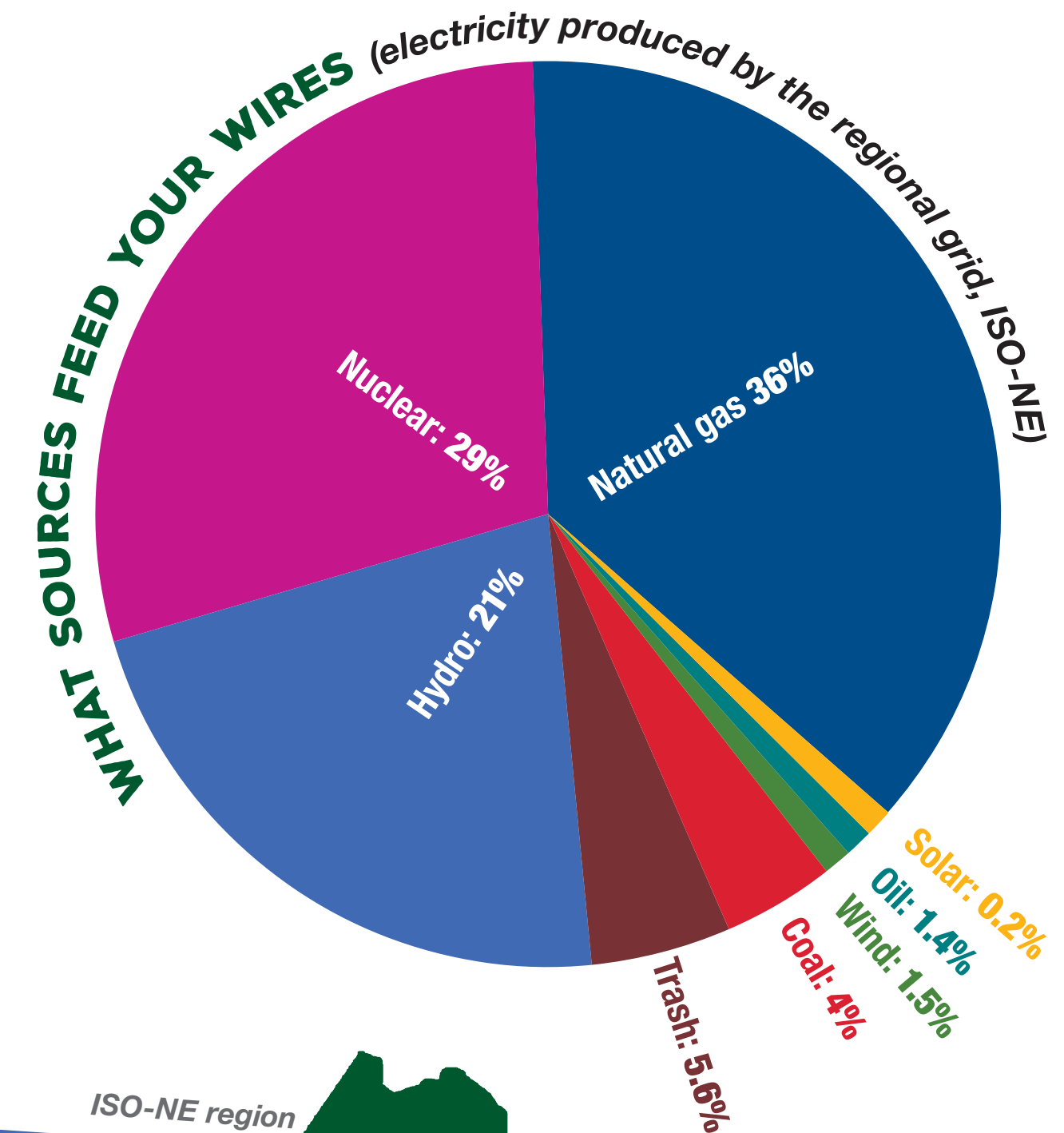
