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USEFUL, SALABLE PRODUCTS FROM CO2.

Someday soon, probably sooner than we think, we'll have to get serious about removing carbon dioxide from coal-fired power plant exhaust, perhaps even extracting it from the atmosphere as well. The Arctic ice cap is shrinking in area and thickness. Another state-sized ice shelf is breaking away from Antarctica as this story is being written. Global warming is blamed for the dramatic changes going on at the extremes of the planet – our home.

Small carbon sequestration projects are already being built on a trial and test basis. Pumping carbon dioxide underground for future generations to deal with makes some people uneasy. Can't there be a better way to store carbon emissions, possibly do something with them?

There are, of course, natural processes that remove carbon from the atmosphere. The most well known (and probably the most studied) is photosynthesis. In that process green plant's employ the energy of sunlight to blend water, oxygen and carbon into carbohydrates which in turn make cellulose which makes up the structure of the plant itself. If photosynthesis could be artificially replicated the planet would be saved.

Photosynthesis is not the only process on the planet that takes carbon dioxide out of the air and stores it. As oysters (and other shelled mollusks) build their shells they're blending calcium with carbon dioxide to make calcium carbonate, the bulk of their shells. Hens (and other lady birds) do the same thing with their egg shells. Every time you fry an egg the shell you toss away contains a little bit of atmospheric carbon dioxide.

Through their work people store carbon dioxide too. Masons and concrete workers, and others, do their bit to extract carbon dioxide from the atmosphere. Every time a brick layer mixes a batch of mortar he's starting a chemical process that will sequester CO2. As the bricklayer's mortar sets, carbon dioxide is pulled from the air.

Quicklime, the reactive agent in mortar and cement that makes them solidify, is mostly calcium. When quicklime (also known as calcium oxide) meets with water the chemical reaction begins that mates it with carbon dioxide in the air to make calcium carbonate.

Unfortunately the making of quicklime, as part of cement manufacturing, also produces carbon dioxide. In the process of making quicklime limestone (a natural calcium carbonate) is heated and carbon dioxide is released. The energy required to heat the limestone is considerable. When the carbon emissions from that energy source are combined with those released from the limestone, or other source of calcium, the cement plants become huge carbon dioxide emitters - about 5 percent of global man-made CO2 emissions. (Fifty percent is from the chemical process, and forty percent from burning fuel.)

However, the story doesn't stop there and has a more pleasant ending.

Some, perhaps all, of that carbon dioxide released from the heated limestone in the first place is reconnected with the calcium as the cement or mortar cures. Concrete, made with cement, sand and crushed stone will continue to absorb carbon dioxide for decades as it continues to cure, making calcium carbonate once again.

Calcium carbonate is used for all kinds of things beyond cement and plaster, It's a food additive, It's in paper and plastics. It's used in cosmetics. It's manufactured, sold and purchased. It has value.

Carbon Sciences Inc. (CSI), of Santa Barbara, California, thinks calcium carbonates are a key to cutting atmospheric carbon dioxide and storing it in a secure way. The company has some thoughts on the matter as well as some technology to employ:

– Use carbon-free energy in the processes to make calcium carbonate raw materials or products;

– Create more efficient ways to make the calcium carbonate and products from it;

– Use carbon dioxide from coal power plants to make calcium carbonate products;

– Use carbon dioxide from ethanol plants to make the products so that the plants become carbon negative:

– Finally, consider in the economics of carbon storage with calcium carbonates in that the products will have value thus offset the cost of carbon storage.

The company has a patent-pending process that makes calcium carbonate more efficiently. Carbon Sciences calls its technology GreenCarbon(tm). According to the company, the process uses waste mineral products from coal mines and other mining operations, also know as tailings, as a feed stock for the transformation of carbon dioxide into useful mineral carbonates. Through a proprietary cyclone and mill system, these particles are processed into extremely fine mineral particulates to maximize the available surface area for reacting with carbon dioxide. This method greatly reduces the energy needed to produce fine particulate minerals, which reduces the overall cost of this carbon dioxide transformation system.

For demonstration purposes the company has built a CSI Mobile Technology Vehicle which houses a solar-powered miniaturized version of the GreenCarbon technology. The technology is scalable to industrial-sized applications, including coal-fired power plants and other major industrial producers of CO2.

Carbon Sciences makes note of extensive commercial uses for calcium carbonate, including agriculture, the manufacture of paper, coatings, plastics, glass, ceramics, chalk, dental care, cosmetic products, construction and architectural applications and as a natural buffer used in pollution filters.

Why waste CO2 when it can be used to make useful, salable products?