

Distributed Wind 101

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Distributed Wind: Behind the meter, or off-grid, and sized for the customer's needs or smaller projects connected to the distribution grid



Residential



Schools



Commercial



Remote Communities



Military



Farms



Public



Foreign Assistance

Christine and Sam Simonetta

Deerton, MI

Installed by:



- 10 kW turbine on 140' tower
- Installed October 2010
- 3,200 sq ft Net-Zero home, including electric car
- “We’re 372 miles from the nearest Tesla Supercharger, so we rely on wind” (2016)*
- Home recently sold; wind turbine was a positive factor

*: <https://www.teslamotors.com/customer-stories/riding-wind>

Brock Environmental Center Chesapeake Bay Foundation Virginia Beach, VA

Installed by:



- 2 x 10 kW turbine on 90' towers
- Installed June 2014
- 10,000 ft² Net-Zero building with wind, solar PV, geothermal, and passive solar
- Named in GreenBiz top 5 “Truly game-changing green buildings of 2014”
- LEED Platinum



Navy TACTS Platforms

60 miles offshore Savannah, GA

Installed by:



- Tactical Air Combat Training System (TACTS) range for Navy and Marine aviators
- 2 x 7.5 kW on 3 data relay platforms
- First turbine installed 1993, other 5 in 1995
- Save ~ \$200K/yr in O&M and fuel costs
- Some downtime in first two years, but 100% available since 1997
- Solar modules and batteries have been replaced; turbines have not
- Turbines have paid for themselves ~ 16 times

Heritage Dairy Farm Yuma, CO

Installed by:



- 2 x 100 kW turbines on 100' towers
- Installed October 2016
- Turbines produce 480,000 kWh/yr – 60% of dairies' annual energy
- Utility: Y-W Electric Association (REC)

Anheuser-Busch Brewery

Fairfield, CA

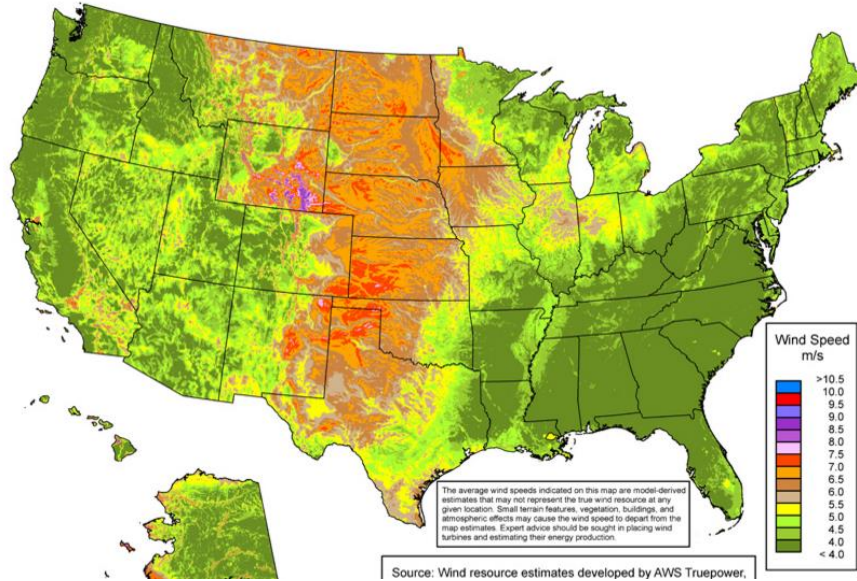
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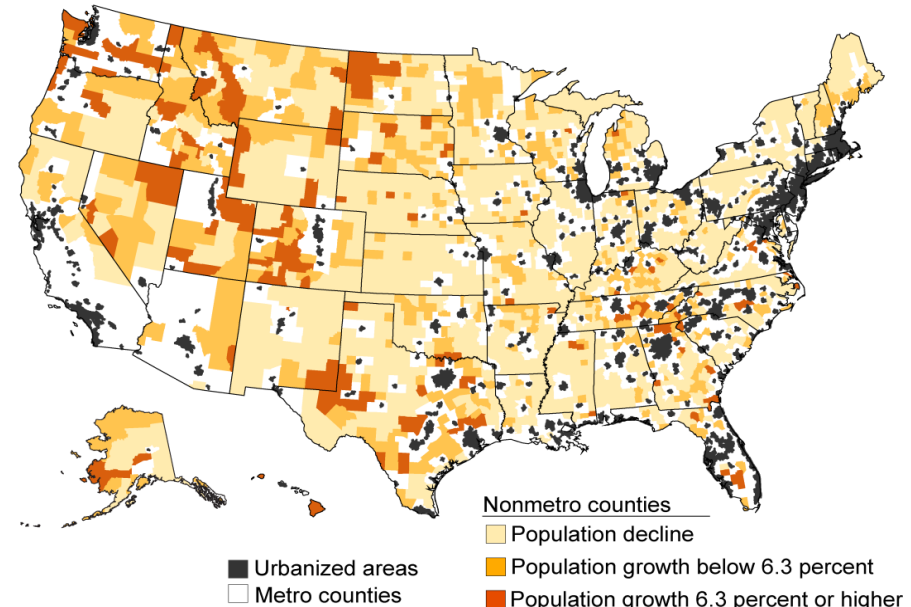
- 1,850 kW turbine, “Bud Light”, on 260’ tower installed August 2014
- Brewery’s second turbine: 1,500 kW turbine installed in 2011
- Two turbines provide 30% of energy demand (equal to 33,000 cases of beer per day)
- Installed under Power Purchase Agreement (PPA)

