Summary description of Holistic Solar technologies

Over the past 50 years Holistic Solar personal were involved in the research development and commercialization of several technologies. These included liquid crystal displays in the 1970s (RCA-Optel) lasers photo-voltaic (Chronar) batteries and the hydrogen economy.

Based on the experience of the past 50 years and hopefully benefiting from the past effort Holistic Solar holding was formed in 2016 the United States www.holistic.solar . The company builds on the Greek meaning of the word "holistic", empathizing that all problems should be solved within their context, considering the relationship of all the elements to the whole in harmony with man and the environment.

The charter of Holistic Solar is to participate with technological innovations in the changeover in the energy industry from carbon based fuel sources to carbon free, clean renewable energy source, the sun.

The single central product of Holistic Solar is trade named H-REBOX (*1). H-REBOX is a universal clean energy generation and storage system comprising of 3 subsystem; H-SPV (*2) the power generation, Air Miner and the REBOX with the overall storage and control functions.

Several of the concepts described in the document below are covered by patent pending and patent applications. These are marked by (*P).

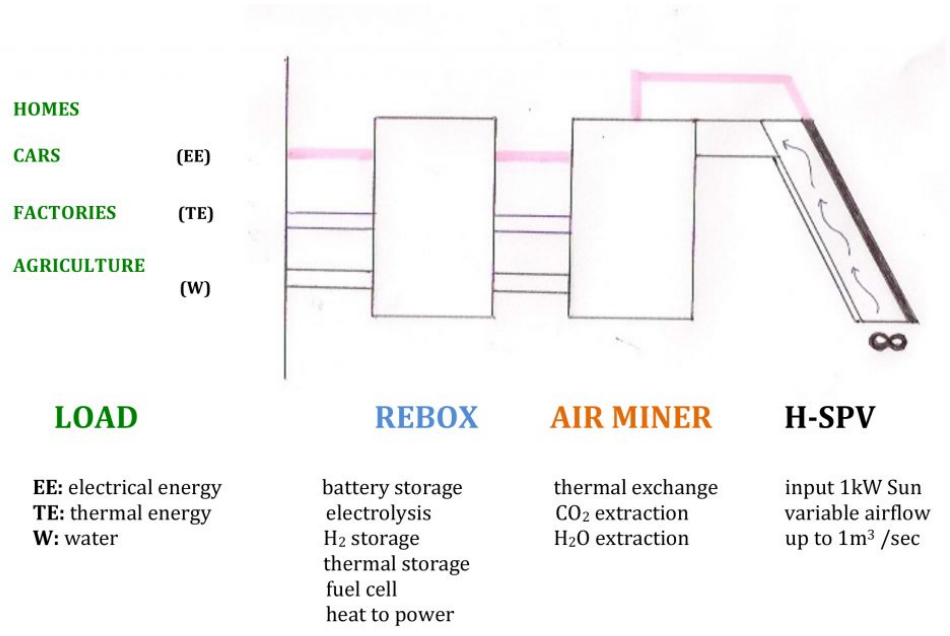
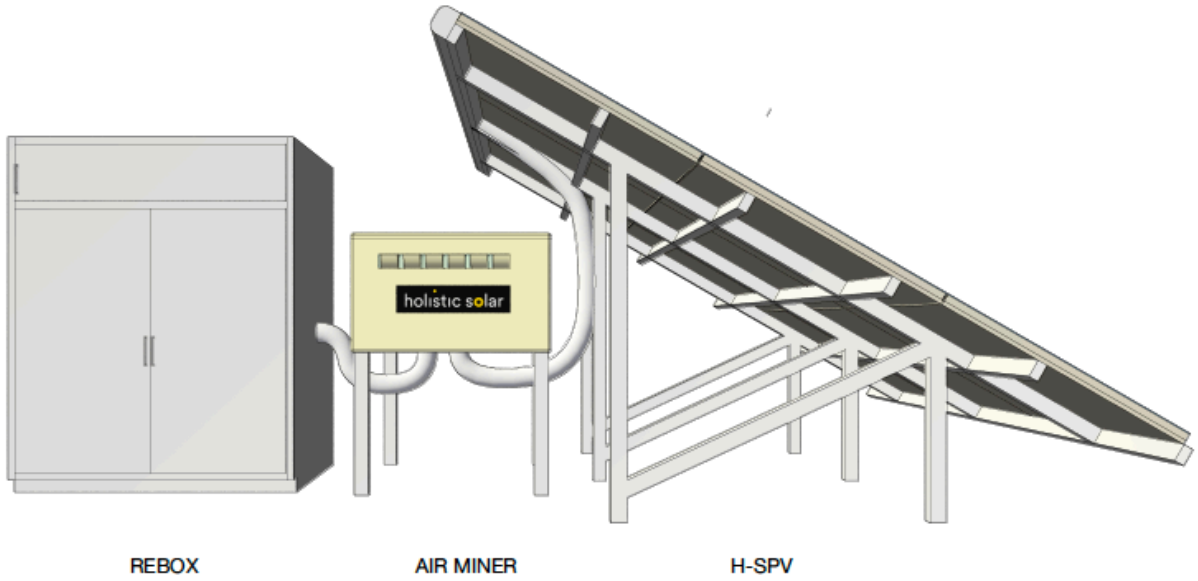
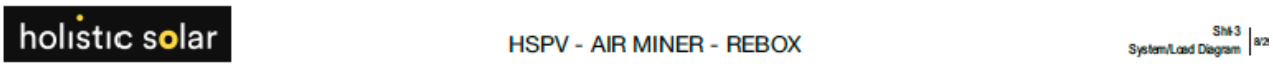


