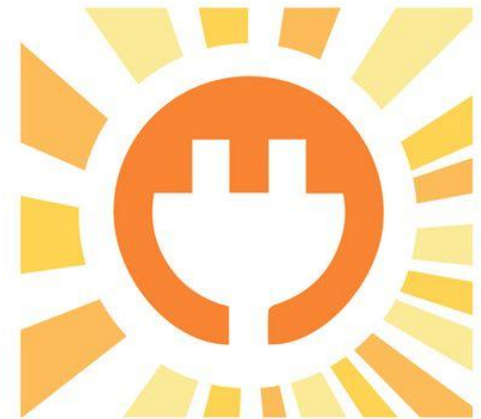




# A Guide to Energy Efficiency and Renewable Energy

Jamie Hess, Energy Committee Chair, Town of New London  
(802) 291-3939      [energy@newlondon.nh.gov](mailto:energy@newlondon.nh.gov)



**In New Hampshire in 2018,  
per capita energy consumption  
was the equivalent of **1,954**  
**gallons** of gasoline.**

Source: US EIA (Energy Information Administration)

**At \$3.50 a gallon, that's \$7,000 per  
person (\$14,000+ per household)**

# Where does your energy dollar go?

**20% to household electricity**

**40% to home heating**

**40% to transportation**

**A car driving down the interstate consumes as much energy as 2,000 LED light bulbs all burning at once.**

# Let's focus on electricity for a moment.

## Eversource electric supply rates, 2021-2023

Feb 2021 - July 2021 .06627 cents/kWh

Aug 2021 - Jan 2022 .08826

Feb 2022 - July 2022 .10669

**Aug 2022 - Jan 2023 .22566**

## Electric rates more than tripled in just over a year because:

We depend heavily on natural gas to generate our electricity.

Russia's invasion of Ukraine, and Europe's response, created a worldwide surge in demand for natural gas, **which caused prices to skyrocket.**

# Where does our electricity come from?

<b>Natural gas</b>	<b>38.4%</b>
<b>Coal</b>	<b>23.5%</b>
<b>Nuclear</b>	<b>19.7%</b>
<b>Renewables</b>	<b>17.5%</b>
<b>Oil</b>	<b>0.5%</b>
<b>Other</b>	<b>0.4%</b>



**Source: US EIA (Energy Information Administration), 2019**

**Looking to save money?  
Here are 3 ways to cut  
your energy bills.**

- 1. Use less energy**
- 2. Make your own energy**
- 3. Join Community Power**

# Converting to LED light bulbs

- \* **LOW PRICE** – under \$2
- \* **LONGER LIFE** – Last 10 to 20 years
- \* **SAVE ENERGY** – 85-90% savings over incandescents; 30-50% savings over fluorescents
- \* **SAVE MONEY** – \$60 per bulb in lifetime savings



# Replace gasoline-powered yard equipment with cordless electrics.

- \* Lawnmowers
- \* Chainsaws
- \* Snowblowers
- \* Leaf blowers
- \* Weed whackers

**Zero Maintenance.**

- \* No need to winterize
- \* No more spring tune-ups





# Replace inefficient appliances

Refrigerator  
Dishwasher  
Washer & Dryer  
Air conditioner  
Dehumidifier  
Flat screen TV



**Cost: \$250 to \$2500**

**NH State Rebate: \$25 to \$850**

# Weatherizing

Where are you losing heat?  
(And money)

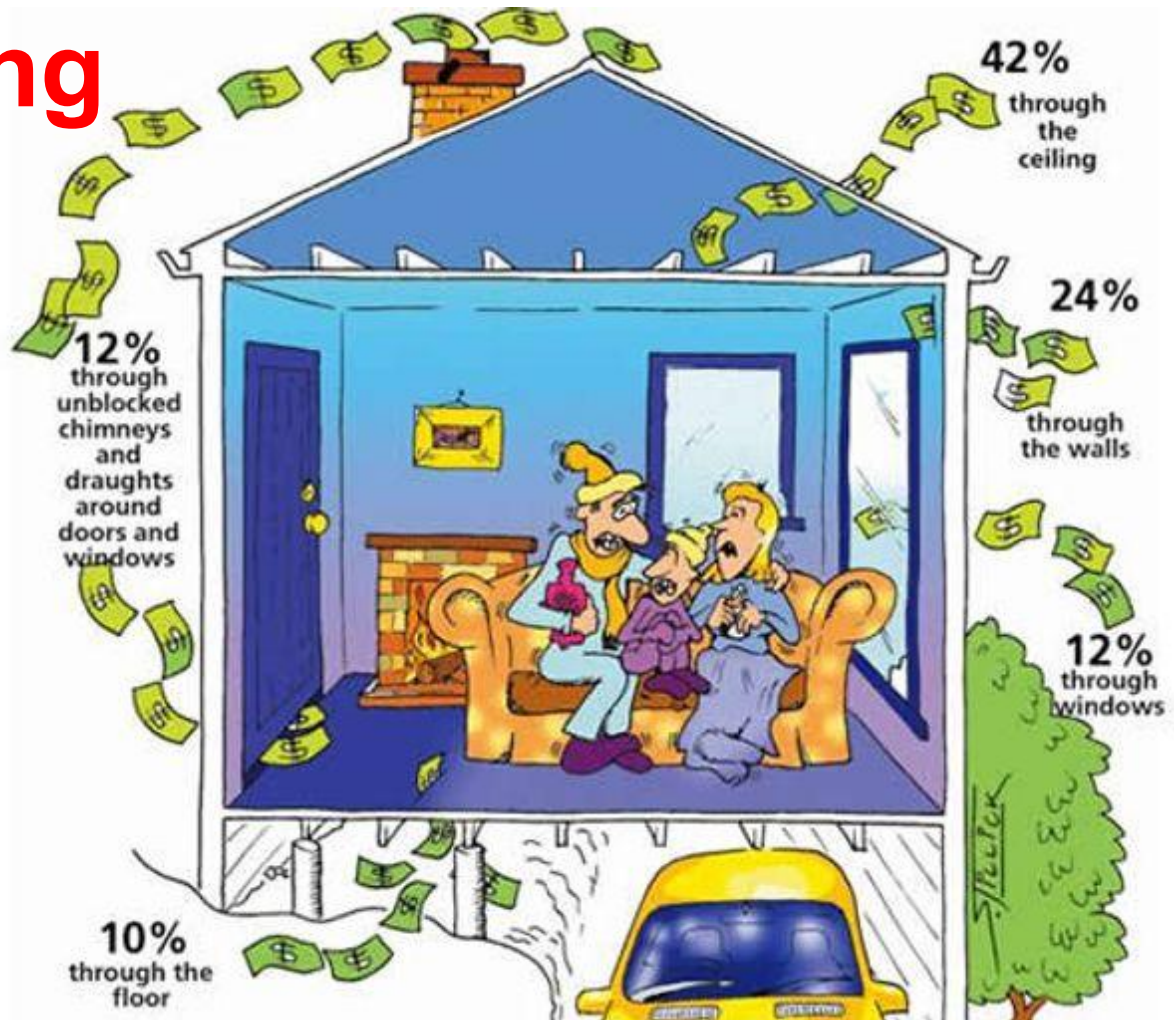
Attic / Ceilings - 42%

Walls - 24%

Air leakage / Drafts - 12%

Windows - 12%

Floor / Basement - 10%



**Insulating with rigid foam and blown-in cellulose in the attic**



**Air-sealing with spray foam around the rim joists in a basement**



# **‘Mini-Splits’: Cold-climate air-source heat pumps that deliver both heating and air conditioning**

**Federal tax credits and NHSave rebates available**



**Indoor component**



**Outdoor component**

# Heat Pump Water Heater

**Installed Cost:**

**\$2000 to \$4000**

**NH State Rebate:**

**\$500 to \$600**



# Electric vehicles

average 100 mpg.