Huge Potential: Comparable and Complementary to Offshore

Wind Resource



County population change, 2010-19



Note: U.S. growth for the period was 6.3 percent.

Source: USDA, Economic Research Service using data from the U.S. Census Bureau.

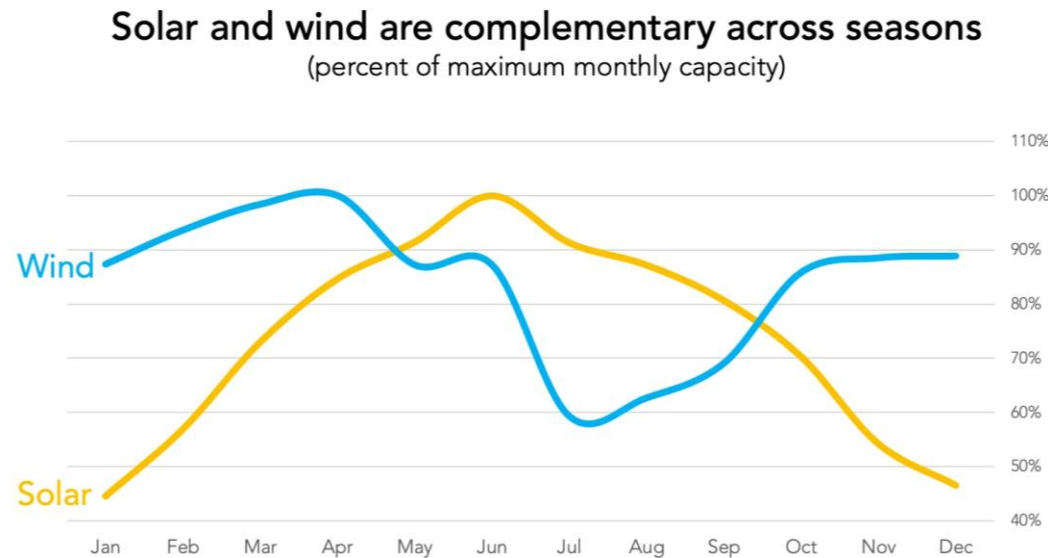
2017 NREL Report:

- Technical feasibility: **49.5 million residential, commercial & industrial sites**
- Potential capacity for turbines < 1 MW: **3 Terawatts (TW)**
- Larger turbines could provide additional **5.1 TW** of capacity in distributed applications

Offshore Wind serves larger coastal communities. Distributed Wind serves interior, less affluent and more disadvantaged communities. Both have large supply chain opportunities, but DW offers more domestic mfg.

