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## Behind the 2 Degree Scenario Presented at COP21

December 4, 2015

On November 30, 40,000 delegates from 195 countries descended on Paris to hammer out a global climate pact at the U.N. Framework Convention on Climate Change's (UNFCCC) Conference of the Parties (COP21). According to all involved, the stakes are incredibly high. By even the most conservative scientific estimates, the window for meaningful climate change mitigation – and a chance to limit warming to two degrees Celsius – is quickly closing. But what if GHGs could be removed from the atmosphere, through carbon negative technologies, including biomass energy with carbon capture and storage (BECCS)?

### Limiting Warming to 2 Degrees

The two degrees warming scenario was originally proposed in the 1990s as an upper limit that would avert the worst consequences of climate change. The UNFCCC still labels a two degree scenario as "economically feasible" and "cost effective." A two degree warming scenario translates to deep cuts in emissions, as much as 70 percent by 2050, with a decarbonized or even carbon negative economy by 2100, according to the Intergovernmental Panel on Climate Change (IPCC). IPCC also suggests that such deep cuts would not affect economic growth.

But as world leaders have dawdled and emissions grown over the past 20 years, the costs have risen and the feasibility drops of meeting such a goal. Some climate scientists assert that the current rhetoric around a plausible two degree scenario is disingenuous and risky. According to a recent study in Nature Geoscience by Dr. Kevin Anderson, deputy director of the Tyndall Center for Climate Change Research at the University of Manchester, most scenarios that limit warming to two degrees rely on unrealistic time tables for emissions peaking and untested technologies.

According to Anderson, "carbon budgets associated with a 2 degree Celsius threshold demand profound and immediate changes to the consumption and production of energy." He argues that the IPCC relies too heavily on carbon negative technologies, geoengineering, and other untested and controversial mechanisms. To stick to a 2 degree warming scenario without reliance on these untested methods, Anderson asserts that CO2 must be removed from the global energy system by 2050. This would have widespread consequences to the global economy, particularly for the poorest citizens.

### The Role of Carbon Capture and Storage & Biomass

Carbon Capture and Storage (CCS) collects carbon dioxide that would otherwise be emitted into the atmosphere by industrial and power generating sources, and pumps it deep underground for long term storage. Despite large investments into the development of this technology, it has not yet taken off. Many carbon budgets rely on carbon negative technologies - like CCS at a biomass energy plant.

Biomass energy can provide needed baseload power for more intermittent renewables, such as solar and wind, while also removing carbon from the atmosphere. As biomass feedstocks grow, they draw carbon from the atmosphere, offsetting some or all of the carbon emissions generated by biomass power generation. Burning certain biomass feedstocks, such as forestry slash or urban wood waste, can be carbon neutral and also deals with waste streams that would either be burned or landfilled. By also burying the resulting carbon from biomass energy underground, BECCS has the potential to be carbon negative.

BECCS certainly makes sense in particular regions or with particular feedstocks. One example is areas of the western United States, where large amounts of forest fire slash and residue are present. Scientists at the UC Berkeley's Energy and Resources Group feel that there is potential in BECCS, and that is one of the few potentially cost-effective carbon negative technologies available for the region. In the latest IPCC report, BECCS is listed as a potential climate mitigation tool.

While co-deployment of biomass and CCS sounds promising, it relies on assumptions as well. Currently, biomass power is generally deployed on small scales, by timbering operations, or as a small percentage of coal co-firing. Significantly ramping up BECCS would require significant biomass supply chains and infrastructure that are currently unavailable, despite the volumes of potential feedstocks. A binding agreement in Paris may make previously expensive technologies more desirable, as countries grapple with the need to cut carbon – and cut it quickly.

### For more information see:

COP21 climate change summit: 'Never have the stakes been so high'  
<http://www.cnn.com/2015/11/30/europe/france-paris-cop21-climate-change-conference/>, CNN

Duality in Climate Science  
<http://www.nature.com/ngen/journal/v8/n12/full/ngen2559.html>, Nature Geoscience

Electricity from biomass with carbon capture could make western U.S. carbon-negative  
<http://news.berkeley.edu/2015/02/09/electricity-from-biomass-with-carbon-capture-could-make-western-u-s-carbon-negative/>, Berkeley

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# EESI, 2015

The magic number: Holding warming under two degrees Celsius is the goal. But is it still attainable? (<http://www.washingtonpost.com/sf/national/2015/11/29/carbon/>), The Washington Post

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