- \* No noise.
- \* No exhaust.
- \* \$7500 tax credit on many models.

Low maintenance.

- \* No oil changes.
- \* No antifreeze.
- \* No radiator.
- \* No muffler.
- \* Brakes last for the life of the vehicle.



Rivian electric pickup truck at New London's 2022 Electric Vehicle Expo

# Free Electric Bicycle Loans in New London

**Now through August 15th**

Weekdays: Noon to 1:30 PM

Weekends: 11 AM to 1:30 PM

## **Location:**

Sunapee Ebikes & More

428 Main Street, Lower Level

New London, NH

**Top speed 20 mph**

**Range 40 miles and up**

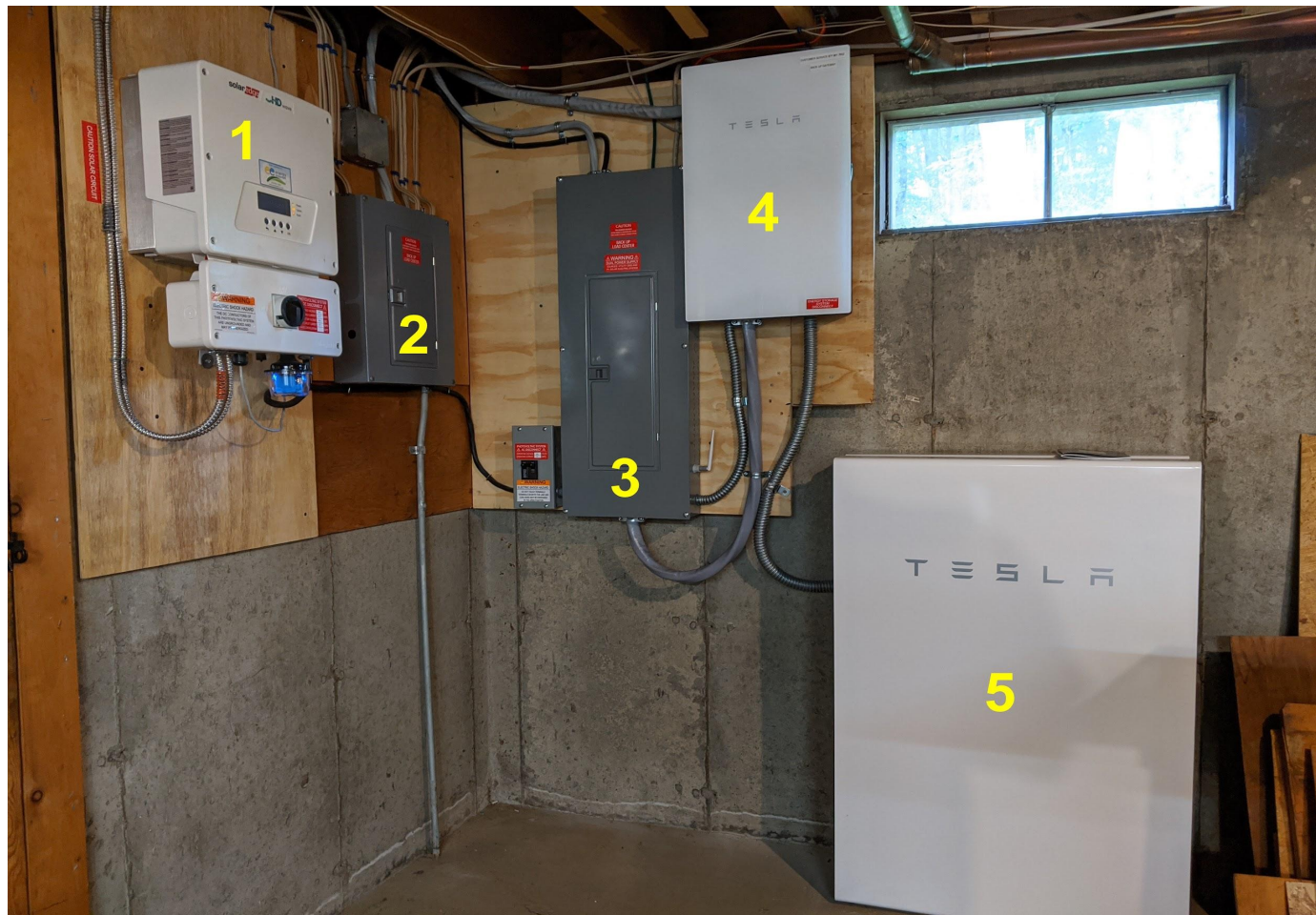


# Replace your gas or diesel generator with a storage battery

Storage batteries fit easily in your basement/garage.

Components in photo:

1. Solar inverter
2. Solar subpanel
3. Main electrical panel
4. Automatic transfer switch
5. Battery





# Once you max out energy savings, start making your own energy

## RENEWABLE ENERGY

Sun - Shines every day

Wind - Blows every day

Water - Flows year round

Biomass - Trees grow to maturity  
within a human lifespan

Geothermal - Inexhaustible heat source  
beneath the earth's surface

## NEW 30% FEDERAL TAX CREDIT

Direct Pay Option for Nonprofits

Eligible expenses include:

Solar arrays

Heat pumps ('mini-splits')

Geothermal systems

Wood and pellet stoves, wood boilers

Storage batteries

Roof replacement, if needed for rooftop solar

# Producing energy close to home is more efficient.

## LOCAL ENERGY

**Cordwood** - Harvested in your backyard or in a neighboring woodlot.

**Solar** - Produced on your rooftop or in your backyard.

**Geothermal** - Pumped from the ground underneath your house.

Very little energy is expended to extract this energy and transport it to where it's going to be consumed.

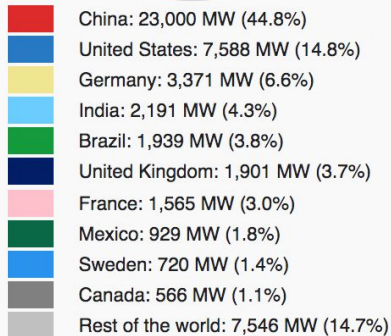
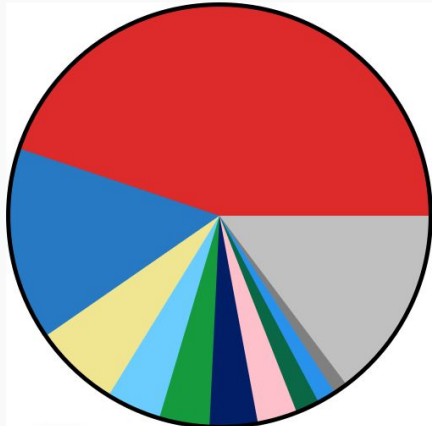
## NON-LOCAL ENERGY

**Fossil fuels** (oil, coal, propane and natural gas) are extracted hundreds or thousands of miles away. Extraction and refining consume huge amounts of energy, and transportation consumes even more.

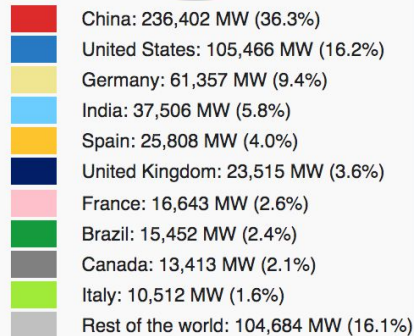
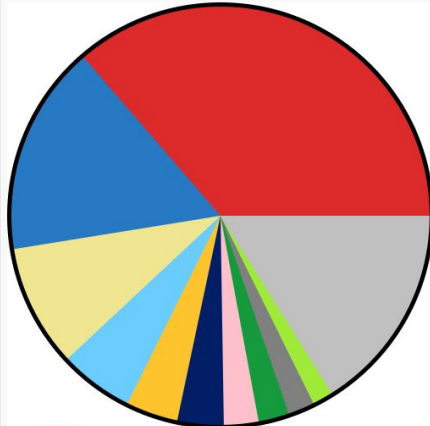
Electricity produced at a large power plant travels many miles across high-voltage transmission lines. On average, more than 50% is lost into the air before it reaches its destination.

