

### **GEOTHERMAL ENERGY**

## THE LOST SOURCE OF ENERGY

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## MOTTO



## "Geothermal can be a huge source of energy very quickly."

## David Suzuki

## I GENERAL



- 1. The continuation of human civilization is conditioned by access to energy.
- 2. The heat resources of the Earth also the upper lithosphere are unlimited, due to the constant migration of heat from the inside of the globe.
- 3. The essential feature of geothermal energy is its increase with depth.
- 4. Current directions of geothermal technology focus on the use of naturally generated liquids including relic fluids of various ages.
- 5. There is a possibility to use artificially injected liquids into dry hot rocks so called "induced geothermal energy"
- 6. There are limitations with regard to temperature and liquid mineralization.

#### Mapa temperatur Polski, 4000m POLSKA



Map of Poland 1. More than 50 % of territory has very hot thermal water – above 100 °C

- 2. More than 25 % has warm
- water above 70 °C
- 3. The water reserves are in "pockets"





## Water system

- 1. Cold water is pumped down blue pipe.
- 2. Hot water is pumped up red pipes.
- 3. In a heat exchanger we get energy for consumption.





#### There are two systems

1. The left – we use water which is under the ground.

2. The right – we pump liquids to hot rocks. In this case we use technique called "fracking" to increase active surface area.

## **II A NEW APPROACH**



- 1. We propose replacing the liquid with another heat carrier.
- 2. The bedrock is commonly composed of hot, dry rocks with potentially unlimited energy resources.
- 3. An energy carrier other than a fluid must be used.
- 4. This can be achieved by technological extension of heat migration phenomena from the inside of the globe.
- 5. The intended goal can be achieved by designing special cables.
- 6. The innovative cables should be placed in a cluster of boreholes. At the bottom, in the area of dry, heated rocks, they should be clearly open, then concentrated at the ground level, and finally combined in a heat exchanger.



A graphical representation of this idea.



## **III THE NEED FOR DRILLING**

- 1. There is practically inexhaustible amount of energy under our feet.
- 2. At the moment we use hot water to transmit energy, its limitation is low temperature up to 100 °C.
- 3. The need to insulate cables will apply to 3.5-4.0 km.
- 4. To achieve higher efficiency we need to reach hot rocks 8 10 km deep.
- 5. Regionally meeting energy needs reduces the need for long-distance transmissions (generating high power losses), reduces ecological burdens, limits the risk of devastating natural events, as well as acts of terrorism or warfare.
- 6. Geothermal energy should become a fundamental pillar of the energy industry, and not be treated marginally, as it has been so far.

POLISH CLIMATE FORUM



# Thank you very much for your attention

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