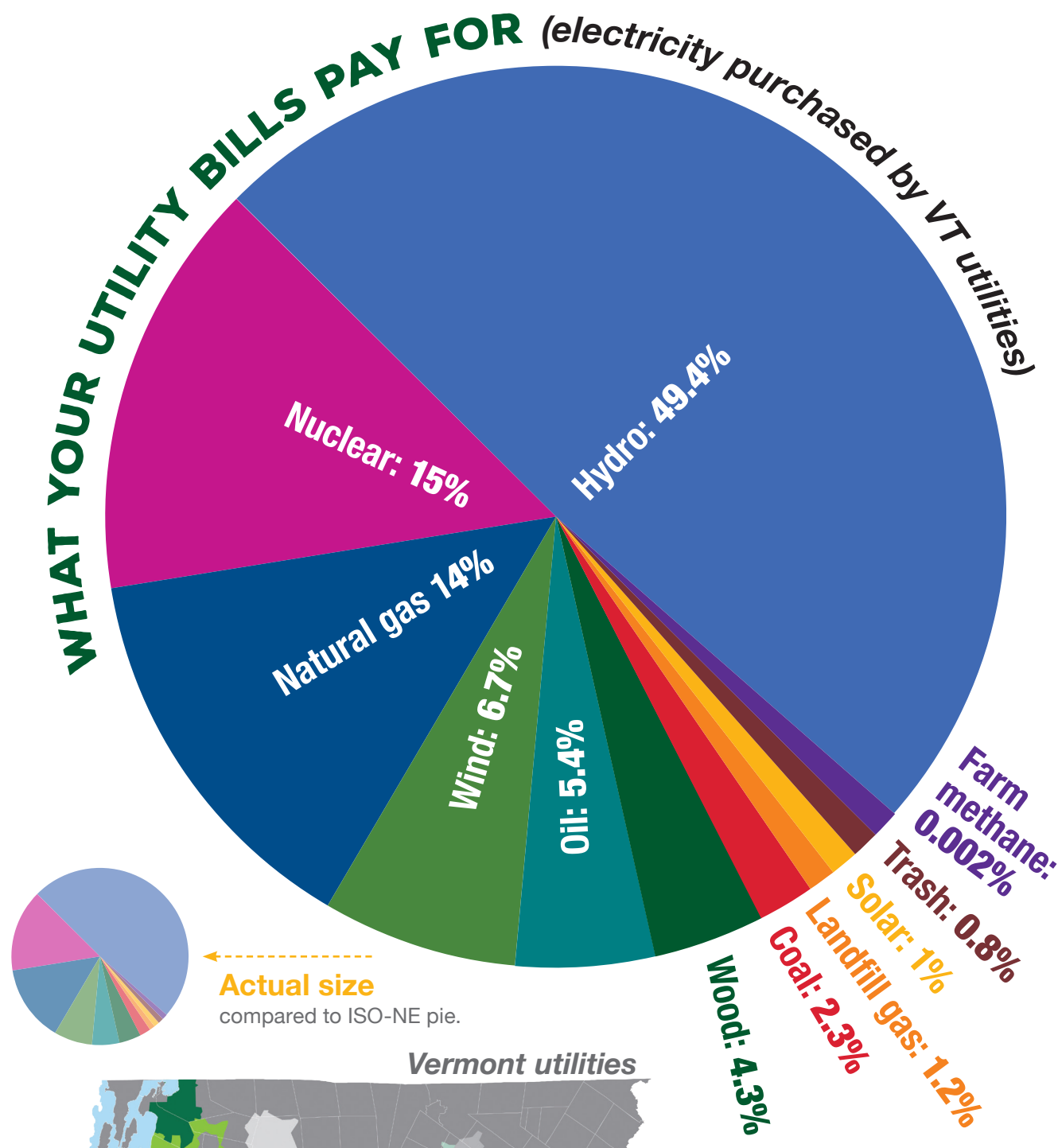
