Comment on Cornell's Carbon Sequestration Plan to Offset CO2 Emissions

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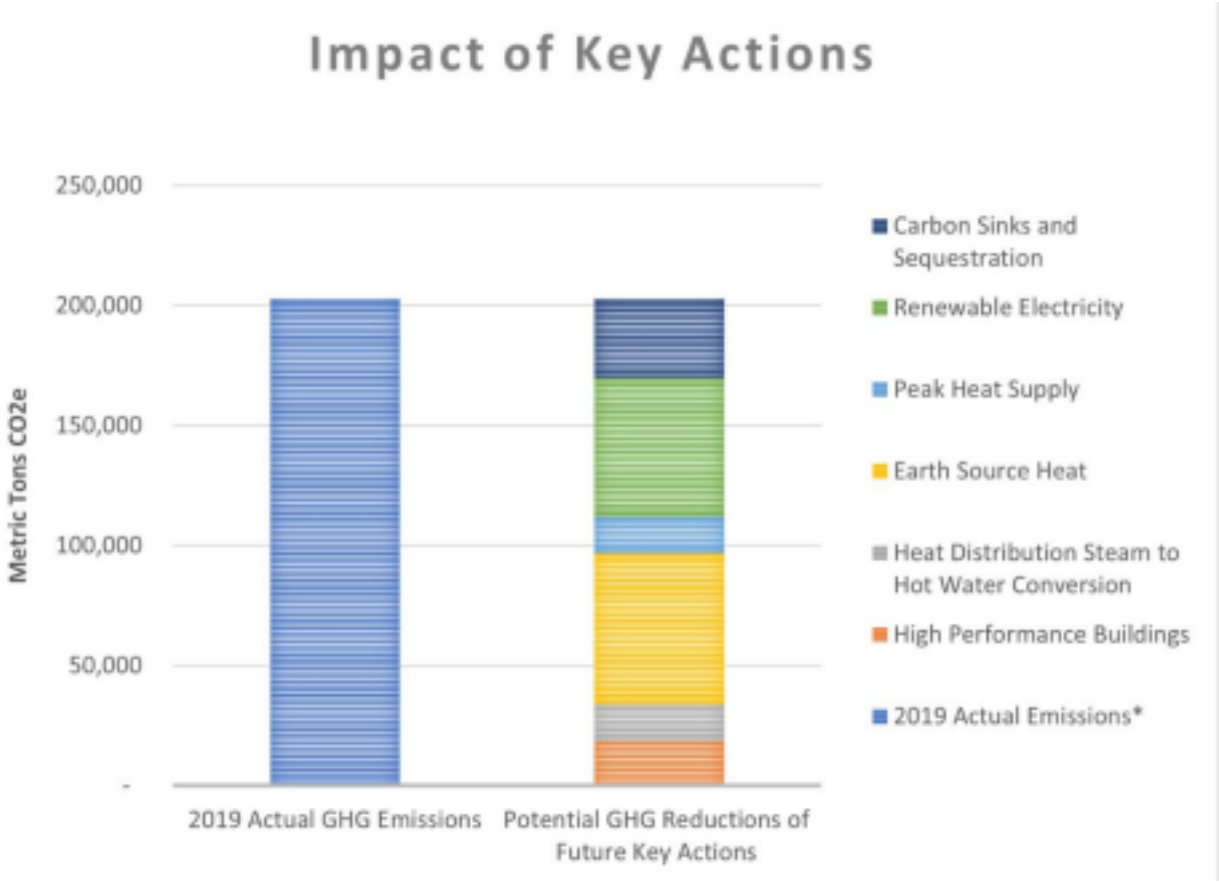

Figure 1: From *Cornell Sustainable Campus*: https://bit.ly/3TvAlSp

By carefully measuring the height of the bars in Figure 1, we can see that "Carbon Sinks and Sequestration" (the darkest blue color) is approximately 17% of roughly 200,000 metric tons of CO2 equivalents emitted annually by the Ithaca campus.

So, the plan appears to be to induce local soils to absorb and store (for how long?) 34,000 more metric tons of CO2 each year, compared to the amount that local soils are presently

absorbing and storing.

There are six known problems with reliance on soil absorption and sequestration of atmospheric CO2 as a verifiable and reliable means of offsetting CO2 emissions:

1. Soils can and do absorb carbon dioxide from the atmosphere, but at some point soils can become "saturated" with carbon and then cannot absorb more. The point at which "saturation" occurs depends on the specific characteristics of the soils in question, and those characteristics can vary within short geographic distances. Soils in one plot will have certain characteristics but soils in a nearby plot may have different characteristics. Determining soils characteristics can be expensive. Without knowing when saturation will occur, or has occurred, soil carbon absorption is, at best, an unreliable and inexact enterprise.
https://go.nature.com/48a0OZI

2. If a farm adopts so-called "regenerative" techniques (mainly, planting cover crops between seasons, and drilling seeds into the ground instead of routinely turning over soil by tilling), those techniques must be maintained forever after. If, after several years of "regenerative" farming, a farmer tills the soil (which reportedly happens often), stored carbon can be released – negating the benefits of the regenerative techniques. See http://bit.ly/4agiDs1 and http://bit.ly/3RF5uBj

3. Farming is an inherently uncertain economic enterprise. To alter farming techniques, from age-old traditional methods to "regenerative" methods, is not simple or easy for farmers. They may fear economic losses during the early years of the change. They typically need an economic inducement to make the shift *and* to maintain the new techniques forever thereafter. Furthermore, depending on the inducements offered, farmers may then be tempted to clear more land for agriculture, thus releasing large quantities of carbon into the atmosphere, negating the benefits of the newly-adopted regenerative techniques. http://bit.ly/4agiDs1

4. Measurement of soil organic carbon (SOC) is difficult and can be controversial. Without accurate, reliable, agreed-upon techniques for SOC measurement, the results of regenerative farming techniques cannot be reliably known. Thus, the actual benefits (or lack of them) from regenerative techniques cannot be reliably calculated.
http://bit.ly/3RF5uBj

5. Typically, about half of applied ammonia fertilizer is taken up by plants. A portion of the remaining half can be broken down into nitrous oxide by soil microbes and released into the atmosphere. Pound for pound, nitrous oxide heats the planet 300 times as much as carbon dioxide. https://bit.ly/47VGb3J Measuring the release of nitrous oxide from soil is not simple or easy (or necessarily reliable), so the benefits (or lack of them) from regenerative techniques cannot be reliably known. http://bit.ly/3RF5uBj

6. As soils become warmer because the planet is growing warmer, those soils tend to release carbon that they stored when soils were cooler. Research conducted by Lawrence Berkeley National Laboratory found that "warmer temperatures lead to a significant drop in

the soil organic carbon compounds that are created by plants during photosynthesis." Without knowing the future trajectory of temperature over relevant plots of land, the carbon storage capacity of soils in those plots cannot be reliably known. http://bit.ly/476vtWF

Conclusion

Therefore, generalized plans to rely on soil carbon sequestration to "offset" CO2 emissions elsewhere are inherently subject to critical scientific unknowns and uncertainties, which can be expensive and time-consuming (and, in many cases, impossible) to eliminate or even to reduce significantly.

Before a university commits to such an enterprise, it would seem prudent and intellectually honest to publish a *detailed* plan that addresses these six documented problems (and perhaps others that might be revealed by public comments on such a plan).