

Electricity Generating System

1- Purpose

Existing electricity generating methods; such as coal-fired, nuclear, and hydrocarbon-releasing power plants; are expensive and release carbon into the environment. This proposal offers new electricity generation system which (1) does not pollute the environment, (2) can be deployed onsite at the end user location, (3) operates continuously 24 hours per day without maintenance, and (4) produces power at much lower cost.

Carbon in the earth atmosphere blocks the nighttime radiation of heat back into space (to balance the daytime heat arriving from the sun) and, over time, the accumulation of heat causes global warming. For example; if Los Angeles county receives 100 UOP (units of power) on a given day and, due to carbon in the atmosphere radiates back to space 99 UOP at night, the difference of 1 UOP per 24 hours will cause accumulation of heat which adds up over time; this is the global warming mechanism.

Turbomachinery Engineering is offering a new-and-unique system which needs development (Phase 1, 2 years duration) and production (Phase 2, 1 year) at a total cost of about \$20M. The electric generating stations will produce clean electricity at no cost, except for the equipment procurement and installation costs, and can be located onsite anywhere in the world.

The inventor and principal Investigator is Dr. Yousef Jarrah and, in order to protect novelties and to guarantee legal protection; at the start of Phase 1, associated patents shall be submitted in the USA, Europe, and Japan. The integrated system architecture as well as aspects of the workings of its subsystems are patentable.

At the most fundamental level, the product promises zero-emission technology and an efficient way to produce electricity in commercial quantities. A true carbon footprint eliminator.