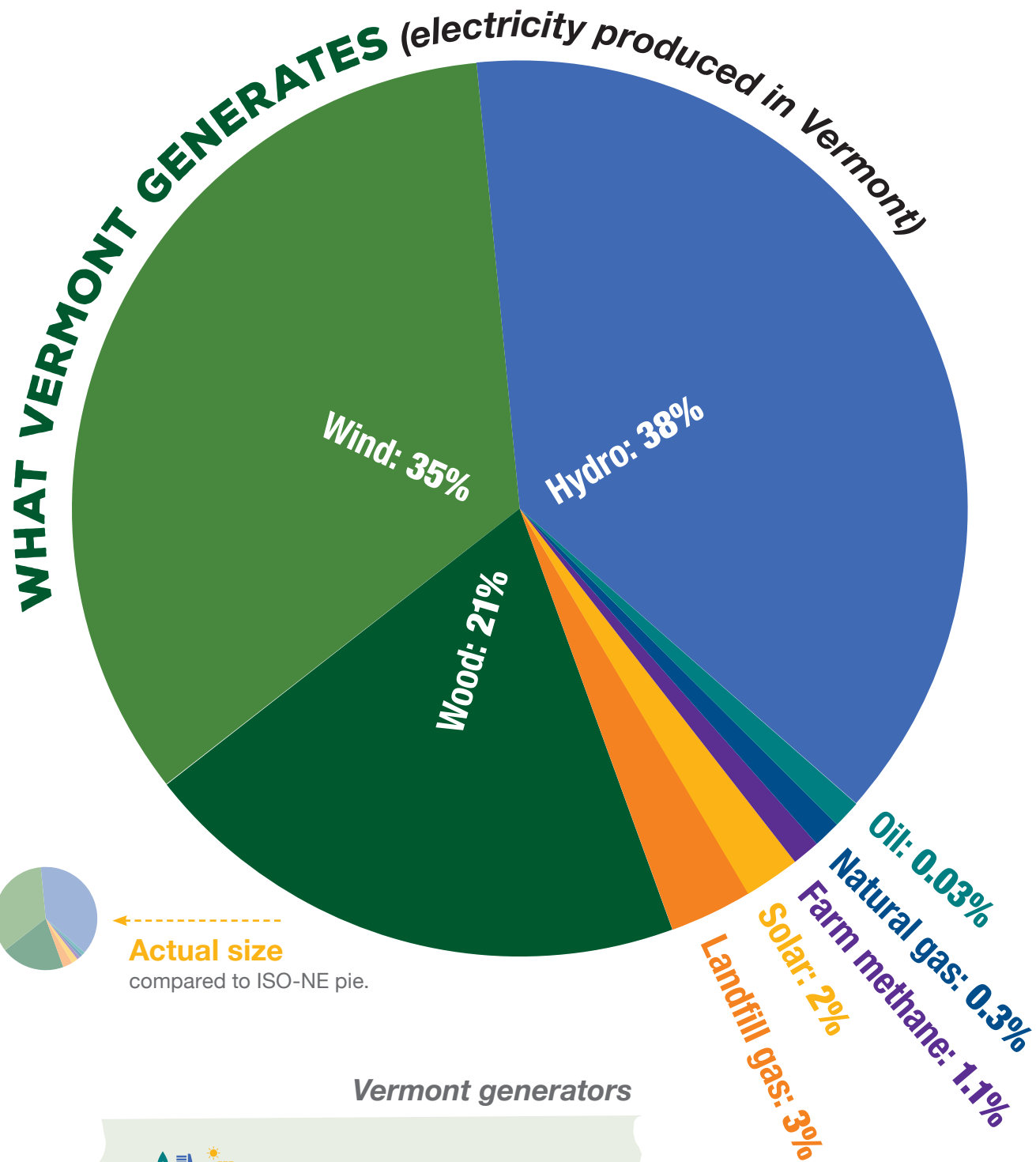