Figure 1

3 Dimensional image of the H-REBOX system:





The REBOX

Renewable Energy Box (see the spec sheet) is a universal storage element that can store the electrical energy, the heat energy, water, hydrogen, oxygen, CO2 in different form and different fuels.

The REBOX consists of the following subsystems (*3-*8)

i) H-SPV generation
ii) Battery storage
iii) Electrolyzer
iv) Hydrogen storage
v) Thermal storage and delivery (heating and air-conditioning)
vi) Hydrogen purifier
vii) Catalytic fuel converter
viii) CO2 sequester
ix) H2 compressor
x) Distilled water processor
xi) H2 and fuel tanks
xii) Power electronics, converters, inverters, chargers
xiii) Control logic and electronics with a remote monitoring

The list above describes all the subsystems of the REBOX that are available with the product. The functional diagram of the basic REBOX is shown on figure 2.

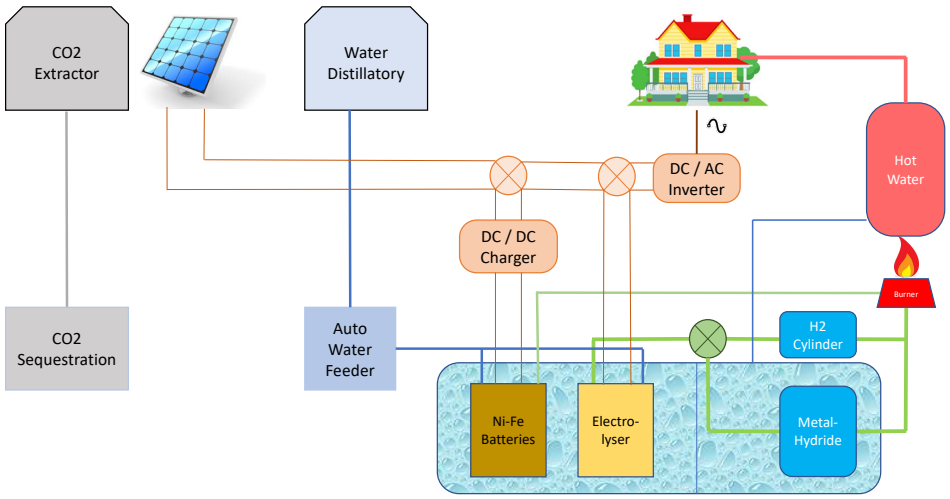


Figure 2

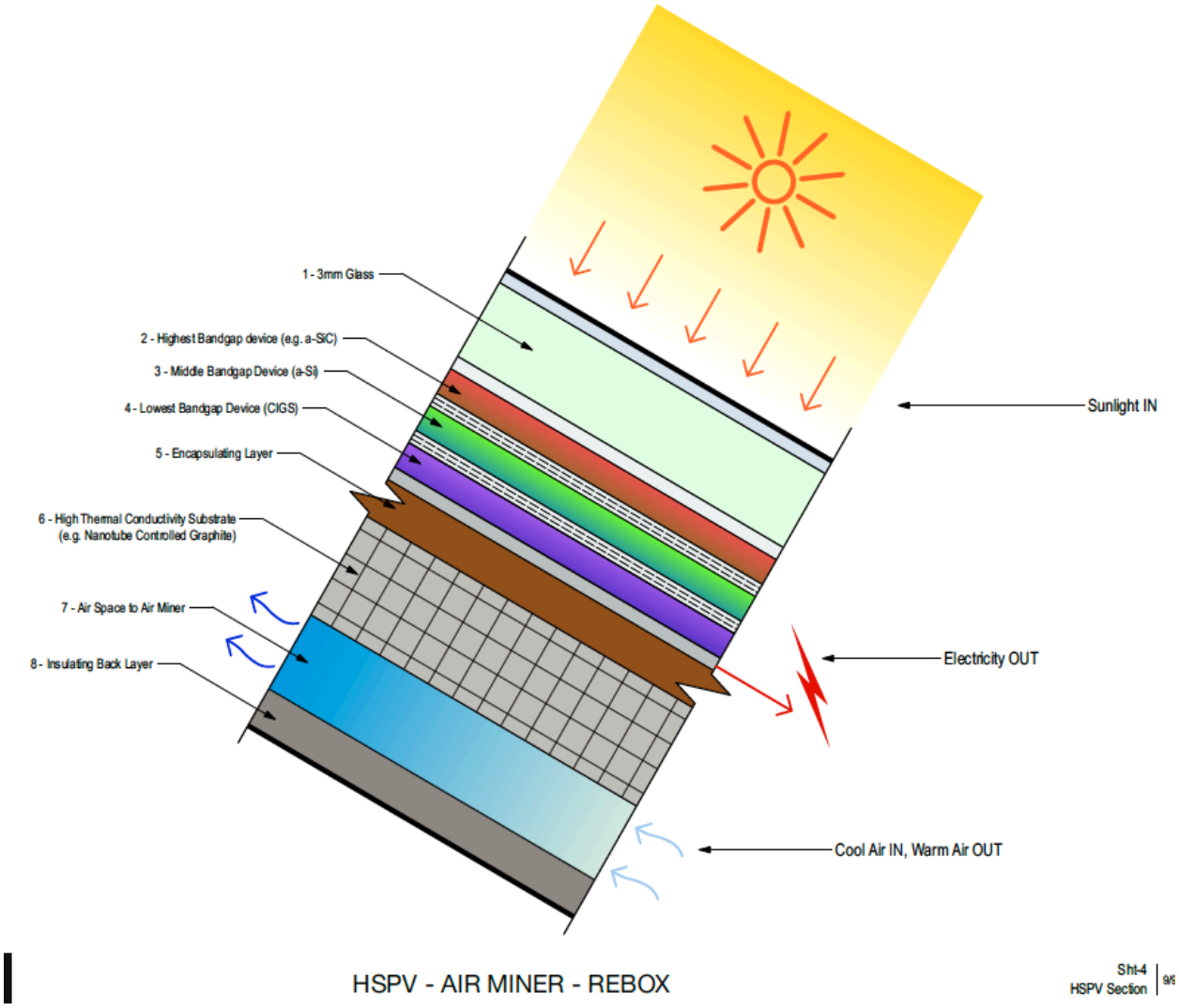
The proprietary technology involved in the Holistic Solar REBOX and the REBOX subsystem are best described by listing the titles of the patent pending technology.

The H-SPV construction:

The schematic diagram below shows the construction of the Holistic Solar SPV, H-SPV module.
The electrical conversion device consists of multi layer thin film semi-conducting PV devices.
The smallest band gap material is CIGS device. The central device is a-Si. For a PV duo these two layers are used.

The high band gap material can be either a-Si or based on ZnO.

The most important aspect of H-SPV is also to extract the heat generated in the H-SPV module. This heat extraction is done with moving air behind the device. The heat so taken out by the air is heat exchanged in the Air Miner with the water that is circulating from the REBOX storage device. Thus automatically the collected heat is stored in the hot water tank located in the REBOX.



