The Spirit of Innovative Solutions

Process Technology Process Development

EVISA Engineering presents the Zero-Carbon-Emission CPCE process
(Carbon Power & Chemicals Economy) to the Congress of the United States in
pursuit to the Green New Deal, Clean Energy and carbon-free Clean Coal

United States Senate
Dirksen Senate Office Building, 50
Constitution Ave NE,
Washington, DC 20510

February 14, 2019

President of the United States Mike Pence

Senate Majority Leader, Senator Mitch McConnel

Senate Minority Leader, Senator Chuck Schumer

United States' Senate's committees and sub-committees for:

- Energy to Chair Senator Bill Cassidy and Ranking Member Senator Martin Heinrich
- Water and Power to Chair Senator Martha McSally and Ranking Member Senator Catherine Cortez Masto
- Energy, Natural Resources and Infrastructure to Chair Senator Tim Scott and Ranking Member Senator Michael Bennet
- Rural Development and Energy to Chair Senator Joni Ernst and Ranking Member Senator Tina Smith
- Energy and Water Development to Chair Senator Lamar Alexander and Ranking Member Senator Dianne Feinstein
- Interior, Environment and Related Agencies to Chair Senator Lisa Murkowski and Ranking Member Senator Tom Udall
- Economic Policy to Chair Senator Tom Cotton and Ranking Member Senator Catherine Cortez Masto
- Communications, Technology, Innovation and the Internet to Chair Senator John Thune and Ranking Member Senator Brian Schatz

List of other proponents to the Green New Deal members of the Congress in Senate and Senators of the State of Maryland:

Senator Ms. Kirsten Gillibrand	Senator Joe Manchin III	Senator Ms. Kamala Harris
Senator Mr. Edward Markey	Senator Cory Booker	Senator Mr. Bernie Sanders
Senator Elizabeth Warren	Senator James Risch	Senator Ron Wyden
Senator John Barrasso	Senator Steve Daines	Senator Martha McSally
Senator Cory Gardner	Senator Amy Klobuchar	Senator Mazie K. Hirono
Senator Maria Cantwell	Senator Martin Heinrich	Senator Lamar Alexander
Senator John Hoeven	Senator Debbie Stabenow	Senator Angus S. King, Jr.
Senator Bill Cassidy	Senator Ben Cardin	Senator Chris Van Hollen

Other members, interested to the Green New Deal, might addressed on upon the discretion of Speaker of the Senate's President

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Dear Senators in the Congress of the United States:

We are very pleased to recognize the exceptional undertaking of the Congress members to pursue the Green New Deal bill and legislation in order to implement the achievements of the clean energy under the purview of the sustainable renewable energy for power generation, gasoline, and Mother Chemicals. We greet with gratitude these members to embrace the technological and economical achievements of the present and recent time for commercial use of Green Energy at large scale in the United States.

We hereby respectfully apprise the Congress of the convincing technological and economical none-competitive capability of the CPCE process in zero-GHG-emission for the five Stationary Sources of GHG emission that is culprit for nearly 75% of global GHG. The advantageous of the CPCE in upgrading of the existing fossil energy or in new installation plants is unequivocally indisputable to the experts of the Energy and Environment Committees, the United States Department of Energy and every other expert, which broach substantive basis for the Green New Deal bill and legislation.

With respect to the ambit of the Green New Deal bill we respectfully inform the Congress of our CPCE process; Carbon Power and Chemical Economy, with zero carbon emission, which is grounded substantively upon the fundamental principles for the re-use of the captured green house gas, the carbon dioxide and employment of the CO_2 as a new inexhaustible sustainable fossil energy resource now. We proudly stress to the Congress that, unlike other similar clean energy processes which lead to an increase of power generation and manufacturing costs, the CPCE is the first-of-kind process that lowers the manufacturing costs for gasoline, chemicals and power generation, i.e. CPCE performs an economically positive venue with a ROI return of invest in the margin of three to about five years. The CPCE is specifically designed in a manner that it can be implemented both in existing plants to benefit from and also for the new plants to install, particularly the new super-efficient hydrogen based power generation with a gross efficiency of nearly 90% that now envisions up to nearly 30% lower costs for power generation.