# Who leads the world in wind and solar?

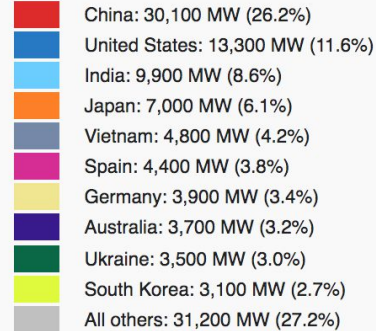
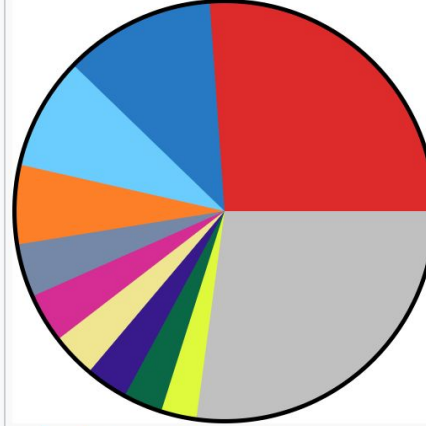
Top 10 countries by added wind capacity in 2018<sup>[11][12]</sup>



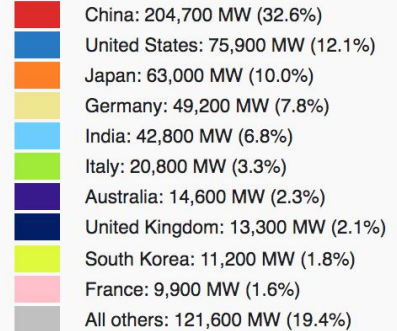
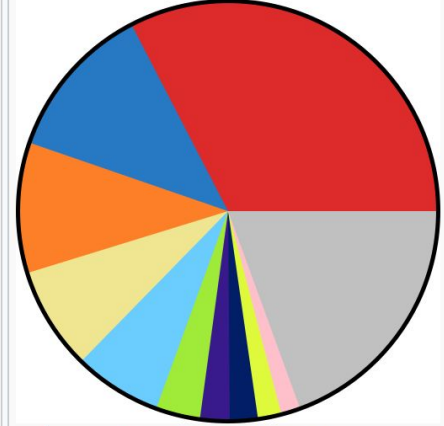
Top 10 countries by cumulative wind capacity in 2019<sup>[13]</sup>



Top 10 countries by added solar PV capacity in 2019<sup>[11]</sup>



Top 10 countries by cumulative solar PV capacity in 2019<sup>[12]</sup>



Source: IRENA (International Renewable Energy Agency)

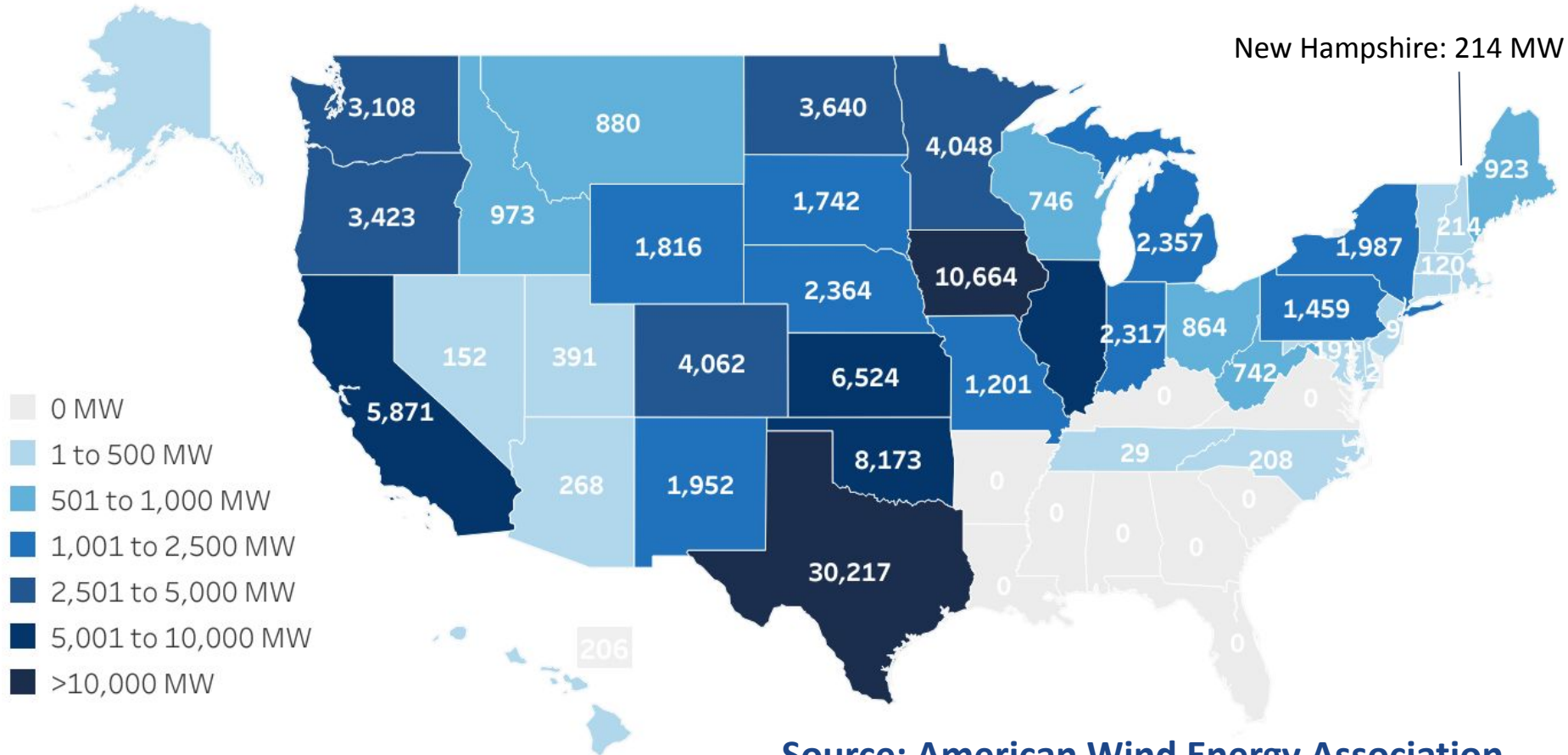
# Where renewable power comes from

<b>Wind</b>	<b>7.3%</b>
<b>Hydro</b>	<b>6.6%</b>
<b>Solar</b>	<b>1.8%</b>
<b>Biomass</b>	<b>1.4%</b>
<b>Geothermal</b>	<b>0.4%</b>
<b>TOTAL</b>	<b>17.5%</b>



