by Ed Hiserodt

Dear Congressman Ocasio-Cortez, Congratulations on winning your seat in the 14th Congressional District of New York. You certainly made a name for yourself even before the House was turned over to the Democrats, with your activist demonstration against fossil fuels at House Speaker Nancy Pelosi's office prior to being sworn in. As a Democratic Socialist, we're aware you support single-payer health insurance, free college tuition, defunding ICE, and several other issues of consequence. But our concern here is your proposal to transition the country, including the electrical grid, to run on 100-percent renewable sources of energy. We would like to take a look at what this would entail. Excuse us for being "numbery," but the scope of this project of the Democratic Socialists is not a matter of good feelings, but cold hard numbers.

You back a "Green New Deal" that would, according to the U.K. *Guardian*, "eliminate greenhouse gas emissions from electricity, transportation, manufacturing, agriculture and other sectors within 10 years. It would also aim for 100% renewable energy."

Since you have an educational background in International Relations and Economics, perhaps you would appreciate a brush-up on electrical terminology and what it would take to accomplish your proposal. First, let's define which energy sources the environmentalist Left says qualify as "renewable sources of energy." They are:

- Solar (thermal and photovoltaic)
- Wind power
- Small-scale hydroelectric
- Biomass (including ethanol)
- Hydrogen and fuel cells
- Geothermal

Of those power-generating sources listed above, wind-power generation, at 6.3 percent of U.S. electrical energy, currently leads the way as a percentage of our country's electric supply. Solar (both utility scale and small-scale) is in second place at 1.9 percent. Biomass is at 1.6 percent, but is not expected to have the potential of wind and solar. So for our purposes here, we will limit the discussion to the top two.

What Is a Watt?

The first bits of essential terminology you need to know have to do with rating electricity generation. Knowing these terms would put you head and shoulders above most of your colleagues, many of whom have law or political-science degrees and don't know a kilowatt from a kumquat. Your first lesson here is that *power and energy are not the same thing*.

Power is the ability to do work. Even though it's not necessary to own a car in the Bronx, you are surely familiar with "stepping on the gas," the action that increases the *power* of the engine up to its maximum to go faster, go up steeper hills, and get to those Green New Deal rallies on time.

Electricity generation and usage are measured in watts. For us the watt is a *measurement of power available to do work*. While physicists would likely say a watt is a *joule* per second, we fortunately don't need to dig that deeply for our purposes. The watt (W) is a tiny amount of power, like that of a flashlight. We more often work with kilowatts (kW) — thousands of watts — or megawatts (MW) — millions of watts.

Though in the United States we measure automotive power in "horsepower, (hp)" we could just as well express it in watts, or in this case kilowatts. A 100 hp engine is also a 74.6 kW engine. Our power grid, wind turbines, and power plants are usually rated in megawatts, though some coal and nuclear plants are rated in gigawatts (GW), billions of watts.

Now here's where you need to be careful to use the correct units lest you lose credibility — at least with the few congressmen who are engineers or physicists.

Energy is always expressed in terms of *power over a time period*, or if you want to get fancy, "the integral of power over a specified time." So we might say that the power of one watt produced or used over one second is one watt-second. Ten 100-watt bulbs operating over one hour consume one kilowatt-hour (1 kWh) of energy. The average residential customer uses 10,300 kWh of electrical energy per year, and a 1,000 MW nuclear plant produces about 8,322,000 MWh of electrical energy per year.

For the nuclear plant calculation above, it is assumed that the plant actually produced 95 percent of the energy it would have produced while running continuously at full capacity, because for about five percent of the time it would be being refueled, so the nuclear plant has a *capacity factor* of 95 percent.

The capacity factor is a vital number to understand, particularly when dealing with the energy produced by a wind or solar

AP Images

Do they realize what they are fighting for? Proponents of Alexandria Ocasio-Cortez' Green New Deal are shown admonishing Congress to promote her proposal — one that Greenpeace co-founder Patrick Moore termed a "recipe for mass suicide."