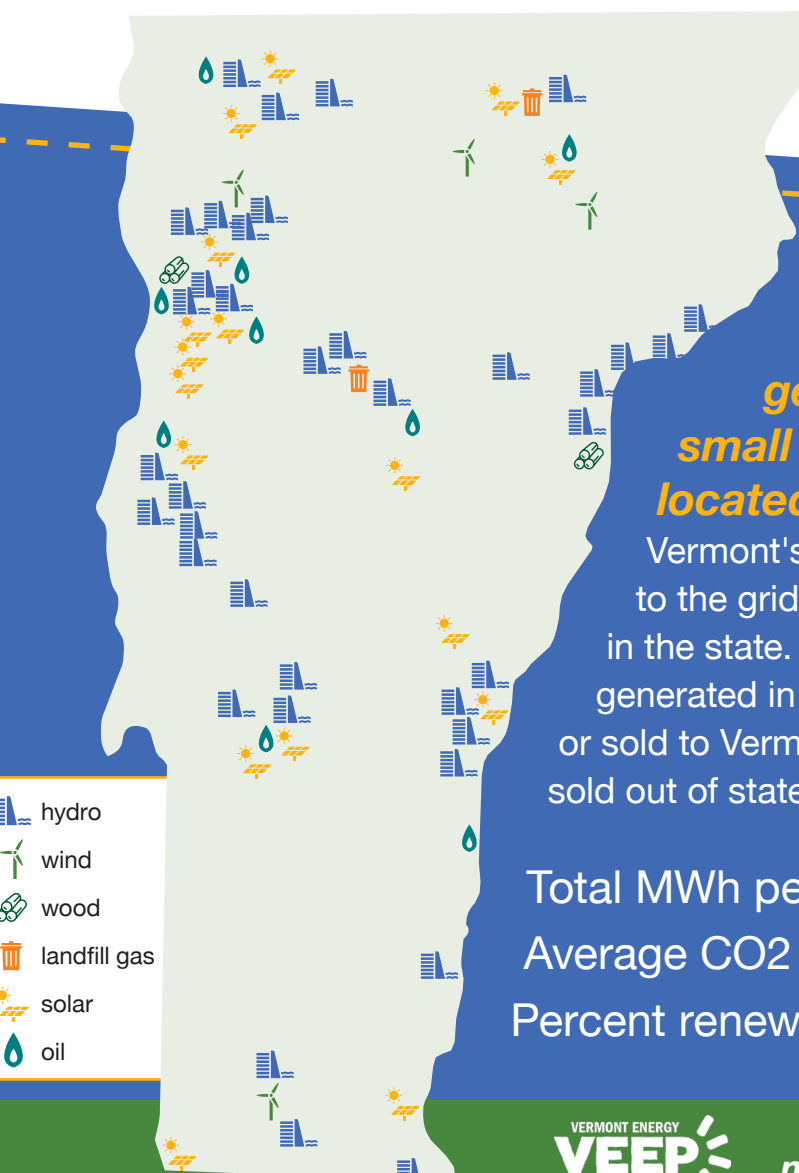


