ADAM, Intelligent integrated self-enhanced photovoltaic panel with rainwater harvesting for irrigation, unit cooling and cleaning

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Abstract: -. **Invention technical field is the areas of: Photovoltaic solar panel for electricity production, desertation ground effect through the forthcoming extensive use o solar panels, Rainwater harvesting, Irrigation and ground fertilization. The main idea of the invention is to collect rainwater on the lower edge of a photovoltaic panel and store it in a tank. With this water we subsequently can: irrigate the land for agriculture use, collect local or away the water for any other use, refrigerate the photovoltaic back or front panel, clean the glass of the panel surface.**
Results are soil cultivation for plant or animal production, greenhouse effect improvement, photovoltaic panel lower temperature with 30% efficiency, photovoltaic front panel glass cleaning with better efficiency. All process are handled by PLC, a programmable Logic Computer. According to the desired use there are 7 system configurations: lake reservoir fill, animal farm irrigation, back cooling, front glass cooling, dual cooling, front glass cleaning, Full feature system.

***Key-Words: -Photovoltaic*, irrigation, global warming, Agrorobots**

I. INTRODUCTION

A. Field of the Invention

Invention technical field is the areas of:

- Photovoltaic solar panel for electricity production.
- Desertation ground effect through the forthcoming extensive use o solar panels.
- Rainwater harvesting.
- Irrigation and ground fertilization.

B. Current level

Bible research refers:
Old testament , Genesis 3
22 Then the Lord God said, 'See, the man has become like one of us, knowing good and evil; and now, he might reach out his hand and take also from the tree of life, and eat, and live for ever'—
23therefore the Lord God sent him forth from the garden of Eden, to till the ground from which he was taken.
24He drove out the man; and at the east of the garden of Eden he placed the cherubim, and a sword flaming and turning to guard the way to the tree of life.
Where till is = To prepare (land) for the raising of crops, as by plowing and harrowing; cultivate.

We name this new photovoltaic after the first farmer, ADAM.

The idea for the invention gave the idea to prepare a huge photovoltaic park of 6000 acres at my home city of Kozani, Greece. There and all around the globe mankind violate this fundamental God's will by replacing crops raising with metallic photovoltaic scaffolds. The main concept is ground fertilization for animal graze. The water is collected through the photovoltaic panel for ground irrigation as the vital first step to give life to the desert of photovoltaic parks.

C. Soil agricultural use and cultivation

The forthcoming years land fields will be shifted from agriculture use to electricity generator fields. These fields for half a century will be devoted to non food industry.
As a principle and as a practical use this is unacceptable. God Angels taught humanity to cultivate area of

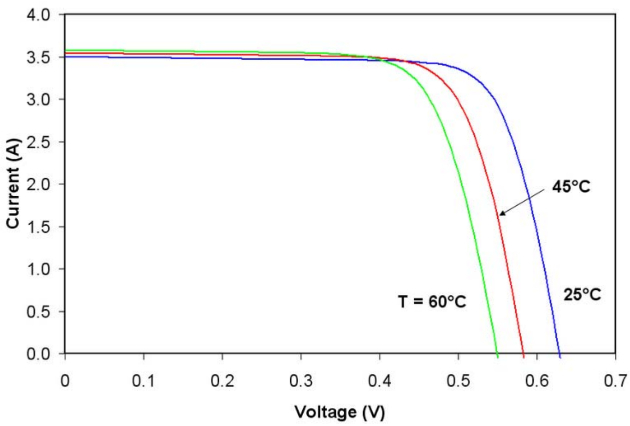
agricultural land thousands of years ago. Human race must reserve this last resort of land specially in our times with all these so called climatic changes.

D. Rainwater Harvesting & Irrigation

Rainwater Harvesting is a very old technique. By collecting rain water at a huge photovoltaic park we can cover any irrigation load and mainland need. The sky reservoir has practically unlimited water capacity. [1, 2, 3, 4, 5].

E. Cooling the photovoltaic panel

Modern Photovoltaic panel they suffer from high temperature [6, 7, 8, 9, 10]. The amount of electricity that they can accumulate is lowered radically with temperature increasing as in the table below.



The table indicates that a 20 degree elevates Voltage output of the photovoltaic panel from 0.4 to 0.55 volts. Therefore we try to cool down the photo cell.

F. Cleaning the photovoltaic panel

Photovoltaic front panel glass are getting dirty from dust, seeds, chemical rain etc. This dirty is expressed in percentage of the surface covered by spots. A negative processed photo of a panel proves this coverage. [11, 12, 13, 14]

The white spots prevents light to enter the panel. Every single spot must be cleared away to increase panel efficiency.