Benefits of Distributed Wind

- ❖ Complements distributed solar: More energy at night and during the winter*



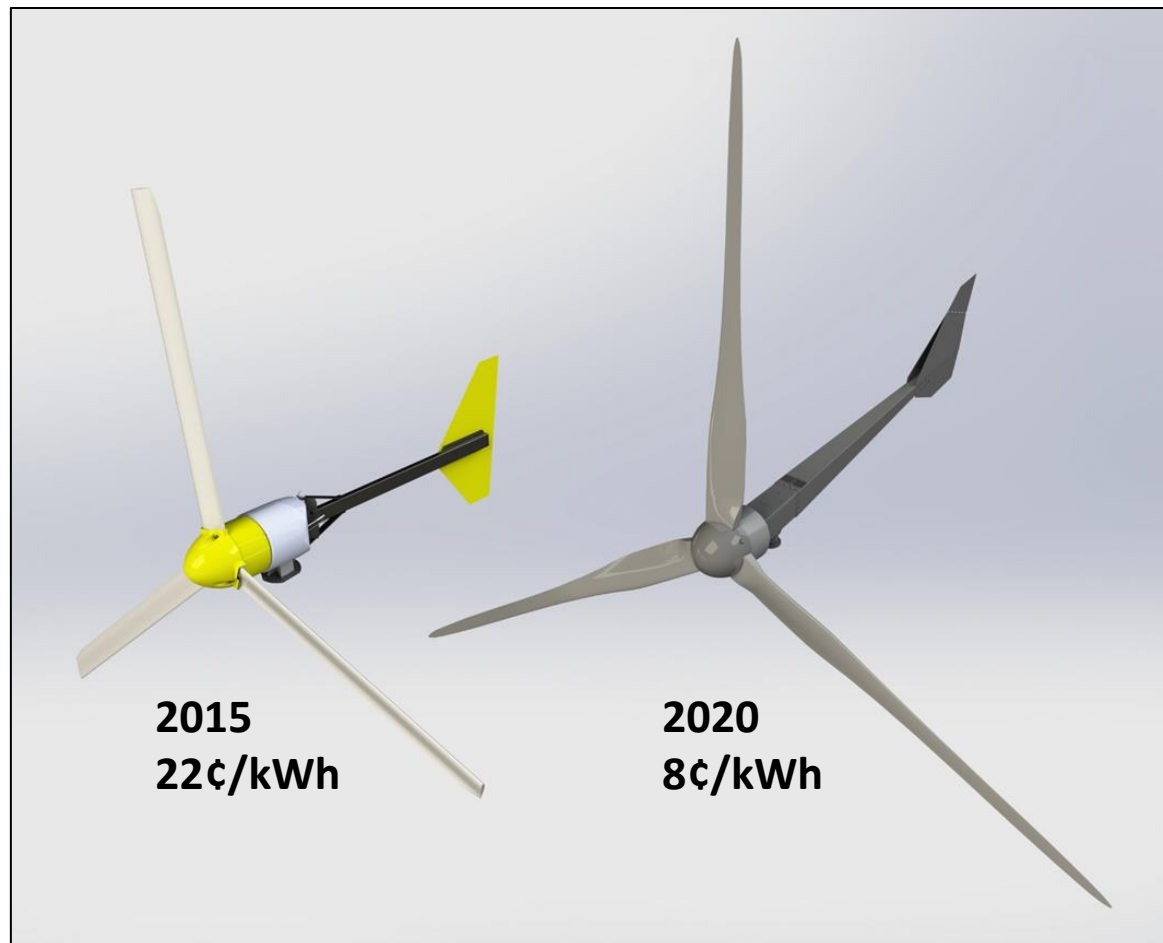
Source: EIA Electric Power Monthly
Graph by: FREEING ENERGY

