From: Jerry Scharf
To: secretariat@v-c-s.org
Subject: comments on the proposed biochar protocol
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Please pass these comments on to the people reviewing the Carbon Gold biochar protocol.

There are two areas on which the proposed protocol is deeply flawed.

First, it does not in any way reflect the current scientific knowledge of biochar in soil.

It is best described that a set of standards used for coal measurement have been incorrectly applied to biochar in soil. There has been significant research in the last year that shows the model proposed is fundamentally and irreparably flawed. In addition, the fundamental language of the protocol is not appropriate.

Unlike the fixed/volatile nomenclature described in the coal model, the correct terms in biochar is that of labile and recalcitrant carbon. Labile carbon is carbon that is available to microorganisms for rapid biochemical processing. The rate of breakdown in this material is very much a function of the soil conditions in which the char lives. Recalcitrant carbon is that which resists bioactivity and instead decays in a more classic half life model. The idea that there is an all or nothing bar in no way reflects any of the known research. There are two major multi-year incubation studies of biochar in active soil.

One is being done at the New South Wales Department of Primary Industries by Annette Cowie and BP Singh. This uses a single Australian native soil and a number of types of biochar produced by the slow pyrolysis process. The clear result of the study is that recalcitrance is quite significantly related to feedstock type. In similar processing methods, chicken litter biochar had a half-life of 26 years, while a gum tree biochar had a half life in the order of 500-1000 years. Interestingly, it is unlikely that the wood biochar would meet the 50% level required while it would be easy to make a chicken litter biochar that would meet this level. (available on the IBI web site (www.biochar-international.org) as a poster paper from the 2008 Newcastle meeting.)

The second is being done at the University of Florida by Andrew Zimmerman. In this case, the work focused more on the way in which the char formed. This study showed that different process technologies would produce different amounts of recalcitrant carbon. Many of the processing techniques that produced half lives in the 500+ year range would not meet the 50% standard. There are complex secondary chemical reactions that have significant impacts on the recalcitrance and are not reflected in any way by the volatile/fixed measure. (This paper was presented at the North American biochar conference and will soon be available on the IBI web site as well.)

What is completely clear in both cases is that the decay of recalcitrant carbon in soil is in first order a log based half life function. This is also consistent with measurements of terra preta biochar that have been in the ground for times ranging from 500-6500 years.

Any reasonable standard must make some estimate of the half-life of the biochar/soil/temperature and then extend this to the 100 year threshold that is most commonly used in sequestration protocols. Interestingly, this may not be as hard as it first looks. It may take several years before the scientific research gives clear validity to these incubation studies. In the mean time, all the project needs to do is store a set of samples of biochar and dried soil. In discussions with professor Zimmerman, he estimated that a 1 year incubation study of 5 repetitions of a single biochar/soil pair at his lab might cost in the range of $200. He also thought there would be no loss in accuracy if the soil and biochar samples were correctly stored for years.

A second area that I believe to be flawed in the proposed protocol is the attempt to avoid true life cycle analysis of the production and application.

The limitation that any biomass used must be abandoned unless used for biochar production is flawed.

While this presents an appealing simplification, it does not reflect many cases in the world. We are looking at small industrial scale biochar production. In this case, we must address our feedstock demands with delivery contracts. Our discussions indicate that most biomass providers can not afford to abandon the biomass in place. This means they must find a way of getting rid of the biomass as a matter of cost. This will often mean selling the biomass as fuel.

We are strong believers in proper life cycle analysis. In our case in the US, the LCA carbon reduction with the most benefit is for biomass that would usually be sent to an incinerator of cofire generation plant. The case for ag waste abandoned in the field showed significantly lower LCA carbon savings than municipal waste usually sold at some nominal value. This is based on another paper from Cornell presented at the North American biochar conference.

So again the protocol fails to reach the goal of identifying the LCA carbon offset of a given project.

With these issues in mind, I believe that the Carbon Gold proposal is flawed beyond repair. You should instead embark on a protocol that is based in the science of carbon recalcitrance and reflective of life cycle analysis that is the basis of almost all protocols.

I would be happy to provide more information and connect you to other resources relating to the science and business of biochar production and application.

warmly,
jerry

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