II. DISADVANTAGES AND ADVANTAGES

A. Panel temperature

Current technology disadvantage is

- photovoltaic panel electricity generation efficiency decreases with panel temperature.

We convert it into an advantage with our invention

- *Back inside panel refrigeration through a closed water cooled loop.*
- *Front glass panel refrigeration through a water spraying system.*
- *The grass below reduces total system temperature through ground water vaporization*

B. Panel cleaning

Current technology disadvantage is

- photovoltaic panel electricity generation efficiency decreases with dust, chemical or other spot on the cover panel glass..

We convert it into an advantage with our invention

- Cleaning while water spraying with
- *a windshield pantograph type cleaner*
- or roll brush.

C. *Fotovoltaic desert*

Current technology disadvantage is

- In the near future million acres of fertile ground fields will be covered with plastic and metal solar panels. Results will be *desertation temperatuture increase, greenhouse effect because the reduce of CO2 plant incorporation.*
- Water apart from cultivation is necessary for industrial use.

We convert it into an advantage with our invention

- By bringing water resources next to the panels we permit agriculture or animal farm use.
- The grass below the panel helps greenhouse effect.
- Capability to create unlimited water resources to open reservoirs for industrial use

III. DRAWINGS

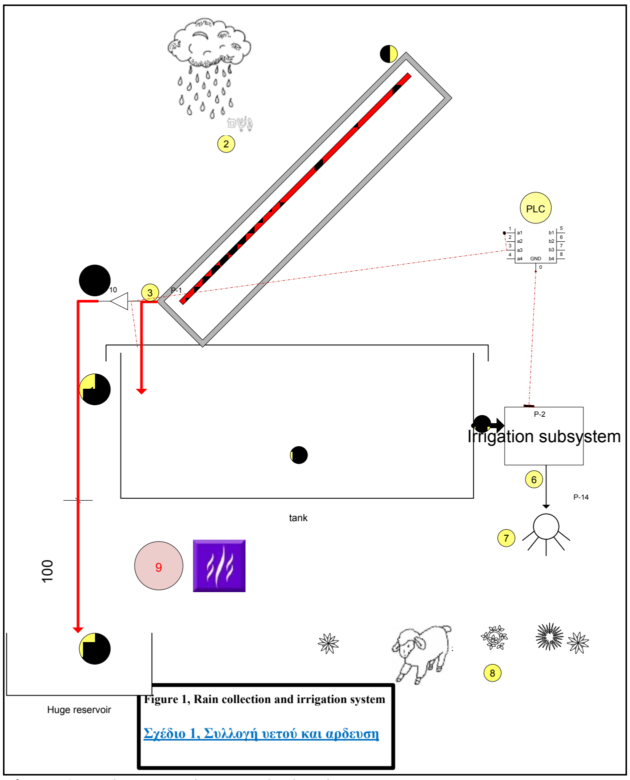


Figure 1, **Rain collection and irrigation system**

There are 13 major components:

1=The commercially available Photovoltaic unit
2=Rain falling over the cell surface rolling down to 3
3=Horizontal collector that guides water to the tank 4
4=Tank open or sealed according to application
5=Pipe under pressure from water tank to irrigation subsystem 6
6=Various types commercially available Irrigation subsystem.
7=Spray, drop brinks water to earth.
8=Grass, plants or other types of agriculture.
9=Cooling the photo-cell backplane by ground vaporization
10= A valve or open circuit feds rain water directly to
11=pipeline to external reservoir
12=huge reservoir
PLC, a programmable Logic Computer
price and pays off the supplier.