Holistic Solar patent pending proprietary technology associated with the Holistic REBOX system

(*1) The first patent pending Holistic Solar technology covers the extraction of CO2 from the atmosphere using holistic PV installations.

(*2) Covers the extraction of CO2 from the atmosphere using any third party manufactured modules and the existing installations.

(*3, *4, *5, *6) Covers the details of the extraction and the sequestration process.
P3- the materials and processes used during the extraction
P5- processes and materials used in sequestration

P6- processes and materials of sequestration for graphite based commercial materials and products

(*7-*8), IP related to the REBOX
P7- integration of NiFe batteries with hydrogen production and stores
P8- Novel method to electrolyze water

(*9) P9- Catalytic techniques to remove the hydrogen and CO2 from synthetic methanol used for the purpose of hydrogen storage

(*10, *11, *12) Processes and material associated with the Air Miner

(*13, *14) Novel materials and device structures for high Band gap semi conductors for PV application (a-SiC, ZnO).

(*15, *16) Novel method for the manufacture of multi-junction thin film modules. (SVDS-Stationary Vacuum Deposition System), (deposition of monolayers)

(*17, *18) Novel nanotechnology based electrodes for NiFe batteries

(*19, *20) Novel high thermal conductivity substrate materials for multi-junction thin films.

For potential clients and partners after execution of NDA, Holistic Solar will deliver the details of the applicable patents pending or patent applications that maybe involved in a Co-operation with Holistic Solar.