A short description of the CPCE with the last update of the ongoing patent application procedure with the United States Patent and Trademark Office of January 24, 2019 is enclosed to this letter for your perusal. Please kindly receive our willingness to provide our reasoning to the members of the Congress or any Congressional Commission if you wish to have any discussion opened and questions answered. We thank you for your attention in pursuit of sustainable clean energy for our nation, and remain respectfully with,

Very Truly Yours

F. Bairamijamal

F. Bairamijamal

Enclosed: List of recipients in the United States' House of Representatives
CPCE Short Description, 4-pages

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List of recipients in the United States' House of Representatives
to the EVISA Engineering's CPCE presentation of February 14, 2014

Speaker of the House: Congresswoman Nancy Polesi

Minority Leader: Congressman Kevin McCarthy

House of Representative's committees for:

- Energy and Commerce, Chairman, Congressman Frank Pallone, Jr.
- Natural Resources, Chairman, Congressman Raúl M. Grijalva
- Science, Space, and Technology, Congresswoman Eddie Bernice Johnson
- Joint Economic Committee, Congresswoman Eddie Bernice Johnson and Senator Mike Lee

List of other proponents to the Green New Deal members of the Congress

Congressman Eric Swallwell
Congressman Joseph Kennedy III
Congressman José Serrano
Congresswoman Ayanna Pressley
Congressman Ro Khanna
Congressman Antonio Delgado
Congresswoman Carolyn Maloney
Congresswoman Alexandria Ocasio-Cortez
Congressman John Lewis
Congresswoman Rashida Tlaib
Congresswoman Deb Haaland
Congresswoman Ilhan Omar
Congressman Earl Blumenauer
Congressman Joe Neguse

Members of the House of Representatives from the State of Maryland

Congressman Andy Harris
Congressman John Sarbanes
Congressman David Trone
Congressman Jamie Raskin
Congressman Dutch Ruppersberger
Congressman Anthony G. Brown
Congressman Elijah Cummings
Congressman Steny Hoyer

Other members, interested to the Green New Deal, might addressed on upon the discretion of Speaker of the House and Minority Leader

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CPCE process for sustainable Clean Energy with Zero-GHG emission

EVISA Engineering presents the CPCE process for carbon-free Clean Energy with significant cost reduction for the generation of power, gasoline, and manufacturing of primary chemicals ammonia, methanol and ethanol. Unlike to the other Clean Energy processes that lead to an increase of costs, the CPCE (Carbon Power & Chemicals Economy) is the first-of-its-kind non-competitive process, which reduces the costs because CPCE implies the re-use the carbon dioxide as a new fossil energy resource.

CPCE is designed in a way that it can be installed in an upgrading of all large or midsize scale existing plants or be installed in a grass root new plant. The economic features of the CPCE results to a ROI, return of investment of three to five years (depend on the installation of CPCE in the existing or a new plant with the actual sale prices of electricity, gasoline or the Mother Chemicals). This ROI results primarily from the lowering of the manufacturing cost or costs for power generation up to about 30% because CPCE employs the capture and electrochemical conversion of liquid carbon dioxide to syngas and oxygen along with recovering the waste heat of the conventional plants via carbon dioxide cycle.

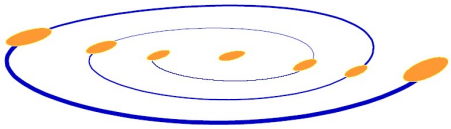
The versatility of CPCE allows both post-combustion and pre-combustion carbon capture of all five group of Stationary Sources of CO_2 GHG (according to classification of the DOE Carbon Atlas) i.e. the flue gas of coal, oil, and gas fired power plants or the chemical plants, which are culprit at nearly 75% of all GHG Green House Gas emission globally. The applicability of CPCE is presented in five block diagrams in the pending patent application as well in the enclosed diagrams. In its acme, CPCE performs the super-efficient hydrogen based fossil power plants with a gross thermal efficiency of 85% to 90% depending on the season, location of the site, extent of the installed fuel cell unit with optional solar panel system, if installed.