* - Alternative to fuel oil and propane for heat

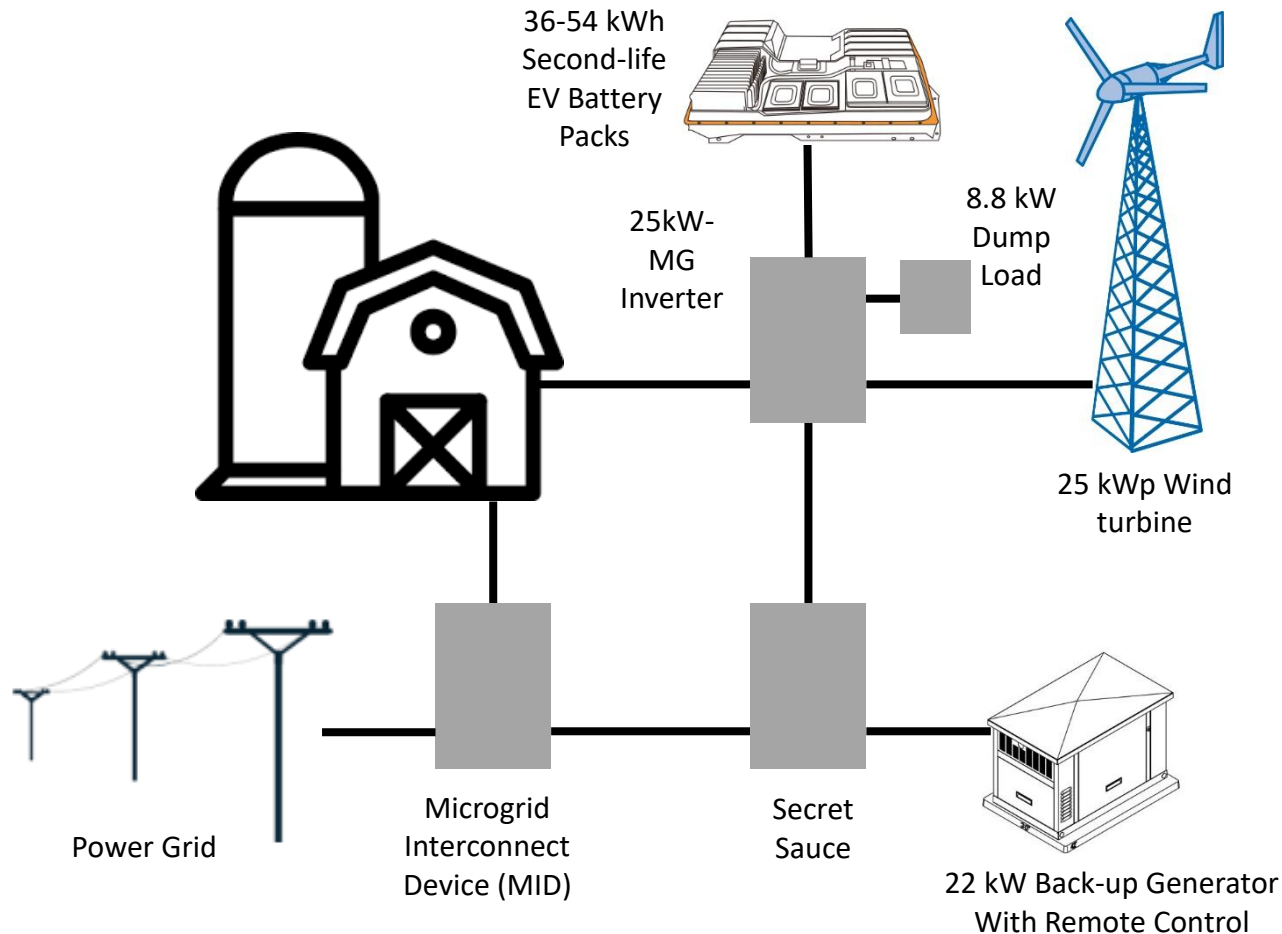
Benefits of Distributed Wind

- ❖ Provides economic development serving primarily rural areas
- ❖ Leverages U.S. technology and contributes to the renaissance in American manufacturing
 - ❖ Small turbines have > 90% domestic content
- ❖ Creates additional clean energy choices for Americans, promoting competition

Industry has leveraged US-DOE funding to develop next-gen technology that lowers costs more than 60%



Emerging Microgrid Technology will Provide Rural Home and Farm Power Surety and Grid Support Services



Ingredients for Project Success

- ❖ Wind resource of 5 m/s (11.2 mph)+ at top of tower
- ❖ High electricity costs, but little or no demand charges
- ❖ Sufficient space (No rooftop siting!)
- ❖ Certified wind turbine(s)
- ❖ Tower at least 80 ft. (taller min. for larger turbines)
- ❖ Experienced, stable, and “local” installer/developer
- ❖ Early outreach to neighbors and permitting authority

Steps for DW Project Success

- ❖ Define your energy production target or usage
- ❖ Define the general site location
- ❖ Reach out to experts:
 - ❖ DWEA member(s): www.distributedwind.org/dwea-members/
 - ❖ NREL: Ian Baring-Gould, Ian.Baring-Gould@nrel.gov, 303-384-7021
- ❖ Always verify a track record of successful projects with potential vendors