Public Comment and Colorado House Hearing Regarding:
HB-23-1069
Concerning biochar in oil and gas well plugging, and establishing an advisory group
To: Colorado Legislature, House Committee on Energy and Environment
From: Richard Andrews, President & Founder Boulder Innovative Technologies, Inc.
P.O. Box 19105, Boulder, CO 80308; citizen of Colorado
Submitted: 16 February 2023

The conceptually proposed HB 23-1069 is worthy of investigation to determine the feasibility of reducing the fugitive emissions of greenhouse gases from oil and gas wells, and by the potential use of Biochar included in or supplemental to the concrete typically used in plugging oil and gas wells.

However, the production of biochar and the pyrolysis (oxygen deficient partial oxidation) processes involved in its manufacturing produces harmful greenhouse gases (GHGs), this concept requires very comprehensive life cycle assessment (LCA) to fully and properly determine the net benefits (or disadvantages) that may be achieved in reducing the climate altering effects. Biochar production involves partial combustion in an oxygen deficient environment which results in not only carbon dioxide (CO_2) and potentially carbon monoxide (CO) emissions but potentially other extremely potent greenhouse gases such as nitrous oxide, N_2O, which is approximately 300 times more potent as a climate heating GHG than CO_2.

Given the less than GHG free or very low GHG emitting concerns with materials and methods of making biochar, any proposed feasibility study for this legislative bill, must be more comprehensively designed and its product study executed to ensure that:

- **Full life cycle assessments (LCA) environmental and economic are utilized properly to determine the complete net effects of the objective to reduce fugitive losses of greenhouse gases from oil and gas wells.** Think of this LCA approach as "cradle to grave" in a broad assessment inclusive of the source materials used as feedstocks, how they are obtained, their transport to the biogas production facility and how the finished product Biochar is transported and ultimately utilized in well plugging, how or if biochar would replace other well plugging materials such as Portland cement in the concrete, etc.

- **A comprehensive assessment of alternative adsorbent ingredients, other than Biochar, in well plugging must** be included any feasibility study with the overall objective to maximize reduction of greenhouse gas emissions from closure and abandonment oil and gas wells. As with biochar and noted above, such alternative plugging material ingredients **must also make full LCA assessments to allow comparisons with biochar, and to reduce/eliminate losses of greenhouse gases from abandoned wells, while minimizing the LCA embodied GHG emissions.**

  The proposed legislation feasibility study should include natural minerals that do not require any large consumption of fossil fuels or chemical release of greenhouse gases in their extraction or manufacturing.

- One such available alternative adsorbent material that should definitely be included in the initial feasibility review is a class of naturally occurring minerals of the class, zeolite. This mineral group is widely available in deposits throughout most of the Western USA states, including in Colorado. It can be mined, generally in surface deposit mines, and requires no fossil fuel intensive and GHG emitting and no chemical transformations like the production of biochar.
    - Natural zeolites have been widely used in adsorbent processes for gaseous separations, including separations involving CO_2 and methane (CH_4), notably in coal bed methane processes.
    - Natural zeolites have also been utilized in removing gaseous emissions from organic composting and municipal sewage operations, and in coal bed methane capture, and in landfill methane capture, reducing the potential for CH_4, N_2O, and NH_3 releases to the atmosphere.

- **Offsetting the intense embodied greenhouse gases from cement, an essential component in concrete used in well plugging, must also be a part of the full LCA assessment of materials used in plugging abandoned or closed oil and gas wells**. Portland cement in concrete is responsible for approximately 8% to 9% of total greenhouse gas emissions world-wide, and therefore reductions in cement use by substitute concrete formulations in well plugging should be part of any feasibility study authorized in the proposed legislation.
    - As above, natural zeolite minerals, have been proven to significantly reduce the quantity of GHG intensive cement used in concretes, upwards to 40% or more; and
    - Simultaneously increase the resistance to degradation on concrete in saline environments, which are common in oil and gas formations and wells.