SLICING THE ELECTRICITY PIE

There are many ways to answer the question "Where does our electricity come from?"



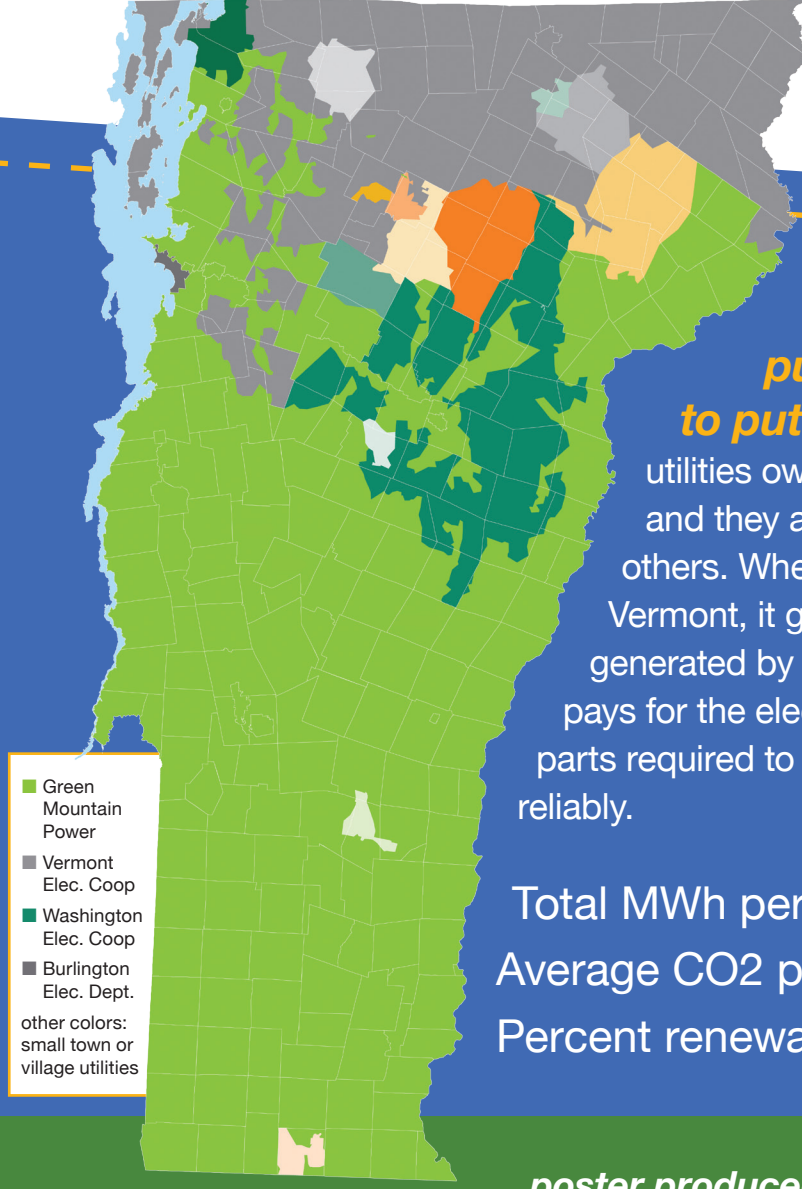
Vermont generators



There are many generators — mostly small and very small — located in Vermont. This is Vermont's part in supplying electricity to the grid by hosting these generators in the state. Not all of the electricity generated in Vermont is used directly by or sold to Vermont electric utilities; some is sold out of state.

Total MWh per year: **1,700,000**
 Average CO2 per kWh: **0.66**
 Percent renewable: **99.7%**

