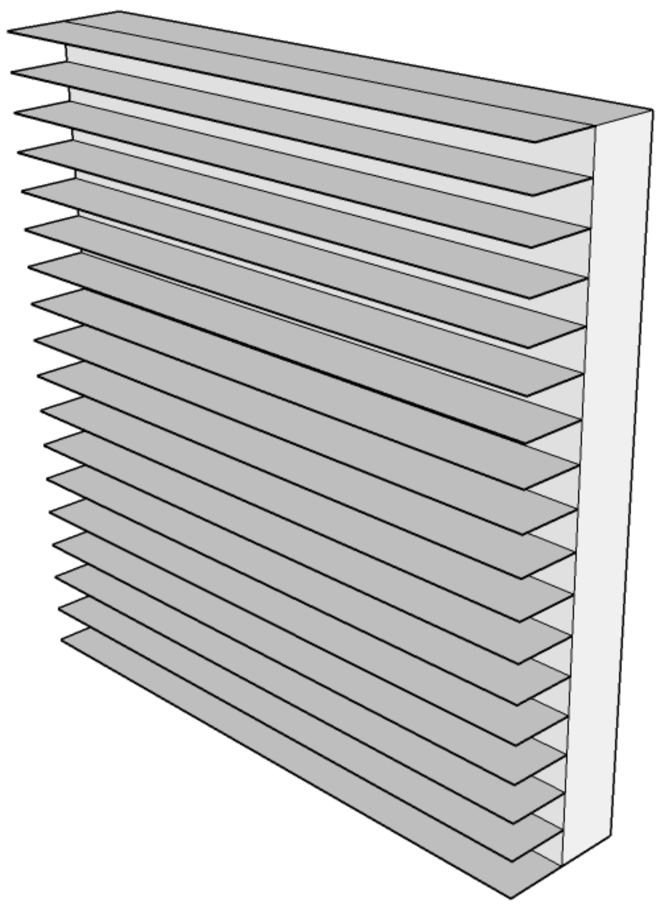
Ambient Infrared Thermal Powercell



By Nick Brevard

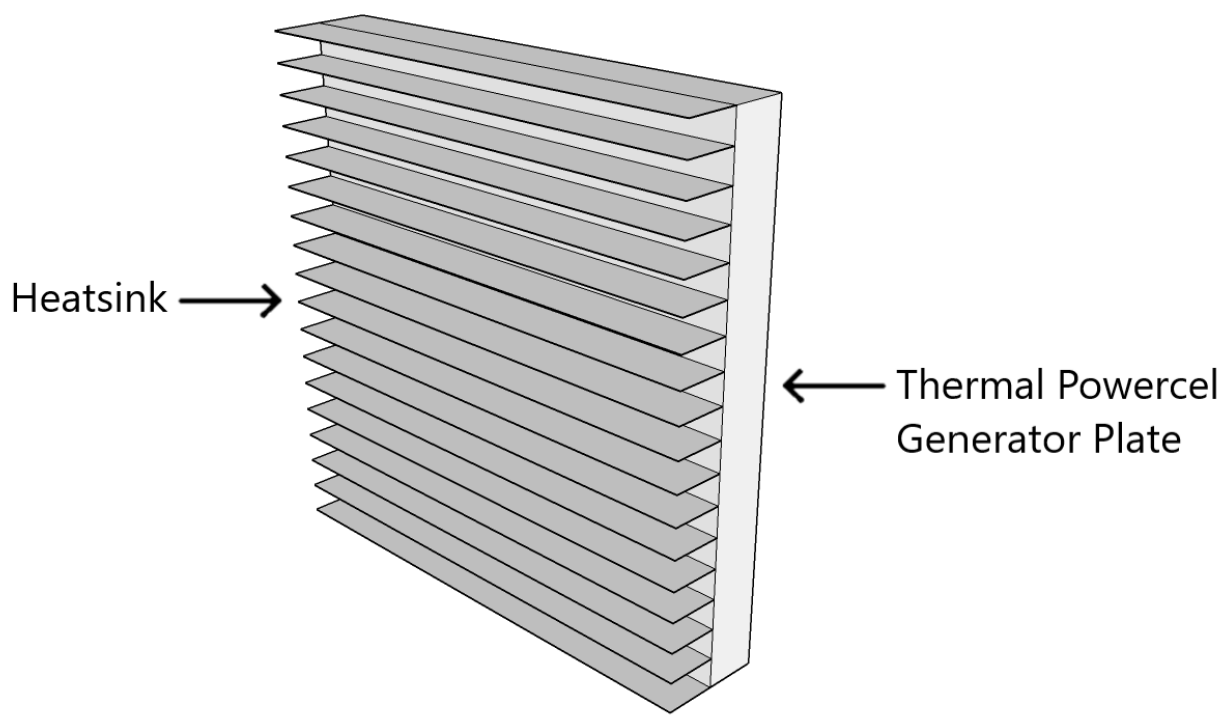
Table of Contents

Ambient Infrared Thermal Powercell:

The Ambient Infrared Thermal Powercell collects thermal energy from the air at room temperature using both free and forced convection and then converts it to electricity. There are 3 types of Thermal Powercells:

1. Ambient Infrared Thermoelectric Powercell
2. Ambient Infrared Pyroelectric Powercell
3. Ambient Infrared Thermophotovoltaic Powercell

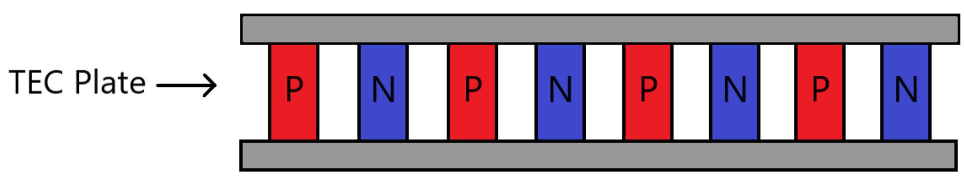
Ambient Infrared Thermal Powercell Plate:



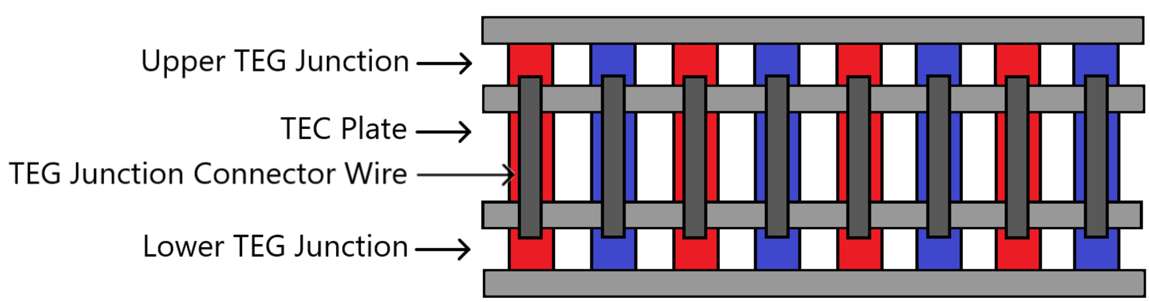
1. Ambient Infrared Thermoelectric Powercell:

The Ambient Infrared Thermoelectric Powercell collects thermal energy from the air at room temperature using both free and forced convection, and then absorbs it using thermoelectric elements. The powercell is made of a single thermoelectric heat pump, which, when electricity is run through it, becomes cold on one side and hot on the other. Since most thermoelectric heat pumps are about 100% efficient, the energy used to move heat from one side of the plate to other is equal to the amount of energy that is moved. Since the energy used to move the heat from one side to the other is "dissipated" in the form of heat inside the device, it ultimately ends up as heat placed on the hot side of the device along with the heat that has been moved from the cold side. This results in the hot side of the device becoming twice as hot, and having twice the wattage of heat placed on it as the cold side. The thermoelectric powercell then converts the heat from the hot side of the plate to electricity at approximately 100% efficiency using a single thermoelectric generator plate who's junctions have been split in half and placed on both the hot side and the cold side of the heat pump plate. Since the energy used to move the heat from one side of the heat pump plate to the other is recycled as heat on the hot side of the plate, after being absorbed by the thermoelectric generator plates that are on each side of the heat pump, it is sent back through the heat pump, leaving the original heat taken from the room to be used as a power supply.