Products specifications

By the functions the REBOX product is divided in to 3 different functional categories:

- **REBOX-E**, This product is primarily an energy source optimized for the delivery of electricity only. The electricity is stored in NiFe batteries and hydrogen. The hydrogen can be reconverted to electricity, either using a fuel cell or a heat to power turbo generator.
- **REBOX-ET**, REBOX delivering both electrical and thermal energy.
- **H-REBOX-ET** is the complex overall system where the H-SPV module is used extracting both heat and electricity. It also includes the full function Air Miner to extract humidity and CO_2 from the air. The REBOX storage system includes the storage and delivery of heat, an option of hydrogen conversion into electricity either by using a fuel cell or heat to power turbo generator. It also includes the extraction of humidity from the air and the production of distilled water. As a final option through the Air Miner the CO_2 can also be

extracted and can be sequestered in different industrially useful products such as synthetic methanol and graphite.

The Holistic Solar power generation and storage can exactly be fitted to the specific needs of the client. Some of the standard products are describes on spec sheets designed to fit a generic needs.

The first such spec sheet

Spec sheet 1. – REBOX/B. The first simplest REBOX storage system only utilizes battery storage without the other elements including the electrolyzer, hydrogen storage and water supply. This is the only system where the company offers only 5 years guarantee for the batteries and uses not Ni-Fe batteries but the $LiFePO_4$ product. The company recommends that the user/buyer examine the somewhat more complex but complete REBOX storage system (Spec sheet 2) and compare the cost advantages of the two, before making a decision.

Spec sheet 2. – The 10kW residential solar. This product is designed for a large residence on the latitude of New York. It includes electrolysis, hydrogen storage, water management and thermal storage. It does not have the CO2 extraction and sequestration but complete thermal management of the residence including heating and air-conditioning can be build into the REBOX.

Spec sheet 3. - The REBOX lab. This is a special purpose 25kW H-REBOX designed for the study and extraction and sequestration of the carbon dioxide using the H-SPV modules. This is the device that Holistic Solar coordinated CO2 extraction study from the atmosphere utilizes.

Spec sheet 4. – Solar hydrogen farm. The REBOX as a means of clean energy storage capable of accepting hydrogen produced in areas of highest insolation and delivered as bottled sunshine anywhere to REBOX owners. The SHF using H-SPV for electrolyzes and also utilizing the pure medical oxygen produced is the most profitable business in manufacturing and trading electricity, H_2, O_2, distilled water and thermal energy.

Spec sheet 5. – Clean EV charging station (H-EV). Weather it is B-EV (battery electrical vehicles) or H_2-FC operated EV an appropriately sized REBOX is the lowest cost solution capable on insuring no carbon footprint for the fuel. Residential H-REBOX can also be used to fuel whatever EV the owner user has. Further important aspect of the H-EV station, it can also contain a fossil fuel reformer. That means that either synthetic methanol or other kind fossil fuels can be used in the clean EV station. This is accomplished by reforming the fossil fuel catalytically using the hydrogen as the clean fuel and ad sequestering the CO2 in form of graphite that will

be purchased by Holistic Solar and manufactured into an element of the solar industry.

Spec sheet 6. – 1 MW community solar. This application of the REBOX product is particularly suitable to deliver clean electricity, H_2, O_2 and water to a given community. Not only are the different forms of energy and materials clean without a carbon footprint but even in high latitudes like New York, the cost of any form of energy is guaranteed to be minimum 20% lower cost than the user now pays for centrally delivered electricity and utility.

Spec sheet 7. – Dispatch able clean electricity for utilities. The fact that the REBOX product is completely scalable in all aspect means that utilities can also use it, and take advantage of any cost reduction and lack of carbon footprint. At the same time it should be noted that since the sun directly delivers the energy anywhere in the planet, the cost of transmission the great for the utilities and the pipeline for natural gas are not needed. This alone reduces the cost of locally produced distributed energy resources (DER) compared to the cost the user have to pay for the utilities or the natural gas suppliers.

Spec sheet 8. – Water distillation and purification. For the water treatment the thermal low-grade waste heat energy can also be used with the help of heat pumps. The marketable product can be either distilled water or drinking water fortified by different nutritional or chemical elements.

Spec sheet 9. – REBOX H_2 for natural gas replacement. Hydrogen produced on solar farms with high insolation is not only clean, but can be as low cost as 25% of a MJ of natural gas. Solar hydrogen farm located near transmission pipes can be used to replace natural gas in delivering the fuel for thermal energy.

Spec sheet 10. – REBOX for synthetic methanol production.

Spec sheet 11. – REBOX for carbon sequestration as graphite. As H-REBOX as capable to extract CO_2 from the atmosphere bring it into the REBOX storage as a carbonate dissolved in alkaline water. From this solution the carbon can be sequestered in many different forms. If it is sequestered as graphite then Holistic Solar will purchase the materials for structural elements used in the H-REBOX product.

Spec sheet 12. – The REBOX super factory. The minimum size of the REBOX super factory processes annually 25 MW of H-SPV modules and can build REBOXes annually approximately 5000 residences.