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Thesis Introduction

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­­ On October 8th, 2018 the International Panel on Climate Change (IPCC) published a report called the Special Report on Global Warming of 1.5° C (SR15). The main takeaway of this report was the declaration of a 1.5°C limit i.e. limiting global temperatures to below 1.5° C above pre-industrial levels. Not surprisingly, this is a grand challenge, and according to the report would require “deep emissions reductions”. Yet even if we were to completely cut carbon dioxide emissions immediately, we would still need to account for historical emissions. Given the fact that there are no immediate plans to systematically cut C02 emissions, we have double the work cut out for us.

Considering the many obstacles that present themselves when thinking about drastically reducing emissions, it’s tempting to ponder technological solutions that may ease the transition and/or even allow us to avoid ever reducing emissions to zero. Many of these technologies already exist, such as Afforestation and Reforestation, Direct Air Capture, or Enhanced Weathering. These solutions assume that it’s possible to remove emitted C02 while continuing to emit, thus creating a net of zero emissions (referred to as Net Zero). Or, in the case that they remove more than they emit, they are referred to as Negative Emissions Technologies (NETs). Therefore, they are premised on the notion of offsetting emissions (while maybe simultaneously reducing emissions), rather than reducing emissions completely and absolutely. According to Friends of the Earth International (FOEI), “When the focus is only on the flows of carbon – carbon emitted and carbon removed – the cumulative nature of carbon dioxide is hidden. CO2 remains in the atmosphere for hundreds to thousands of years, so any imbalance of additions over removals adds to atmospheric concentrations which will persist.” As we will see in this paper, they should not be considered a viable solution at the scales being proposed.

This paper attempts to outline the main limits to scaling up one specific NET referred to as Bioenergy with Carbon Capture and Storage (BECCS). Although there exist studies that model the planetary boundaries of scaling up this technology, I found that there was a lack of information on the more general critiques that might help an audience outside of the academic realm understand the nuances of such technologies. Despite the seemingly narrow focus of the paper, I believe the critiques that will be offered about this technology foster a healthy skepticism that can and should be applied to NETs or Net Zero solutions in general. For this review, a combination of sources is used that draw from both academic studies and from reports by international environmental justice organizations such as Friends of the Earth International. This methodology permits an analysis that is both based on scientific facts and also rooted in social justice.

As we will see in more detail, there are many limits and uncertainties to deploying BECCS, both on a small scale and large scale. I will be focusing my analysis on the proposed use of BECCS on a large scale, given that that is how it is most frequently being modeled. The limits described fall under the categories of resources, such as land and water requirements. But these material limits can be considered not only in terms of planetary boundaries but also in terms of real human impact, as the land required for BECCS would greatly impact food production and most likely encourage land grabbing practices. We will also look at these impacts on ecosystems, such as the correlation of BECCS with biodiversity loss. Another critique will focus on the C02 emissions that would result as a consequence of implementing BECCS at large scale. These emissions come from a variety of places, including the use of industrial agricultural practices, the transport and storage of liquified C02, and the production of these sites to begin with. Finally, we will end the critique by looking past material limits and towards ethical implications of BECCS. These will be centered around the ability of liquified C02 to be pumped into depleted oil reserves in order to further fossil fuel extraction.

The IPCC has shown that they are willing to take this technology seriously; out of the 116 proposed scenarios with a 66% chance of remaining below the 1.5°C target, 101 of them include the use of NETs. But not all hope is lost. The final section of the paper will provide an overview of a number of strategies that are being proposed by well-recognized environmental justice organizations and must be considered in order to create lasting systemic change. The main areas will focus on sustainable practices in agriculture and the energy sector. This paper echoes other concerned scientists’ calls to reconsider ‘business as usual’ practices through the use of purely technological fixes. I will demonstrate that even the people backing these initiatives recognize their limits; thus, reinforcing the fact that they are not being considered real solutions but rather a way for us to postpone making drastic changes.