Thermoelectric Heat Pump:



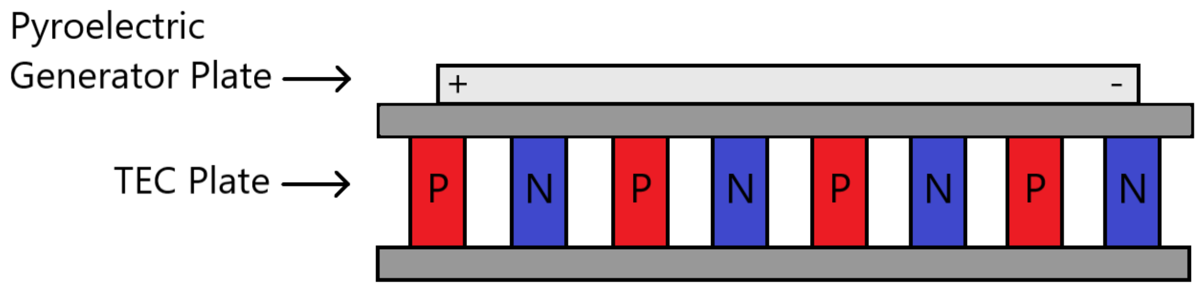
Thermoelectric Heat Pump with 2 sided Thermoelectric Generator Plates:



2. Ambient Infrared Pyroelectric Powercell:

The Ambient Infrared Pyroelectric Thermal Powercell is similar to the Thermoelectric Powercell. It also uses a thermoelectric heat pump plate that produces twice the energy that it takes in on the hot side of the plate that it takes in from the cold side of the plate by adding the energy needed to move the heat from the cold side to the hot side to heat that that it moves. However, instead of using a thermoelectric generator plate to absorb the energy on the hot side of the plate, it uses a pyroelectric material. Pyroelectric generator materials need to be fed energy in pulses in order to produce electrical current, so the energy fed to the thermoelectric heat pump reverses polarity every few seconds to allow the pyroelectric material to heat and cool.

Thermoelectric Heat Pump with Pyroelectric Generator:



3. Ambient Infrared Thermophotovoltaic Powercell:

The Ambient Infrared Thermophotovoltaic Powercell is similar to the thermoelectric and pyroelectric versions, except that the thermophotovoltaic powercell absorbs energy from the air by conducting the heat into individual thin film semiconductor P-N junctions made of Bismuth Telluride or other narrow band gap semiconductors which radiate infrared light into the P-N junction where it is converted to DC current. Hundreds or millions of the thin film layers are placed on top of eachother to form the thermophotovoltaic powercell plate.

Thermophotovoltaic Powercell Plate Layer:

Cost, Production, and Energy Density:

Thermoelectric Thermal Powercell:

The Thermoelectric Thermal Powercell can be produced using existing TEC and TEG production methods, aswell as by placing thin films of thermoelectric material on top of and on the bottom of the TEC plate.

Based on the price of Bismuth Telluride, a Thermoelectric Thermal Powercell can be produced for about $1,200,000 per cubic meter. While most thermal powercells are much small er than this (about 6.4×10^{-4} cubic meters for a powercell that could power a house), a thermal powercell this size would produce about 25 gigawatts.

Pyroelectric Thermal Powercell:

The Pyroelectric Thermal Powercell can be produced using existing Pyroelectric Generator production methods. Based in the price of Bismuth Telluride, like the thermoelectric version, a Pyroelectric Thermal Powercell can be produced for about $1,200,000 per cubic meter.

Thermophotovoltaic Thermal Powercell:

The Thermophotovoltaic Thermal Powercell can be produced using thin film deposition. Based on the price of Bismuth Telluride, like the Thermoelectric and Pyroelectric versions, the Thermophotovoltaic Thermal Powercell can be produced for about $1,200,000 per cubic meter, but might be higher due to the need to deposit thin films during production. Like the thermoelectric version, most thermal powercells would be much smaller than this, but a Thermophotovoltaic Thermal Powercell this size would produce about 25 gigawatts.

Use and Economic Effects:

The Thermal Powercell can produce anywhere from a few milliwatts, using small heatsinks, to several gigawatts using large heatsinks and fans. It can replace batteries in small devices and is small enough and powerful enough to be used to power homes, cars and aircraft. As a result, the oil industry will likely lose about 90% of their current revenue. The economic impact this produces will likely be eased somewhat by the lack of a need for these fuels.