- **Materials other than biochar and natural zeolites may also and should be identified by the Advisory Group proposed by the HB 23-1069**, and the legislation should enable and encourage the Advisory Group flexibility to design the study to include other materials and technologies to be examined in their study and be inclusive of recommendations for follow on in the anticipated full piloting and demonstration phases.

<u>Further considerations regarding the scope of the proposed HB 23-1069 legislation</u>:

While HB 23-1069 is limited to plugging of oil and gas wells, it is highly recommended that the scope be expanded to include other geologic horizon penetrating wells that may also expose and have the potential for releasing greenhouse gases such as methane from underground formations.

It is strongly recommended that all wells drilled in Colorado, such as exploratory drilling, and even water wells that penetrate or result in methane releases, or penetrate coal seams or potentially hydrocarbon geologic lithologies/reservoirs; all must be plugged to prevent greenhouse gas releases, not just oil and gas production wells.

Other comments about the proposed legislation, HB23-1069:

1. In numerous locations in the draft bill, there is mention of the *COMMISSION*, but there is no definition of what commission. That needs clarification.
2. In the listing of members of the Work Group, there is no person identified from the Colorado Oil and Gas Conservation Commission. Surely that is an oversight, since that body is primarily responsible for oil and gas wells and their operational standards for wells in Colorado. (Is this the Commission referred to in various parts of the draft bill?)

Closing Comments:

My comments offered above result from more than 50 years of direct professional involvement in the natural resources industries, including multiple degrees in chemical/petroleum engineering with an emphasis in environmental management, plus employment with major oil and gas corporations, mining of energy minerals, and approximately 35 years founding and operating multiple businesses focused on environmental sciences and engineering. I am a more than 50 year registered professional engineer in Colorado. My current business is Boulder Innovative Technologies, Inc. and its subsidiary ZeoponiX, founded in 1987.

I offer to the legislature and appropriate implementing state agencies my gratis assistance from long involvement and experiences in the matters relevant to this bill, namely prevention and control of greenhouse gas pollution from wells, minerals and chemicals, and related technologies.

Thank you for the opportunity to provide public comment on this proposed legislation.

Richard D. Andrews, President Boulder Innovative Technologies, Inc.
P.O. Box 19105, Boulder, CO 80308
Registered Professional Engineer in Colorado, License PE 0011923 (since 1973)

LEAGUE OF WOMEN VOTERS® OF COLORADO

February 13, 2023

House Energy & Environment Committee
Colorado General Assembly
200 E. Colfax Avenue
Denver, CO 80203

Re: HB23-1069 Study Biochar In Plugging Of Oil And Gas Wells

Dear Members of the House Energy & Environment Committee:

My name is Ann Sutton, living in Westminster CO. This testimony represents the position of the League of Women Voters of Colorado (LWVCO) on the bill to create a working group in COGCC to recommend a pilot program to use biochar in the plugging of oil and gas wells.

We support the study and pilot program to identify another feasible approach to controlling greenhouse gas emissions from spent and orphan oil and gas wells.

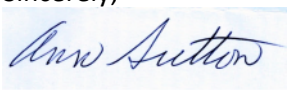
Laboratory testing within the study will determine the ability of biochar to absorb or adsorb methane and other chemicals found in a plugged oil and gas wells and the program will set standards for monitoring emissions before and after well plugging.

Last year we supported SB22-198 Orphaned Oil & Gas Wells Enterprise that created additional funding in the Department of Natural Resources for plugging, reclaiming, and remediation of oil and gas wells that have been abandoned by the operators. In 2021 the Colorado Fiscal Institute estimated well over 4000 abandoned or "zombie" (not in production for more than 5 years) wells in the state. https://www.coloradofiscal.org/orphan-wells/blog/

Another potential benefit of developing the biochar production industry is the use of waste beetle-kill pine as source material and perhaps in mitigation of certain wildfire dangers.

The League believes that an interrelated approach to combating climate change including through air pollution controls and is necessary to protect public health and defend the overall integrity of the global ecosystem.

Sincerely,



Ann Sutton Volunteer Lobbyist
League of Women Voters of Colorado
1410 Grant Street, Suite B-204
Denver, CO 80203