills needed for woodworking, metalsmithing, fiberglass and electrical fabrication. Participants build confidence, self-reliance, and community among diverse future renewable energy leaders.





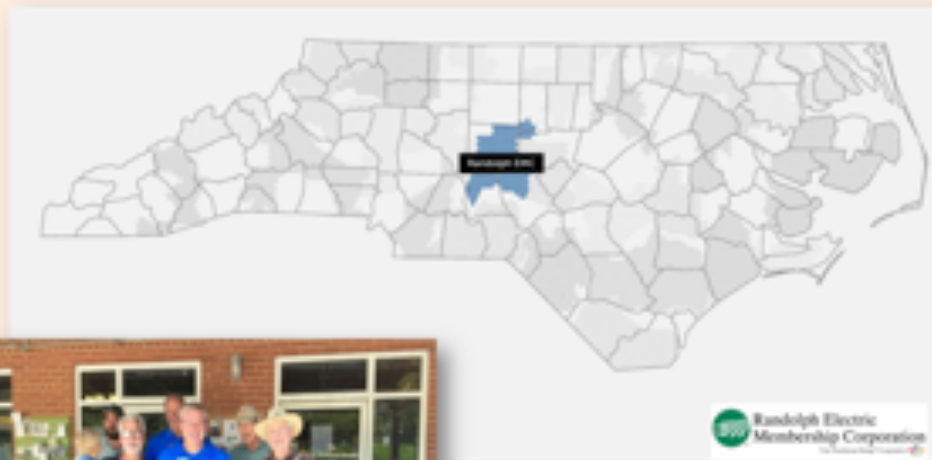
“I recently had the privilege to attend a Wind Turbine making workshop for our Tribe. WOW! The technology is amazing and exactly what our community needs. The ability to be self-reliant again is amazing. Our community has been devastated by repeat hurricanes and other environmental issues. These issues often cause interruptions in utility service. The wind turbine technology could give our Tribal homes a way to function without relying on the power companies. It is extremely important for this technology to be explored and put into practice for our tribe.”

— *Workshop participant*

“Alternative energy sources are one key element that offers hope of stability for the communities. For many years several of the coastal Tribes have talked about energy independence and sought ways to achieve such status. It is important that the alternatives to energy are affordable, easy to operate and are location appropriate. The most recent exploration on energy independence has been wind energy through the development of wind turbines. The wind turbine project provides an affordable source and is reproducible by community members.


“Recently a group of 6 people from 3 Coastal Tribes traveled to North Carolina to be part of a wind turbine workshop. The goal was to build a wind turbine that will be placed at the Pointe au Chien Tribal center greenhouse. Learning the process was as important as the outcome. Each member of the team learned skills needed to produce the turbine, thus having working knowledge to replicate their creation. Handy Village Institute was the host for the workshop. The goal of our coastal communities is to host the next workshop in Louisiana so that more people from the Tribes can learn how to build a turbine, thus creating more turbines, resulting in more energy sustainability for the coastal communities.”

— *Lowlander Center*



Electric Cooperatives

Local Power and Local Food



Randolph Electric Membership Corporation is a rural electric cooperative working hard to prepare its member-owned system for the future. Polling membership about its interest in using more renewable power demonstrated huge support. About 30% of the respondents said they would be willing to pay slightly higher rates for renewable power. A handful of large solar farms are already part of the Co-op. It is experimenting with time-of-use prices for electric car charging. This will create incentives for members to spread out their electrical loads over time.

The Co-op is analyzing distributed generation technologies to enhance its system, providing greater cost savings to members and increasing reliability.

Charles "Doc" Sydnor is a member who raises grass-fed Red Devon cattle. Doc's small wind turbine was built in the first Handy Village Institute workshop. The Co-op is both studying and partially supporting his planned small wind and solar PV hybrid system.



Picture Source: <http://www.traditionalfarms.com/products/cows/>



Process of Building a "Home Brew" Wind Turbine

Stator

Wind and
Cast Coils



Rotor

Place and Cast
Magnets



Nacelle

Grind Hub, Set
Axle, Insert and
Grease Bearings,
then Test



Blades

Carve and Layout
Blades



Tail

Fabricate



Power Generator

Assemble

Success
Celebrate!