The fundamentals of CPCE are grounded on the two new thermodynamic cycles (1. and 2. Bairamijamal Cycle) and the high pressure, low temperature electrochemical conversion of the electrolyte -liquid carbon dioxide and water to syngas ($CO/2H_2$) and oxygen that is produced as GOX as well as LOX (gaseous and liquid oxygen).

From operational perspective, CPCE comprises first the CO_2 separation from the Stationary Source of CO_2 source via condensation, whereas the obtained liquid CO_2 is utilized as working fluid up to two CO_2 cycles that is integrated with the waste and process heat recovery. One CO_2 cycle, referred to as CO_2 power cycle, consists of a multistage CO_2 turbine and generator for external AC power dispatch. This cycle converts the wasted thermal energy down to nearly ambient temperature, corresponding with the critical temperature of CO_2 at 88° F. The second CO_2 cycle consists of a multistage CO_2 turbine, which drives the compressor (for Flue Gas or MP/LP syngas of a gasifier, for instance) and a generator for the AC current. The cleansed carbon-free flue gas is further subject of preheating prior to the off gas expander turbine, that contributes additional power on the driving shaft of power cycle. The generator of this cycle performs power that is needed for the internal back-up for the electrochemical conversion of CO_2 to syngas ($CO/2H_2$) and oxygen. The other backup DC power is generated by use of fuel cell supplied with part of the produced oxygen and hydrogen. Optionally, solar panel can be installed, which performs DC supply for the electrochemical conversion, while dispatching more AC power dispatch to the grid.

The excess liquid CO_2 (referred to as Export CO_2) obtained from the flue gas is further blended with purified water under high pressure, in order to provide a high concentrate aqueous CO_2-H_2O electrolyte. The concentrated aqueous CO_2 electrolyte is fed to the HPLTE-Syngas Generators (High Pressure Low Temperature Electrochemical Syngas Generator) that delivers high pressure oxygen stream from the anode and high pressure syngas stream in the composition of $CO/2H_2$ from the cathode compartment. The obtained HP gaseous product streams of HPLTE-Syngas Generator are also integrated in the power cycle via multistage syngas turbine and multistage oxygen turbine, each one with multiple re-heater sections. The syngas and the oxygen turbine drives primarily AC generator that provides dispatch power to the grid and in part DC current after the AC/DC converter. Hence, there is no need for external power supply for the electrolysis in a power plant according to the EVISA's super-efficient hydrogen based power plant, whereas the 1. and 2. Bairamijamal Cycle is combined with the classic Rankin and the 2. Ericson Cycle).

The four primary products of CPCE are; additional electricity to power grid, gaseous oxygen GOX (e.g. for oxy-fueling, gasification), liquid oxygen LOX for export and the chemically pure syngas $CO/2H_2$ for final conversion to various hydrocarbon products, e.g. transportation fuel, methanol, DME, ethanol and fertilizer (over the conversion of syngas to hydrogen, then with air nitrogen to ammonia).



The technical and economical essentials of the CPCE is grounded on the basis of these two new thermodynamic cycles, entered in technology effective the CPCE patent application along with the HPLTE- Syngas Generator. The first new thermodynamic cycle encompasses a liquid-gaseous carbon dioxide as working fluid for power cycle that includes waste heat recovery, regenerative heat exchange and the supra-heating of CO_2 e.g. up to 1400° F and 250 bar. By operation of the second new thermodynamic cycle, high pressure ultra-superheated steam is generated by sequential combustion of hydrogen (preferably obtained from gasification process) and oxygen (obtained from HPLTE-Syngas Generator). In the context of CPCE, this kind of steam generation is referred to high pressure ultra-superheated Direct Steam that is generated by special torches. This kind of torch is akin to the advanced hydrogen-oxygen injection in modern jet engines (e.g. SABRE engine) or the plasma torches. The application of CPCE, by operation of both above cycles and the HPLTE-SG in combination with high pressure gasification, combined with the Rankin Cycle and the 2. Ericson Cycle, leads to the super-efficient hydrogen based fossil power plants that are capable to perform a gross thermal efficiency up to the margin of 85% to 90% (depending on season/location of the plant). Respectively, depending on season and the location of the power plant a cost reduction in margin of 30% and to 35% if fuel cell units installed.