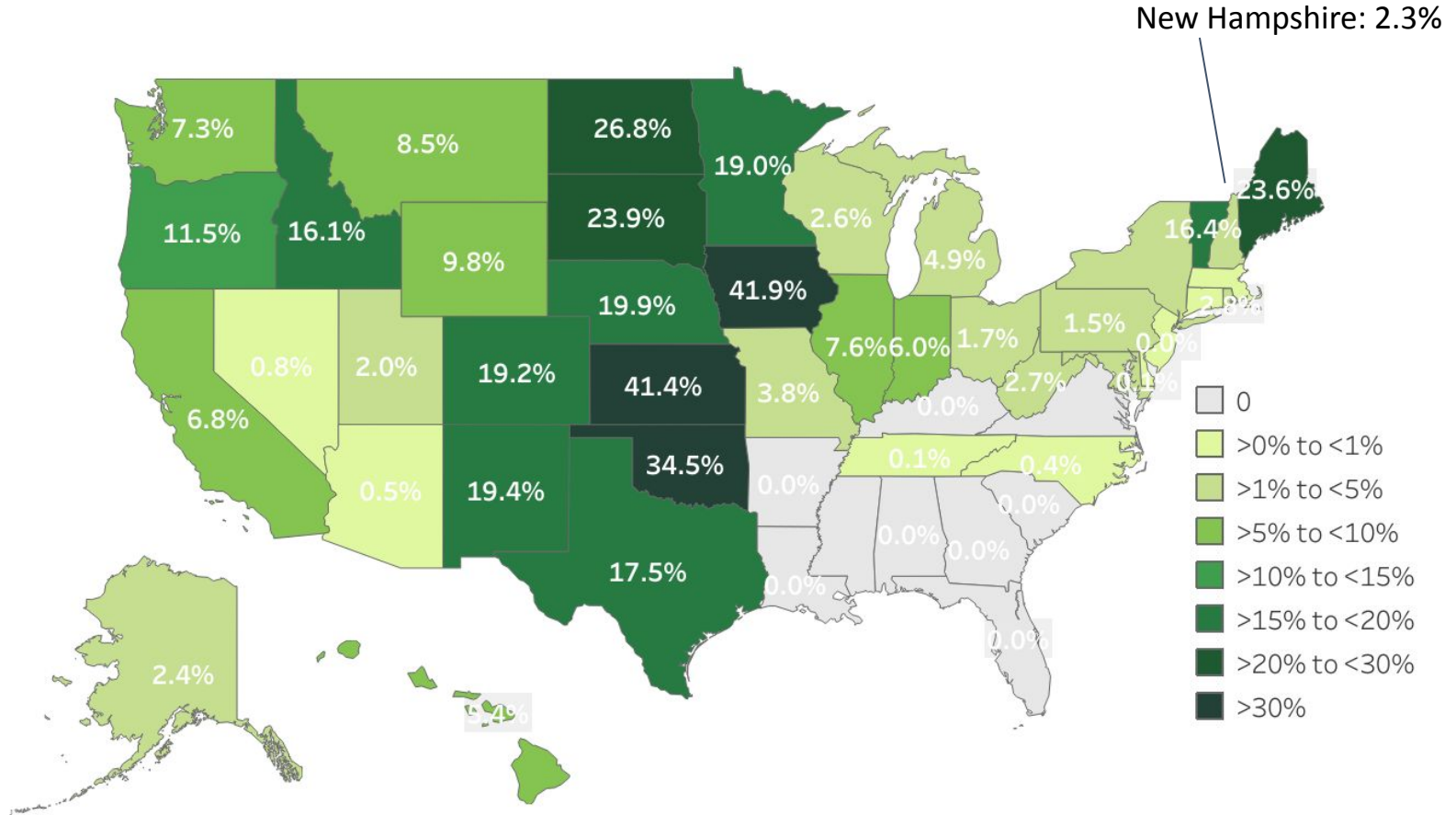
Source: US EIA (Energy Information Administration), 2019

# Wind Capacity by State (Megawatts, 2019 data)



Source: American Wind Energy Association

# Wind Energy's Share of State Electricity Generation (Source: American Wind Energy Association)



# Wind farms in New Hampshire

NAME / LOCATION	YEAR BUILT	POWER OUTPUT
Lempster	2008	24 MW
Granite (Dixville)	2011	99 MW
Groton	2012	48 MW
Jerisco (Berlin)	2016	14 MW
Antrim	2019	29 MW
<b>TOTAL</b>		<b>214 MW</b>

1 MW = 1 megawatt = 1,000,000 watts



# Antrim, NH Wind Farm



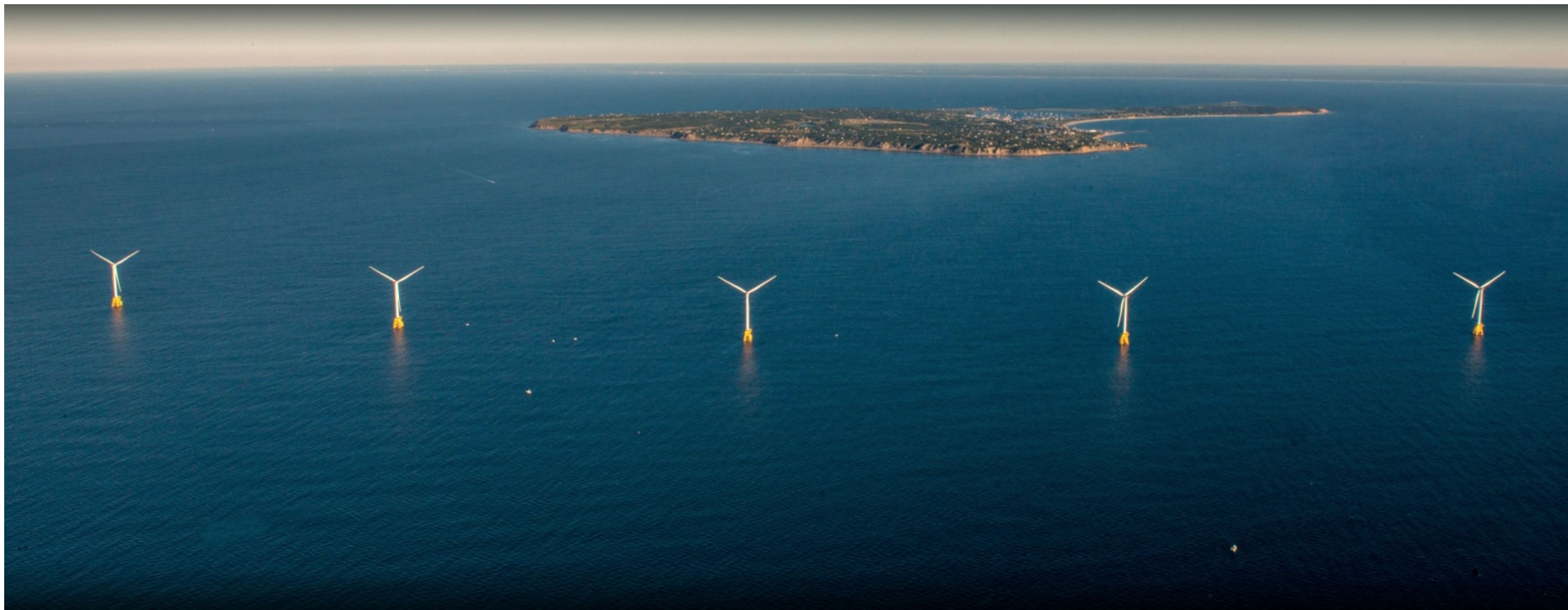
A photograph of an offshore wind farm. In the foreground, the white nacelle and three blades of a wind turbine are visible, extending from the bottom center towards the right. In the background, four more wind turbines are visible, receding into the distance over a deep blue ocean under a clear sky. The turbines have yellow support structures. The text "Offshore Wind" is overlaid in white on the left side of the image.

