Fixing Climate by Cleaning Up Carbon

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The world's energy infrastructure is largely built around combustion of fossil carbon. Carbon, liberated from underground, is dumped as carbon dioxide into the atmosphere where it is the dominant driver of climate change. This massive waste stream will have to be managed just as garbage or sewage have been before. Reducing emissions is not enough anymore; climate goals can only be met by removing excess carbon from the environment. The waste that has already been produced and will continue to be produced for some time will need to be disposed of safely and permanently. Fossil carbon is a waste management problem of staggering proportions: current emissions exceed the world production of sand and aggregate dwarfing all opportunities for permanent reuse. In picking up our carbon litter, we will need to collect and dispose of more carbon than was emitted during the 20th century. Storage technologies may be unpopular, but they work. However, collecting carbon from the environment poses new challenges. Proven biomass capture is unlikely to safely reach the necessary scale. By contrast, direct air capture is a scalable, but still unproven technology. It needs to be developed. Air capture with carbon disposal makes it possible to rethink carbon management as waste management rather than mitigation. Eventually, as the world approaches zero carbon waste, air capture will find a new role in supporting a circular carbon economy. Solar energy, water and carbon dioxide from the air will be the ingredients that make synthetic fuels for airplanes, ships and trucks, eliminating the need for fossil fuels.