The operation of the first new thermodynamic CO_2 cycle is substantiated by sufficient technical available information and equipment on the market. In regards to this section, the CO_2 turbine as well as syngas and oxygen turbine do not endorse any new field or areas subject matter of lengthily research. The primary field of research, required for CPCE is for the development of a test rig for the HPLTE-Syngas Generator that is fed with high pressure liquid CO_2 and water for evaluation and determination of the best kind of electrode material as well the determination of DC current efficiency for the electrochemical conversion. The scientific research for the electrochemical conversion of CO_2 is carried out at low pressure and CO_2 concentration in aqueous electrolyte (e.g. by George Olah et al) as well as under gaseous state (e.g. by C. R. Graves et al).

The second part of research comprises the construction of two kinds of torches, one torch for primary high pressure Direct Steam generation (applicable for HP section upstream of the steam turbine), and the second torch for steam re-superheating (applicable for steam upstream of intermediary and low pressure sections IP/LP of the steam turbine).

1) Brief description for transformational outcomes and the benefits of CPCE

In general, the CPCE fulfills all objectives of Power Initiative Act, Clean Energy Act, Clean Coal as well as the Energy Independence and Security Act set of 2007, in fact, it attained some goals additionally. These are namely:

(a) Reduction of energy reliance of the U.S. on foreign resources, e.g. crude oil

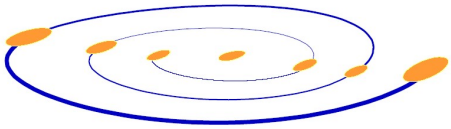
(b) Availing the abundant coal reserve for Clean Energy

(c) Viable solution for the global climate warming and control of GHG

Additionally, other goals were also accomplished in order to address other current challenges; i.e.:

(d) Commercial use of waste material CO_2 and waste heat sources that is traditionally wasted to atmosphere through the cooling tower and the chimney for power generation

(e) Green Energy or in the context of previous description, Ultra Clean Fossil Energy is ascribed to the CPCE chemical and power plants due to the capacity of Zero Carbon Emission, along with elimination of other emissions that is attained by the deletion of the chimney. For instance, there are no longer pollution of Black Carbon, mercury, antimony, NOx, SOx, and the radioactive constituent from fossil energy resources into the atmosphere



(f) Introduction of new surmounting measures for facilitation of super-efficient power plants, whereas the cooling tower and chimney are removed from the scenery of power generation. These are the main pulpit for loss of over 45% of the thermal input energy from the fuel applied.

(g) Thus the way of nuclear power generation can be abandoned by economical reasons now.

(h) The attainment for capturing liquid CO_2 within economically inexpensive conditions, resulting in the sustainable reuse of carbon dioxide to high-end commodity products like jet fuel, gasoline, methanol, DME, ethanol, fertilizers, etc., maximizes the efficacious use of fossil energy by preserving the existing resources. Due this fact, the sequestration of carbon dioxide is no longer considerable. The EOR application of CO_2 for depleted oil fields via CPCE process shall be analyzed case by case.

In pursuit of Clean Energy, there are three outcomes (a), (b) and (c) expected. Thus the CPCE re-uses the CO_2 from all stationary CO_2 sources, provides sustainable energy. The Stationary source of CO_2 emission, as new resource of fossil energy, comprises with a potential of about 65% of U.S. CO_2 and up to 75% of CO_2 emission globally (with reference to annual report of IEA International Energy Agency). Therefore CPCE is capable to reduce GHG at technologically feasible and commercially beneficial scope. The second aspect under (b) above, offers the embarking of CO_2 as a new inexhaustible fossil energy resource for leveraging electric power (both, for re-powering of existing as well as for new fossil power plants) and high efficient manufacturing of commodity chemicals. Considering the United States sources of all stationary CO_2 emission as of 2014, the re-use of CO_2 with water to syngas, is equal to 2.4 times equivalent carbon balance to all imported crude oil in United States in the same window of time. Hence, one of the prime goals of Clean Energy Power Initiative is accomplished. The ballpark calculation of CPCE application for the flue gas of an existing conventional 1000 MW coal power plant unveils an amortization time less than 4 years for an overall plant investment costs of 1,095.83 MM$ (corresponding to a syngas value at 0.1824 $/Nm³) without hydrocarbons manufactured from the syngas. This level of syngas generation costs conquers the existing state-of-the-art processes i.e. steam reforming of natural gas in around 30% lower costs.