# Offshore Wind



**An offshore  
wind turbine  
can be 800 feet  
tall, generate 10  
megawatts of  
power and run  
2,000+ homes.**

**Block Island Wind Farm off the south coast of Rhode Island**



**Block Island Wind Farm consists of five 6-megawatt turbines. Block Island, 4 miles to the north, is visible in the background. The south coast of Rhode Island is barely visible on the horizon. Electricity travels through submerged cables to reach the shore.**

**One offshore wind turbine can generate as much power as 40,000 solar panels.**

**Europe has 16,000 megawatts of offshore wind power.**

**The USA has only 30 megawatts.**

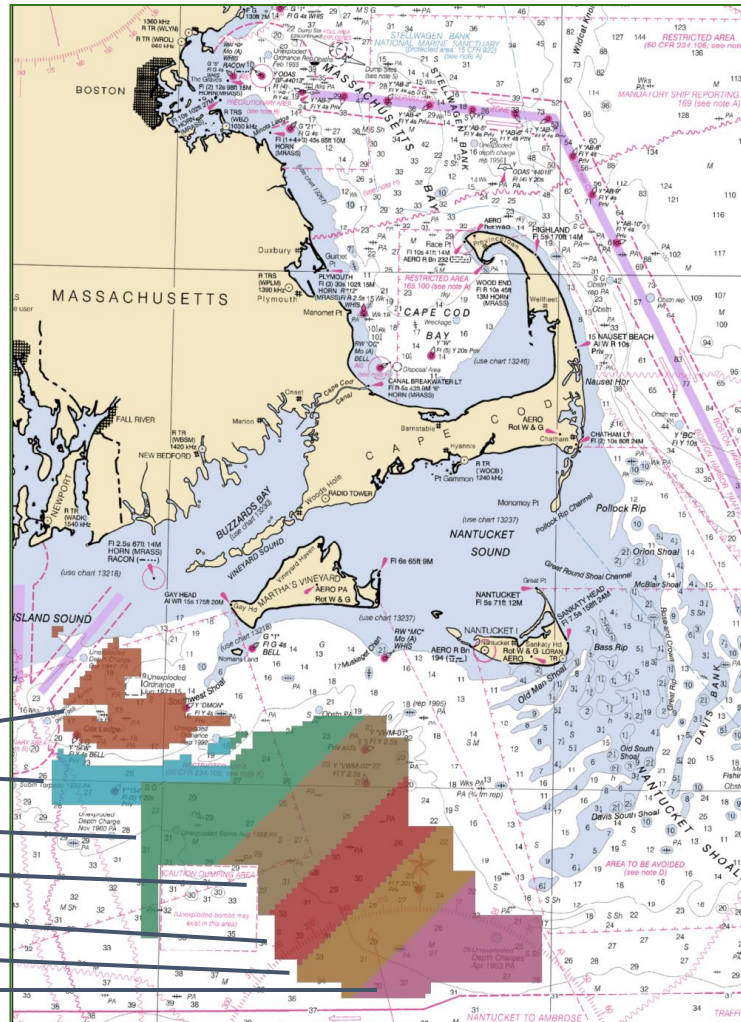
**That's about to change.**

Offshore wind developers have leased seven tracts off the Massachusetts coast.

The first one, Vineyard Wind, will produce 25 times as much power as the Block Island wind farm.

62 turbines  
x 13 megawatts  
800 megawatts  
total power output

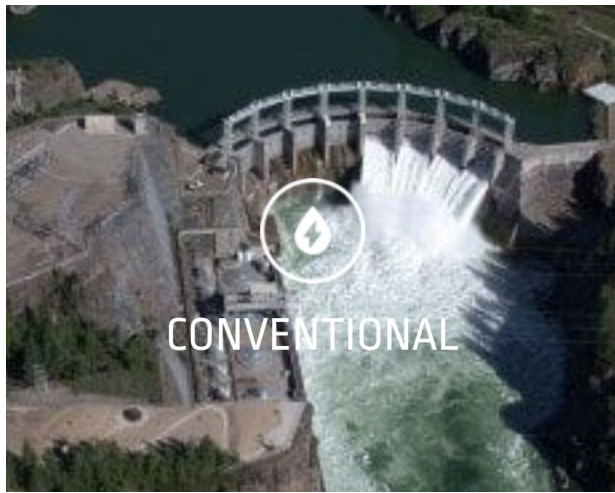
- Deepwater Wind New England LLC
- Deepwater Wind New England LLC
- Bay State Wind LLC
- Vineyard Wind LLC
- Equinor Wind US LLC
- Mayflower Wind Energy LLC
- Vineyard Wind LLC



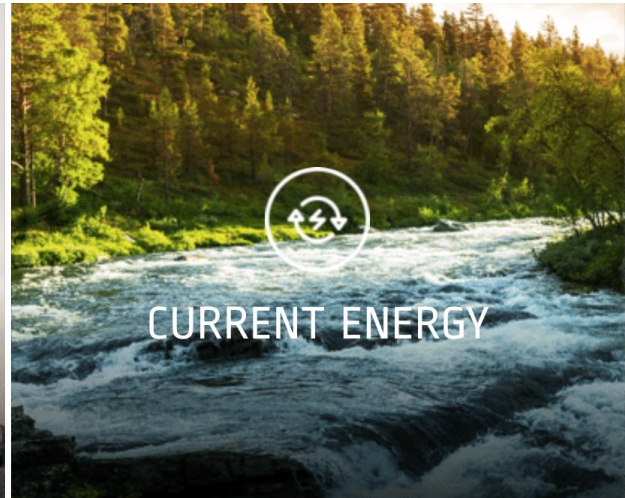


# *A Giant Wind Farm Is Taking Root Off Massachusetts*

The offshore energy project will have turbines taller than any building in Boston, but they will be barely visible from Martha's Vineyard.