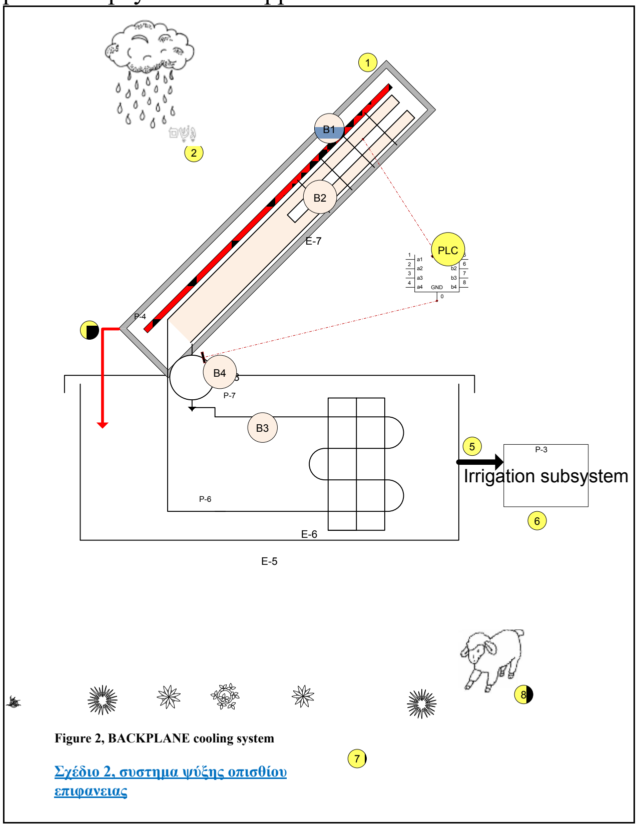


Figure 2 **BACKPLANE** cooling **system**

- B1=Photovoltaic base unit
- B2=Cooling exhanger the hot part
- B3= Cooling exhanger the cooling part
- B4=circulator motor

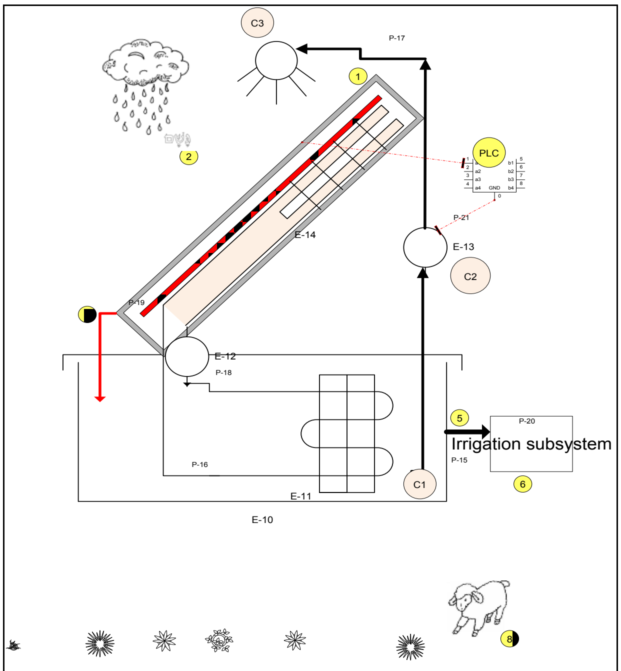


Figure 3, Front panel outside cooling system

Σχέδιο 3 εξωτερικό συστημα ψύξης

Figure 3 **Front panel outside cooling system**

- C1=inside the tank water valve to pump
- C2=pump that drives the water from the pump to the Sprayer
- C3=Water sprayer directs water to solar panel upper surface

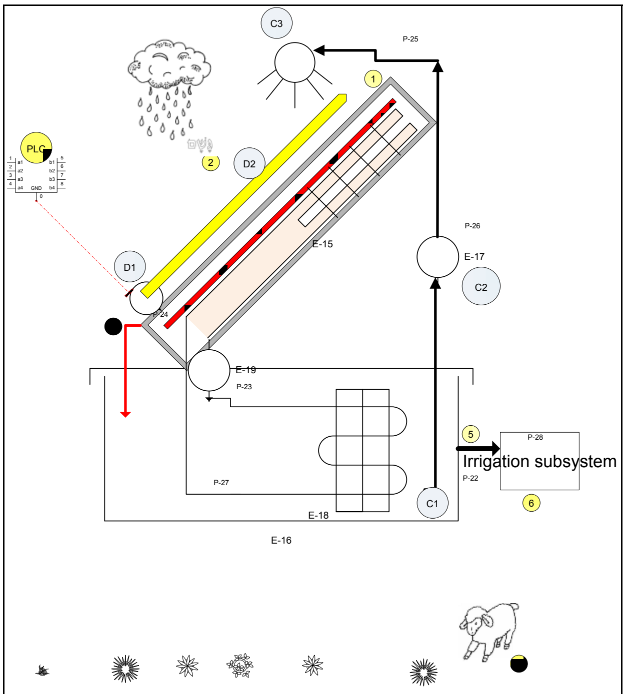


Figure 4, Frontplane cleaning system

Σχέδιο 4, Συστημα καθαρισμού επιφανείας πάνελ

Figure 4 **Frontplane cleaning system**

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