The achievement of lower costs down to this level is facilitated primarily with the feedstock; CO_2 and waste heat resource are both virtually of zero value (d), while the water for the electrolysis and supplementary natural gas are both of low value.

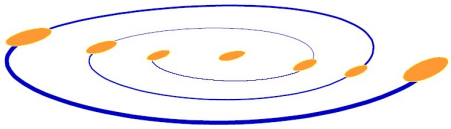
The third chief perspective of CPCE is in connection with the utilization of coal as the primary fossil energy resource for chemicals and power. Hence coal delivers the highest amount of CO_2; coal is now the favorite energy resource ahead of crude oil and natural gas. Thus the CPCE opens the utilization of abundant coal reserve for clean electricity, gasoline and other hydrocarbons. Specifically, the utilization of coal via coal gasification enables to perform ultra clean fossil energy (e) above, while the highest efficiency of fossil resource will be achieved (f).

With respect to CPCE potential for commercially profitable re-use of CO_2 to syngas and value-added final products with oxygen (e.g. for oxyfueling), the presently prevailing application of CO_2 for sequestration is no longer favorable from economics perspective.

With regard to new plants or upgrade of existing plants, the installation of CPCE leads either to deletion or reduction of use of a number of commonly installed plant sections and/or plant equipment. For instance, there will no longer be a need for costly high maintenance gas turbine, Acid Gas Removal Unit, Air Separation Unit (for oxygen supply), wet cooling tower, chimney, extensive water treatment, and large scale costly HRSG section according to Rankin Cycle. By virtue of CPCE super-efficient power generation, there is no longer any economically reasonable foundation for pursuit of expensive electricity by way of nuclear power generation.

2) Identification of the principal

CPCE is filed first for patent application in United States with registration code of US 61/850, 685 and the priority date of February 21, 2013. The international PCT application was entered to as of February 19, 2014. As of November 2014, the CPCE is deemed as unique, patentable process without any kind of interference or infringement to other few commercially processes. Thus as the same date, the CPCE is referred to a non-competitive process due the proven fact, that the few like-minded heralds of Clean Energy are not deemed as competitors. Name of those likeminded research and development persons can be outlined upon request.



By virtue of above security, the nomination of the inventor for outstanding engineering and scientific prizes (e.g. Queen Elizabeth Prize and Nobel Prize) is ongoing for 2015. Further publications in oil and gas, chemical and power plant magazines at international stage are in preparation.

EVISA Engineering pursues the commercialization of CPCE in collaboration with recognized Clean Energy companies and investors e.g. with chemicals manufacturing and power generating companies, as well as with renown engineering companies.

In addition, collaboration is also sought with a jet engine manufacturer specialized with new H_2/O_2 jet engines (e.g. SABRE jet engine) for the CPCE's torches. The test rig for HPLTE-Syngas Generator (with ca. 10 kinds of electrode materials to be tested) and the two kinds of CPCE's torches requires ca. 1.5 to two years for design, construction, and commercial run.

Further references, amenable by the website:

CPCE Short description with the 5 Block diagrams for CPCE applications associated with Stationary CO_2 sources, either for existing plants and new plants with the map of United States connection with repowering/retrofitting of existing fossil power plants

Background and resume in hydrogen production, power generation, and Clean Energy of the inventor

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Market potential of CPCE as regards to retrofitting of existing fossil power plants for additional power, oxygen and syngas supply in the United States only