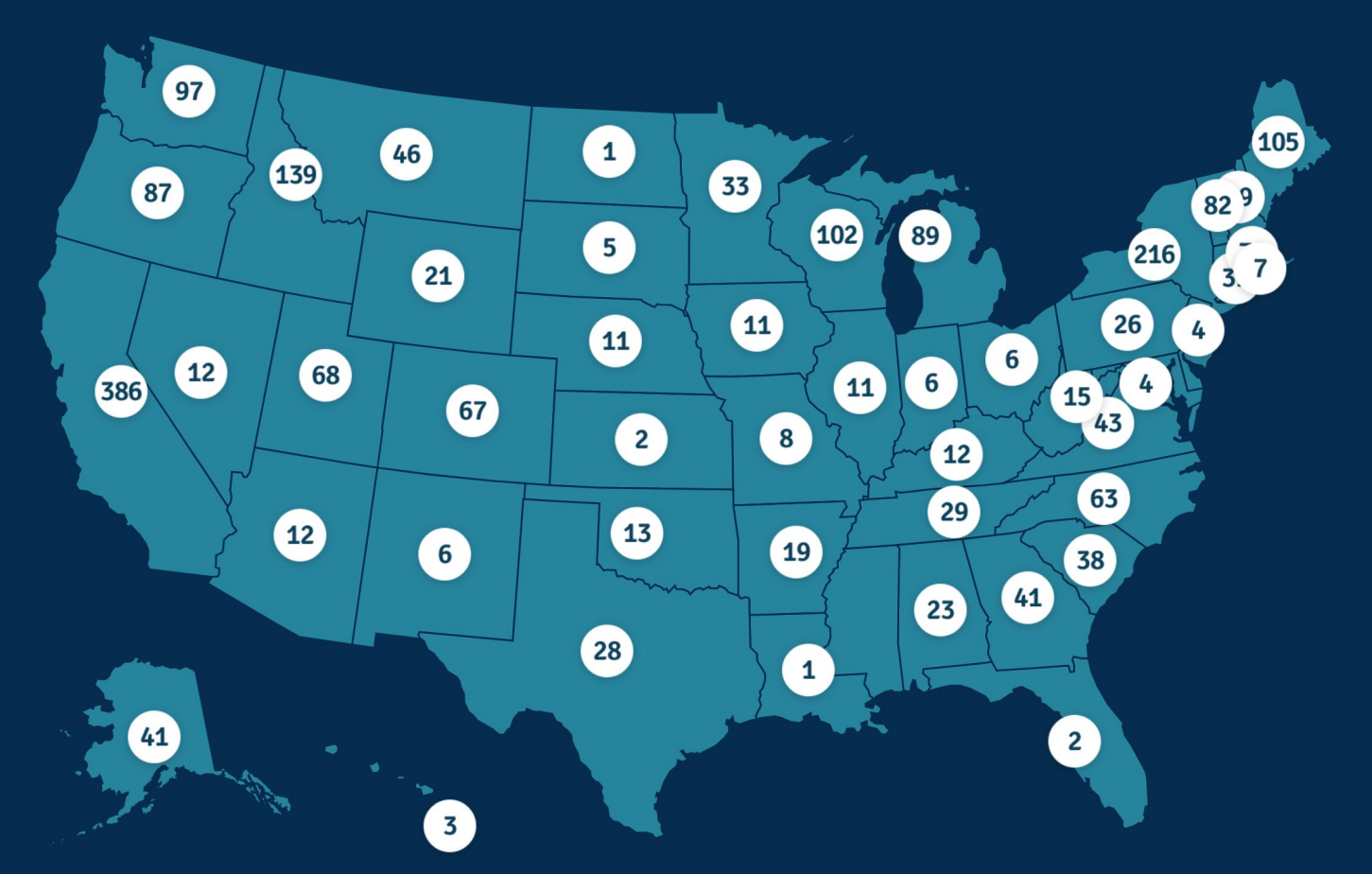


# Hydroelectric Power



# Number of hydroelectric power plants in each state

New Hampshire ranks sixth in the nation with 99, ahead of WA and OR, and behind only CA, NY, ID, ME and WI. But our power plants are small, so we're way down the list in total power generation.



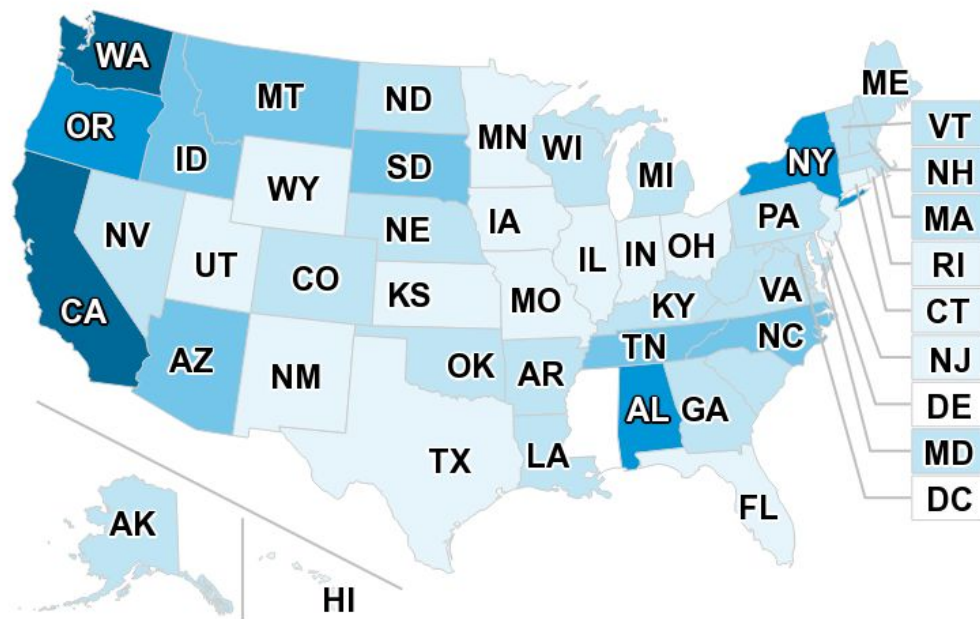
Source: National Hydropower Association



# Hydroelectricity generation by state in 2019

## Top five states:

Washington	27% of total kWh
California	13%
Oregon	10%
New York	6%
Alabama	4%



## billion kilowatthours



Note: Includes utility-scale conventional hydropower.

Source: U.S. Energy Information Administration, *Electric Power Monthly*, Table 1.10.B, February 2019, preliminary data



**Solar Power is locally produced and consumed, eliminating the inefficiency of high-voltage transmission lines.**



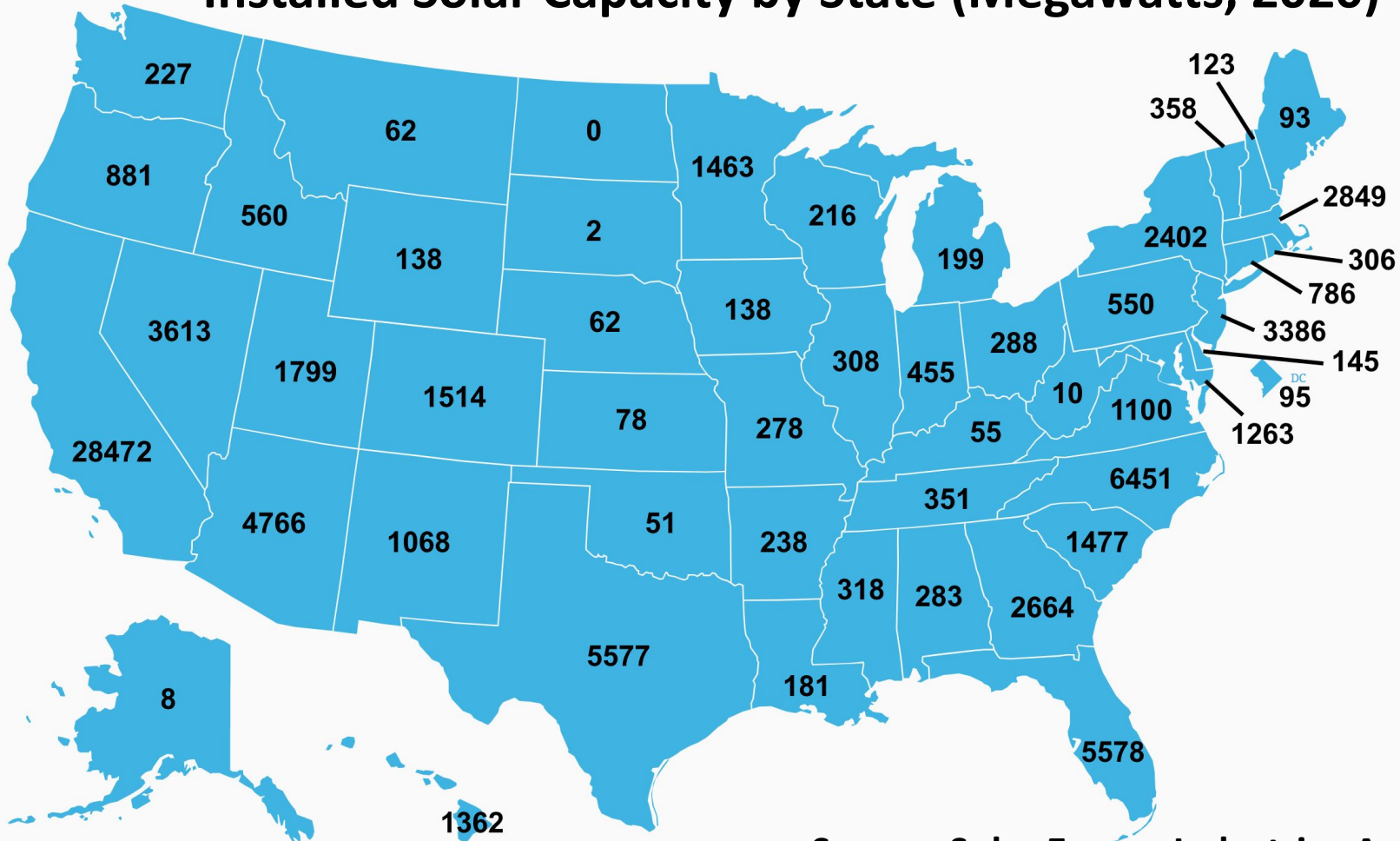
**Photo: New London Municipal Solar Array - 428 panels behind the Sewer Department**

