To: Dr. Randell Mills
copies to: Industry and Government

Dated September 15th. 2014

THE PRESSURIZED CIHT UNIT
Using saturated steam at 500 psig as electrolyte - Generated in a small adjacent pressurized electric kettle.

Note: This text and following sketch of the pressurized CIHT unit is a speculative concept of what could be a much more efficient and powerful unit than that extensively experimented with by your team at BLP.

Accepting that your encouraging progress with the more recent invention of the SF-CIHT has greater potential and promises a much cheaper and more compact product for the world market, I believe the elegant and simple definition of your earlier CIHT unit, enhanced with the possible boost of pressurization [with high pressure steam], can find a healthy worldwide market [as a complimentery option to the SF-CIHT].

I am sure this described concept, is not without some flaw or ommission [of the electrical infrastructure required], but is offered as a foundation for your team or any other party who you may designate, to vigorously develope.
My endeavours are submitted without any aspirations of securing a commercial or legal interest should any development proceed and be successful.

The steam passes from the top chamber via a porous anode disc and a porous [non conductive] catalyst containment disc, through the stack of catalyst discs [or loose beads fill], to the other catalyst containment disc and then the cathode disc to the outlet chamber.
This vertical cylindrical unit with the steam inlet chamber at the top, will have an effective stack height of say 36 inches and a disc [or loose fill] dia of 12 inches.

The shell, with an internal diameter of 12.06 inches will be made of a non-conductive [electrically] non-porous material [perhaps a composite material] of suitable thickness to contain the steam pressure. The design conditions of all pressure parts shall be generous to withstand temperature [and thus pressure] excursions that may occur during the three phases of operation [charge phase, discharge phase and idle phase].

The complete exterior of the pressure vessel will be applied with a vacuum jacket [like a thermos flask] such that little heat will be lost from the unit during operation in the charge or discharge phases or when idle.

A small, compact and simple electric steam generator or kettle [constructed of same material as pressure vessel for the CIHT unit and also equiped with a vacuum jacket for limiting heat loss] will provide a low feed rate of saturated steam [building slowly up to a final pressure of 500 psig and derived from a distilled water feed]that will be maintained throughout all three phases of operation. The total steam required to fully pressurize this experimental unit in terms of feed water to kettle, is approx. one tea-cup full.

In the event of over pressure due to electrolysis [in the charge phase] or a temperature excursion [during the discharge phase], bleeds from the top or bottom chambers will be automatically activated to re-establish the operating pressure and temperature. If some condensation is occuring within the CIHT unit then this will be handled with a steam trap serving the bottom chamber.

With regard to bleeds, [following experimentation, showing magnitude, frequency and causes of pressure/temperature excursions during the charge or discharge phases] it may be practical to initiate, on commencement of charge, a continuous micro-bleed from the bottom chamber [equivalent to 2 tea-cups of feed-water per 8 hr. shift]and to have a slightly larger bleed to automatically cut in when serious over press/temp occurs [that can not be corrected with the continuous micro-bleed]. The accumulative loss of steam with such a system could still be small and acceptable [energy wise] whilst enabling the unit to operate smoothely without ongoing operator interface.

CHARGE PHASE
When the steam condition in the CIHT unit has gradually increased and is stabilized at 500 psig, the charging phase may proceed and with a 36 inch total layer of catalyst discs to be penetrated, the voltage required may be substantial [perhaps in the range of several hundred volts]. When the charging energy approaches zero, the electrolysis [charge] phase is ended and the discharge phase can begin.

DISCHARGE PHASE
Only experimentation will indicate the optimum conditions of discharge or the consistancy, duration, magnitude of exported energy.
It is probable that temperature or pressure excursions will occur and will require focused attention to remedy.
One would not be surprised if the basic performance signatures of the pressurized CIHT unit were indeed found to be remarkable and encouraging.

Prospects of scaling up [if experimental impressive performance and system optimization are achieved] could be as follows:

Experimental unit - catalyst bed size - 12" dia. and stack height 36".
Production sizes catalyst bed size - 12" dia. and stack height 72".
- 18" dia. and stack height 54".
- 18" dia. and stack height 108".
- 24" dia. and stack height 72".
- 24" dia. and stack height 144".
- 36" dia. and stack hieght 108".
- 36" dia. and stack hieght 216".

The power rating of each size will of course depend on developed performance of prototype.

John Varney

I trust you find the above of some interest in that it would provide a secondary option to your promising SF-CIHT unit.

The following sketch of the proposed " Pressurized CIHT unit will show a vertical orientation and both top and bottom heads would be assembled first and then these attached in the necessary sequence to the shell section [already filled with catalyst discs [or loose fill].

THE PRESSURIZED CIHT UNIT