4C-Adapt's Two Technologies

#1. Value Added Torrefaction

- The cyanamide and cyanoguanidine manufacturing process, PCT/EP2012/054171, PCT/EP2012/054171 and Patent Pending Applications 62/761,593 and 62/762,115; requires large capacity sources of carbon.
- This manufacturing process produces large quantities of high value waste heat from two sources, each source convenient, useful, and potentially enough to process torrefaction carbon sources.
- Cyanoguanidine is a high value product, commonly selling for $1200-2200/ton.
- Cyanoguanidine, also known as dicyandiamide, is known as a nitrate inhibiting, nitrogen-based fertilizer that is commonly mixed with other nitrogen-based fertilizers at concentrations of less than 5% to limit nitrate run-off into rivers, reducing/eliminating ocean dead zones.
- As a fertilizer, 4C-Adapt argues, with emphasis, that cyanoguanidine can be used as a very safe, long-term method of storing ammonia with conversion into liquid ammonia, as needed, for local farming communities, thereby eliminating variables in the cost of this fertilizer that relies on massive liquid ammonia storage at the end of each local farming community of a 50+ year old ammonia pipeline distribution network that now averages a fixed leak for every five miles of this aging 3,000+ mile distribution system.
- Cyanoguanidine, as a fuel, is non-explosive, has a toxicity similar to that of Vitamin C, can be transported by common carrier, has a hydrogen carrying capacity of 14.3% when hydrolyzed with waste engine or fuel cell heat and exhaust water, and answers safety and transport problems associated with the "Hydrogen Economy."
- As a fuel, 4C-Adapt argues that cyanoguanidine can be safely used as a grid-capacity method of extended energy storage (days to years) with Solid Oxide Fuel Cell (plus small steam generator) conversion back into electricity at 70% efficiency.
- Both cyanamide and cyanoguanidine are commonly used as industrial raw materials with a wide range of use in the production of pesticides, as a raw material in the pharmaceutical industry, as epoxy curing agents, dye fixing agents, and flocculants. Cyanoguanidine may be used to manufacture guanidine salts and is used as one of the many organic chemical raw materials in the plastics industry, specifically, in the preparation of melamine, formaldehyde resins, adhesives, and epoxy resins. Cyanoguanidine is also used as a rubber accelerator, synthetic detergent, viscose fiber production for the textile industry, viscose wood fiber thickener, and other organic chemical products that are commonly associated with the organic chemical industry.