Table One identifies present sources of GHG (in percent of total releases) on a USA national basis, from NY State, and from New York City. New York State is a leader in dealing with GHG releases with its significant hydropower, 6 nuclear plants, no use of coal, its conservation efforts, upstate wind farms, and its plan to build the world's largest off-shore wind farm. NY City is one of the nation's most energy efficient cities, largely because of its extensive use of electrified transportation.

Table One –Sources of GHG Releases, Percent

	National	NY State	NY City
Power Plants	29	17.6	30.3
*Transportation	27	34.0	21.4
*Residential	12 (includes commercial)	16.3	~22.8
*Commercial	----	10.2	~15.1
*Industrial + Others	30	22.0	10.4
*Total GHG from the end use sectors	71.0	82.4	69.7

Table One provides several insights. First, most of the GHG come from the end use sectors, not from electricity production. NY, like other States, has a goal of 50% renewable electricity by 2030 of which about 22% is already met through existing wind power and hydropower. The solar contribution is less than one percent. New on-shore wind power plus the huge off-shore wind power project plus some increase in solar might bring the total renewable electricity by 2030 up to about 36%, well short of the 50% goal. Even if NY State's planned renewable energy program could be further expanded to meet the 50% goal, the whole remaining NY State program would only move the GHG "needle" by about 5%.

Second, eliminating the GHG from the end use sectors is far more difficult than replacing a comparatively small number of fossil fueled power plants. Nationally, replacing fossil fueled electricity with large nuclear plants would take about 320 such plants or about 250,000 three megawatt on-shore wind turbines. By contrast, replacing fossil fueled end use items such as cars, hot water heaters, and space heaters, would require hundreds of millions of replacements. There are about 250 million vehicles in the USA and about 130 million housing units. If each housing unit had an average of two fossil fueled appliances that would require 260 million replacements. Many more millions of replacements would also have to take place in the commercial sector.

Third, these end use replacements would largely be energized with electricity. This could require a new clean electrical capacity two or more times larger than today's whole electric power system plus vast amounts of energy storage. So, many State energy goals are only directed at the "low lying fruit", replacing fossil fueled power plants. The biggest challenge to a low carbon future lies in the end use sectors.

States have produced lots of goals and mandates, but the most important “figure-of-merit” is the rate at which GHG releases is being abated: it is not a temporary decrease in electricity use, nor the year-to-year increase in wind power capacity, nor the miles of new transmission lines, nor the gigawatts of battery storage, nor the number of new nuclear plants under construction in China and Russia. The US released 6,587 million metric tonnes of CO2 equivalent in 2015. If the goal is an 80% reduction by 2100, that would require an average reduction of 64.3 million metric tonnes each year for the next 82 years. If the target date is 2050, then the average decrease in release rate becomes 164.8 million metric tonnes each year for the next 32 years. Note that an 80% reduction in overall GHG releases actually means more than an 80% reduction in GHG releases from man-made activities: a portion of the remaining 20% of the GHG releases comes from nature, such as the releases of methane from wetlands and from termites.