**Roof-mounted solar panels are the cheapest to install if your roof is strong enough to support them.**



**Photo: New London Municipal Solar Array - 210 panels on Highway Garage roof**

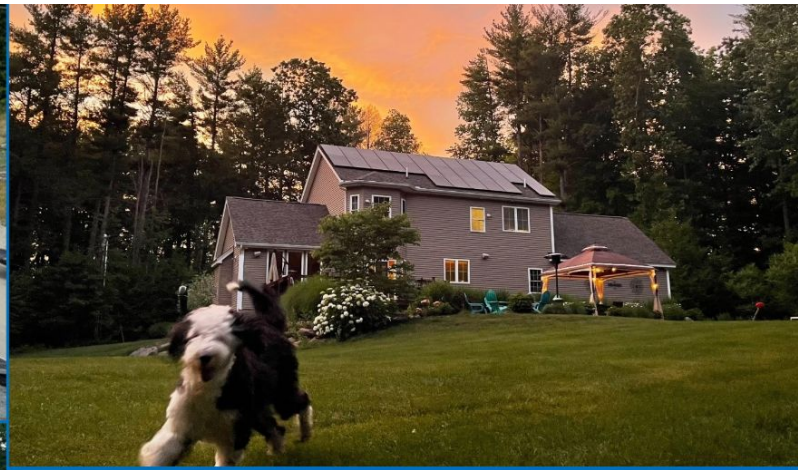
# Installed Solar Capacity by State (Megawatts, 2020)



Source: Solar Energy Industries Association

## Residential solar in NH is boosted by property tax exemptions

TOWN	EXEMPTION	YEAR PASSED	SOLAR HOMES
Andover	100%	2013	54
Bradford	100%	2014	4
Grantham	100%	2016	15
New London	100%	2019	85
Newbury	up to \$5K	2010	37
Springfield	up to \$50K	2010	14
Sunapee	100%	2012	39
Sutton	100%	2017	28
Warner	100%	2008	49
Wilmot	100%	2020	23
<b>TOTAL</b>	-----		<b>348</b>



**Residential installations by Granite State Solar of Bow, NH, our partner in the 2019 Solarize Kearsarge initiative**



**Sun-tracking arrays rotate both horizontally and vertically to aim directly at the sun. They cost more, but they produce 30% to 40% more power than fixed panels.**

**Source: Solaflect Energy of Vermont**

# Local large-scale solar arrays (2020)

	ARRAYS	PANELS	KILOWATTS	YEAR(S) BUILT
<b>INSTITUTIONAL</b>				
Colby-Sawyer College	5	745	195 kW	2012-14
Dartmouth College	14	2000+	700 kW	2016-18
Proctor Academy	9	1470	428 kW	2013-17
<b>MUNICIPAL</b>				
City of Claremont	1	432	151 kW	2018
City of Lebanon	7	2200+	777 kW	2019
Town of New London	2	638	220 kW	2020
Town of Newport	1	1080	373 kW	2020
Town of Warner	2	758	227 kW	2016-17





# Solar at Colby-Sawyer

**2012:** Lawson Hall, Lethbridge Lodge, Windy Hill School, Ivey Science Center (517 panels)



**2014:** Davidow Center for Art + Design (228 panels)



in 2012  
LARGEST  
solar array in NH

# Solar Arrays at Proctor Academy - Andover, NH

Number of panels

Burbank 150

Ice Rink 352

Wilkins 273

Childcare Ctr. 64

Dining Hall 135

Boat House 60

Recording

Studio 56

Headmaster's

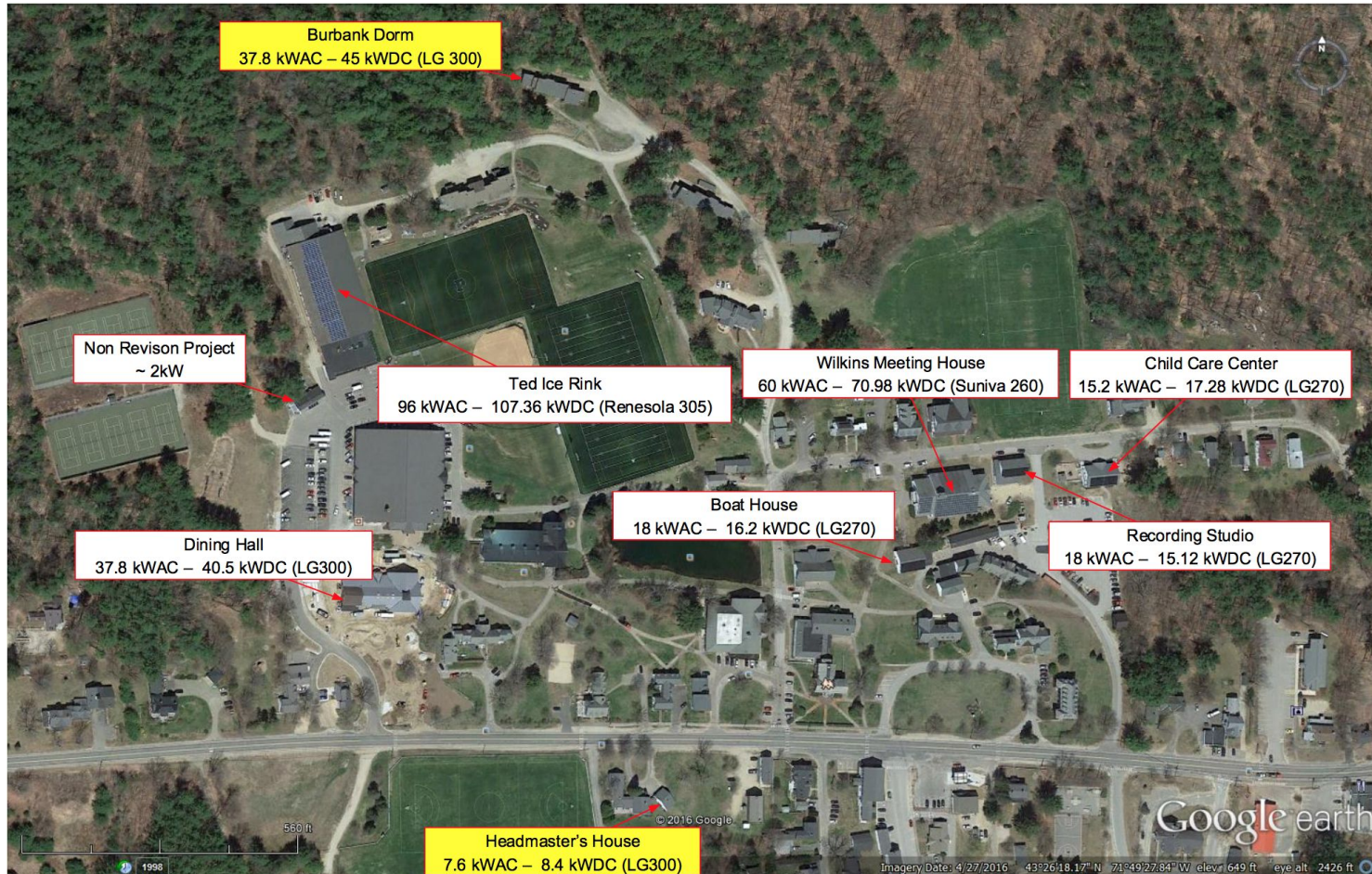
House 28

Ski Area (not

shown) 352

Total 1470

Source: Revision Energy



**In addition to its many solar arrays, Proctor Academy uses large-scale biomass and geothermal heat on campus.**

**(more about that later)**



**Dover High School has NH's largest solar array at an educational institution. It consists of 2,581 panels totaling 912 kilowatts and is expected to save taxpayers \$4 million over its 40-year life.**



# 1-megawatt roof array atop a large warehouse in Manchester, NH



Source: Revision Energy



**This 2-megawatt array on 12 acres in Moultonborough is the second-largest in New Hampshire.**

Source: New Hampshire Public Radio. Photo courtesy of array owner New Hampshire Electric Coop.