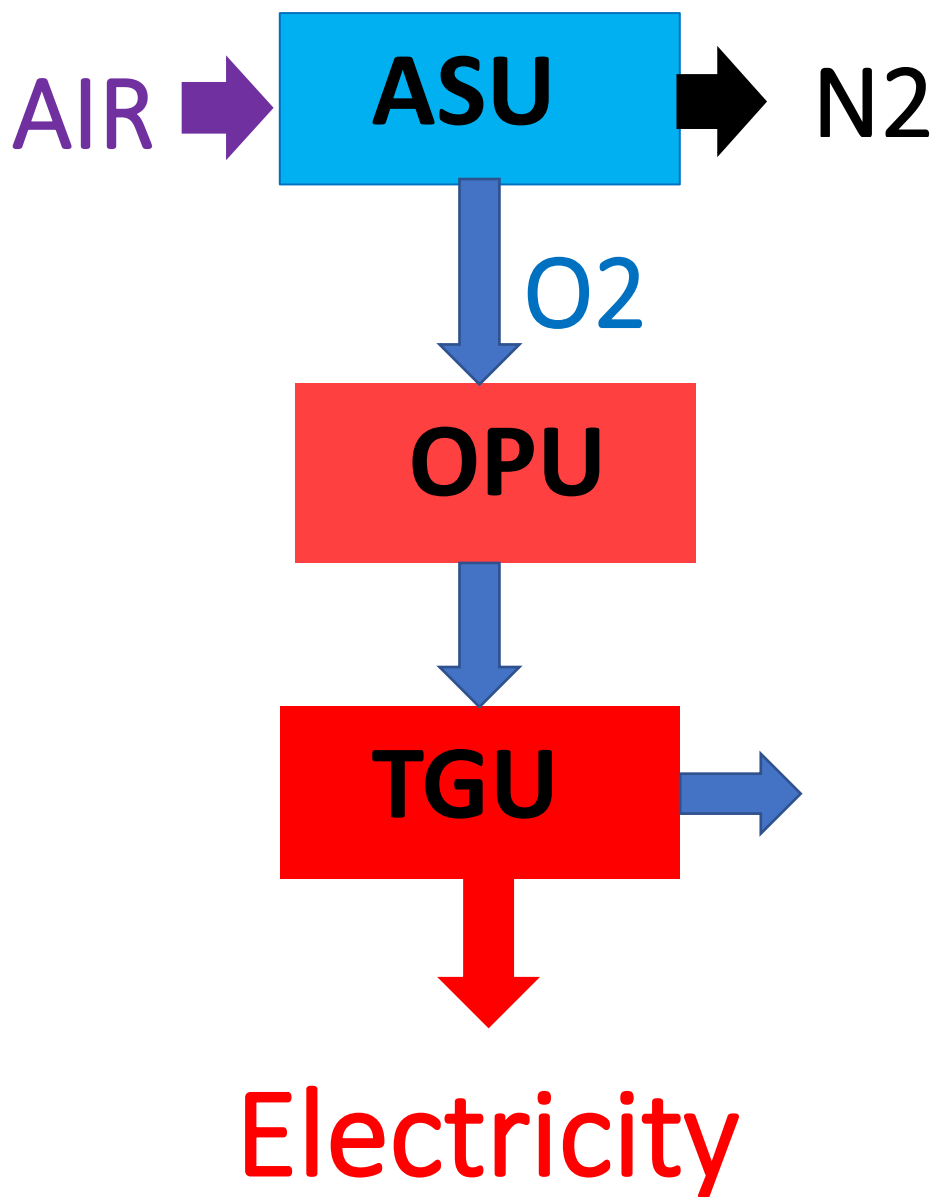
2- System Architecture

The system consists of three (3) engineered products whose volume is about 3 bedrooms apartment, and uses Oxygen (O₂) as the process gas. When expanded, O₂ creates huge amount of power, much more than air or any other element. The system, in single or parallel arrangement for high power applications, can create from 500 KW to 100 MW.

The system consists of Air Separation Unit (ASU) which accepts ambient air, separates air into O₂ and Nitrogen (N₂), delivers N₂ into the environment, and delivers O₂ into the Oxygen Processing Unit (OPU).

The OPU accepts pressurized O₂, and automatically controls its release rate and frequency such that the desired quantity, temperature, and pressure are delivered into a Turbo-Generator Unit (TGU).

The TGU accepts precise quantity of hot pressurized Oxygen, converts heat and pressure into electric power, and releases cold O₂ into the atmosphere.



3- System Novelties

The first patentable aspect is the overall system design architecture. The three subsystems (ASU, OPU, TGU), functioning together and in controlled thermodynamic communication with each other, are essential to overall performance.

The second essential attribute is the electronic management of the OPU such that Oxygen flow, frequency of release, and burning rate are performed in a precisely controlled process; with exact deliverables such as turbine flowrate and inlet temperature and pressure.

The third invention is the structure or configuration of the TGU. The number, turbine type (radial, axial, or mixed-flow), and configuration of turbine wheels are selected for optimal performance. And because more than one TGU may be required to deliver the desired power, unique parallel arrangement is utilized; this configuration is essential because there is a temperature upper limit at the turbine inlet.

Fundamentally; the product utilizes two essential-and-controlled frequencies, the first is the Oxygen release frequency of OPU, and the second is the rotational frequency (RPM) of the TGU.

4- Power Spectrum and Conclusions

The system power spectrum range is from 500 KW to 100 MW. Depending on the achievable operating Oxygen temperature, pressure, and mass flowrate; the system may consist of single or

multiple ASU's and TGU's. The number of ASU's need not be equal to the number of TGU's.

Usually one of each of the three products is sufficient to produce small output power; however, parallel units are required for increased power output. This is because output power is proportional to the Oxygen mass flowrate, so more ASU's are required for increased power. Shown below is a possible parallel configuration, which is also another unique and patentable aspect of the product.

At the most basic level, the novel electricity generator is a true carbon footprint eliminator because it uses Oxygen only as fuel. The TGU accepts hot high-pressure Oxygen, expands and cools the flow, then releases it back into the outside environment.

Like existing systems such as gas and steam turbines, fuel heat and pressure are transformed into power; however, unlike existing systems, the proposed system releases no carbon.

It will take three (3) years to make the system commercially available to end users; and the estimated cost of development, verification, optimization, and transition into mass production is about 20M USD.

The system puts an end to the root cause of global warming, currently caused by power plants which continuously release carbon into the environment, by switching into O₂ as the process gas. Thermodynamics-wise, carbon blocks proper balance between incoming-and-outgoing heat radiation on planet earth.