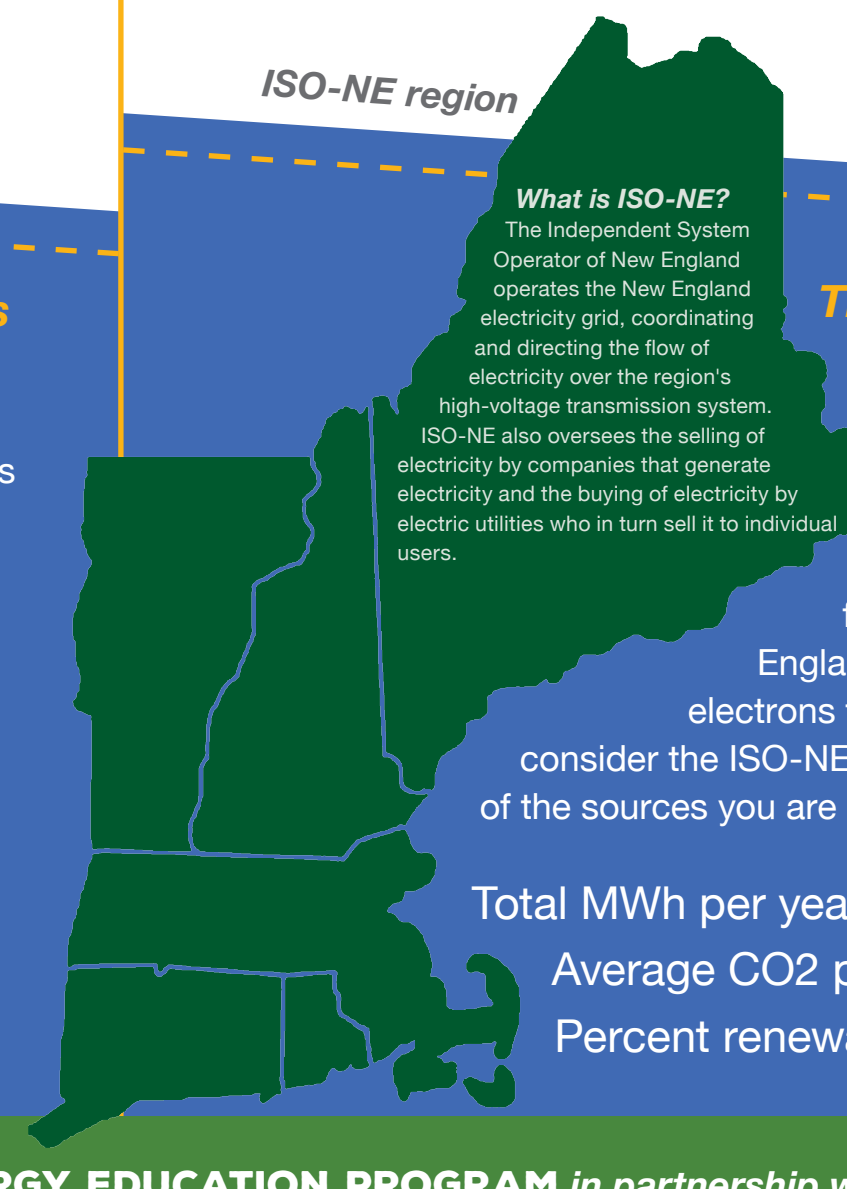
Vermont utilities



This is what VT utilities purchase or generate to put onto the grid. Vermont utilities own some of their own generators and they also purchase power from others. When you pay your electric bill in Vermont, it goes to pay for the electricity generated by these sources. Your bill also pays for the electric lines and all the labor and parts required to make the system stay running reliably.

Total MWh per year: **4,900,000**
 Average CO2 per kWh: **0.53**
 Percent renewable: **63%**

ISO-NE region



What is ISO-NE?
 The Independent System Operator of New England operates the New England electricity grid, coordinating and directing the flow of electricity over the region's high-voltage transmission system. ISO-NE also oversees the selling of electricity by companies that generate electricity and the buying of electricity by electric utilities who in turn sell it to individual users.

This is the average mix of sources you get when you use electricity anywhere in New England. Some of it comes from Hydro Quebec in Canada, but most of it comes from generators in New York and New England. Since you can't decide which electrons to use when you plug something in, we consider the ISO-NE mix to be an average representation of the sources you are using.

Total MWh per year: **127,000,000**
 Average CO2 per kWh: **0.81**
 Percent renewable: **29%**



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NOTES: 1. Electricity source data comes from the Vermont Department of Public Service and ISO-NE. 2. Students can learn more about electric generation in Vermont using the Renewable Energy Atlas, vtenergyatlas.com, about purchases and generation of electricity by individual Vermont electric utilities at tinyurl.com/VermontUtilities and can see a full size map of VT electric utilities at tinyurl.com/GMPmap. 3. Data in pie charts available in spreadsheet form on request from VEEP. 4. CO2 emissions per kWh are based on a weighted average of the mix of sources using Energy Information Agency (EIA) data on CO2 per kWh for each fuel type, with the exception of nuclear and wood fuels. Data on nuclear electricity CO2 emissions come from "Nuclear Power, a Critical Analysis, the CO2 Emissions of the nuclear life cycle," Jan Willem Storm van Leeuwen and Philip Smith, 2003. CO2 emissions are from fuel extraction, processing and transport, and for decommissioning beyond that required for other generator types. CO2 emissions estimated here at one-quarter that of a natural gas-fired plant, though values are controversial. 5. CO2 emissions from wood-fired power plants are estimated at 3.15lbs/kWh, based on "Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal," Mary S. Booth, PhD Partnership for Policy Integrity, 2014, and do not account for any subsequent sequestration of CO2 by forest growth. Wood is included with renewables here, but forests requires proper human management to be sustainable over the long term. Should this category be called "sustainable" to indicate the kind of attention required to keep it renewable? 6. Trash-fired power plants and landfill methane are included as renewable here, but as we recycle more plastics and divert food waste from landfills, these energy sources will decrease over time. Should these two sources be called "short-term renewables"?