## **3.3 megawatt solar array on the Manchester landfill**



**Kearsarge Energy Partners With the City of Manchester to Deliver Largest Net Metered Solar Project in New Hampshire**



**With 2.5 million panels, this solar array near Villanueva, Mexico has a capacity of 754 megawatts. Enel Green Power, which operates the array, claims it generates enough electricity to power more than 1.4 million homes.**

*Source: CNN. Photo by Alfredo Estrella/AFP/Getty Images*



# Wood Pellets, Chips & Chunks

**In New Hampshire, wood pellets and chips are booming as a source of heat.**

*Switching to Automated Wood Heat is not only affordable, its positive benefits ripple out across the community, and the planet.*

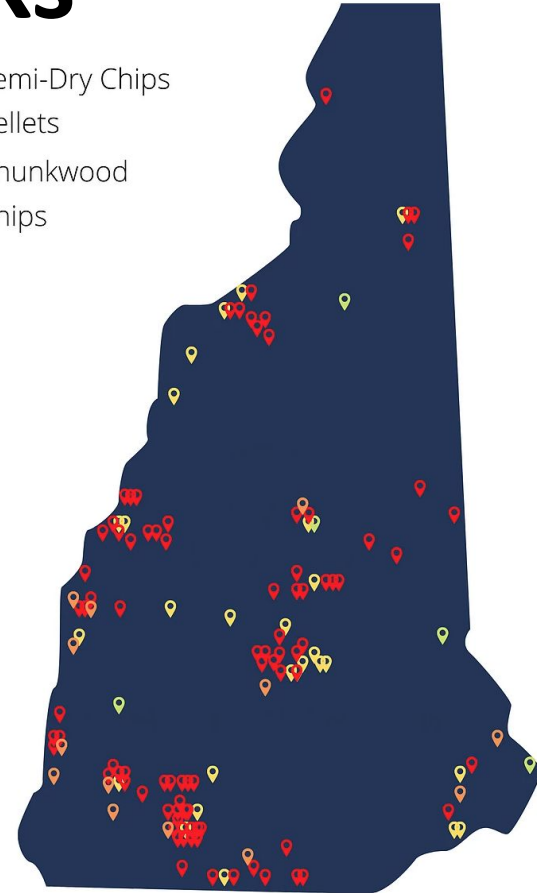


**Volatile Prices**  
**Foreign Sources**  
**Fracking and Oil Spills**  
**Pipelines and Refineries**  
**Money Flows Out**  
**Greenhouse Gas Emissions**



**30% Savings over a 5-Year Average**  
**Community Development**  
**Forest Stewardship**  
**Local Wood Mills**  
**Jobs Growth Here at Home**  
**50% Reduction in Carbon Footprint**

-  Semi-Dry Chips
-  Pellets
-  Chunkwood
-  Chips



Source: Clean Energy NH & New Hampshire Wood Energy Council

# Wood chip silo and boiler at John Stark High School, Weare, NH



Source: Froling Energy

**These three  
Froling P4-100  
pellet boilers  
heat Mascoma  
Regional High  
School in  
Enfield/Canaan,  
NH.**

**The storage silo  
holds 28 tons of  
pellets or ¼ of  
annual usage.**

Source: Froling Energy

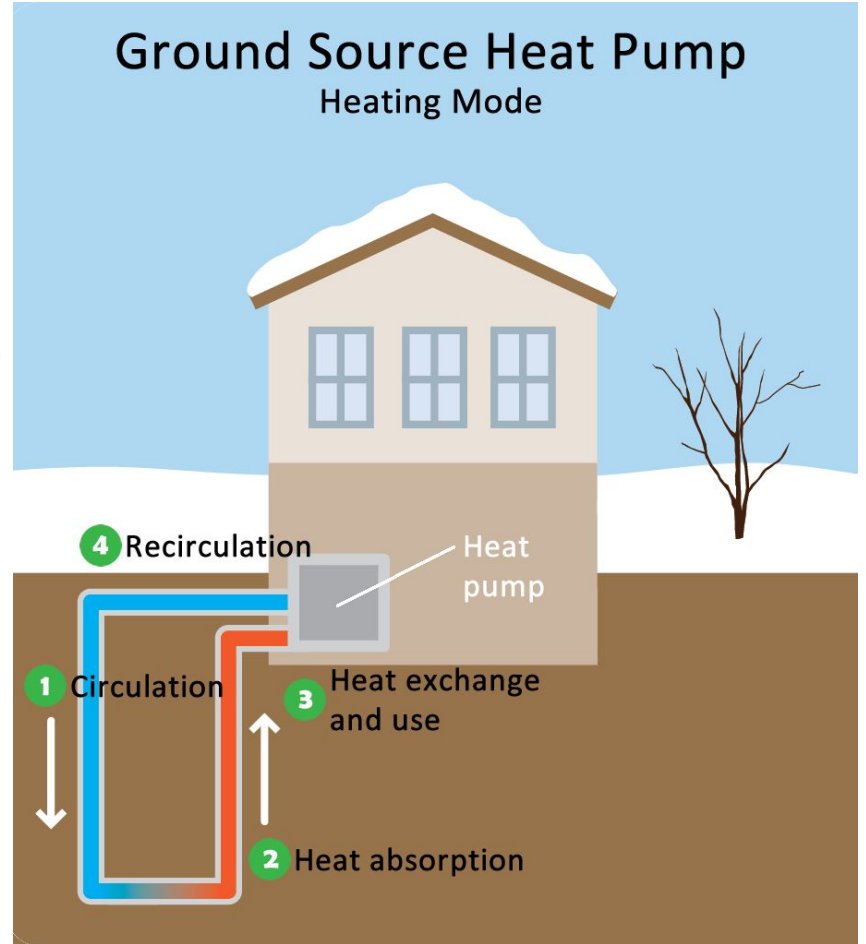


**Geothermal systems** are ground-source heat pumps. They require a deep drilled well or a horizontal well field and are designed to heat or cool an entire house.

**Installed Cost:**  
**\$20,000 to \$40,000**  
**Federal tax credit:**  
**30%**



Control unit



# **Community Power Coalition of NH**

**This new statewide nonprofit is now supplying low-cost electricity to 12 New Hampshire cities and towns.**

**Benefits include local control, a 10% to 15% discount on electricity, and opportunities to boost renewable content.**

**Discounts are achieved through smart power procurement and exceedingly low overhead.**

**Community Power is coming to New London, Warner and Webster in early 2024, with many more towns to follow!**

# Summary

**Energy prices will continue to rise, encouraging all of us to use less energy and/or produce more.**

**Save energy and save money: Weatherize your home, install energy-efficient appliances, switch to electric cars and yard tools, claim your rebates and tax credits, and encourage your town to join the Community Power Coalition.**

**Solar panels, storage batteries, woodstoves and heat pumps are now more affordable than ever before, thanks to the 30% federal tax credit that's in effect for the next 10 years.**

**Through a combination of Efficiency and Renewables, it's possible to reduce your energy budget to zero.**

# Get Involved Locally

**New London Energy Committee (NLEC) is leading the charge to achieve 100% renewable electricity by 2030 and 100% renewable heating and transportation by 2050.**

**In our area, Bradford, Newbury, Springfield, Warner and Wilmot also have active municipal Energy Committees.**

**NLEC meets monthly on the first or second Wednesday of the month. Please contact me for specific meeting dates and times.**

**Jamie Hess, Energy Committee Chair, Town of New London  
(802) 291-3939 [energy@newlondon.nh.gov](mailto:energy@newlondon.nh.gov)**