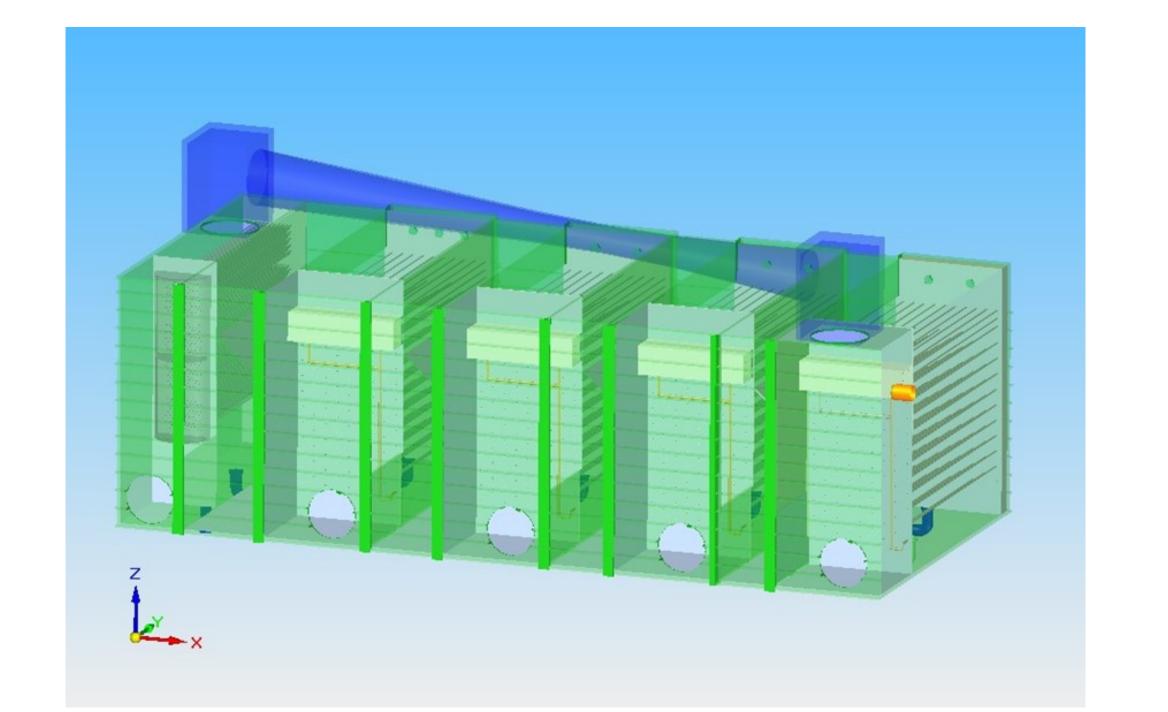
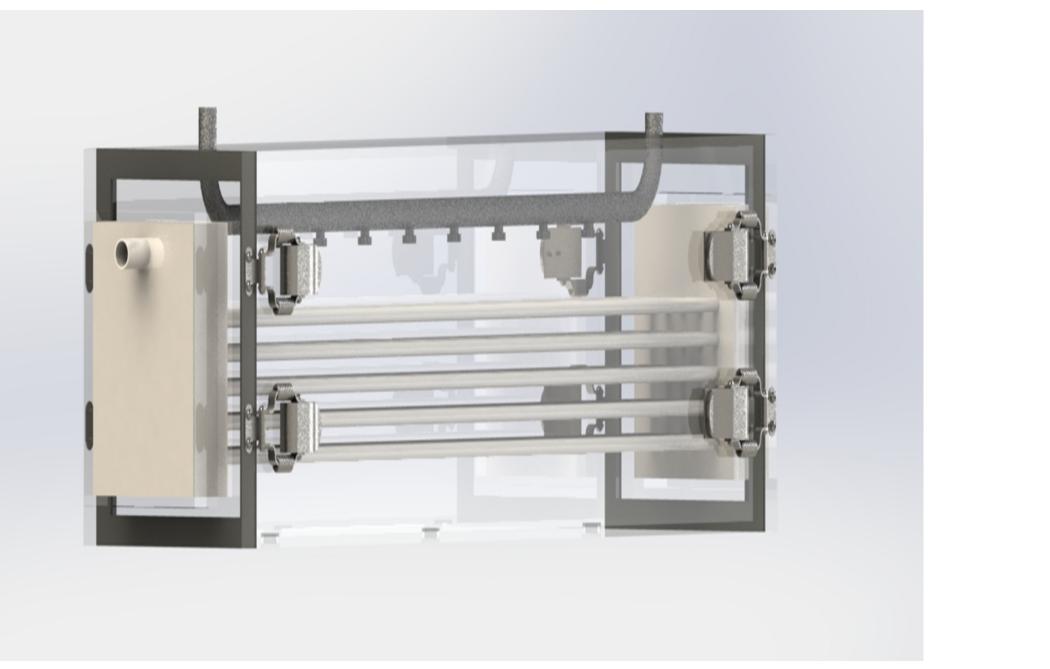
Desalination

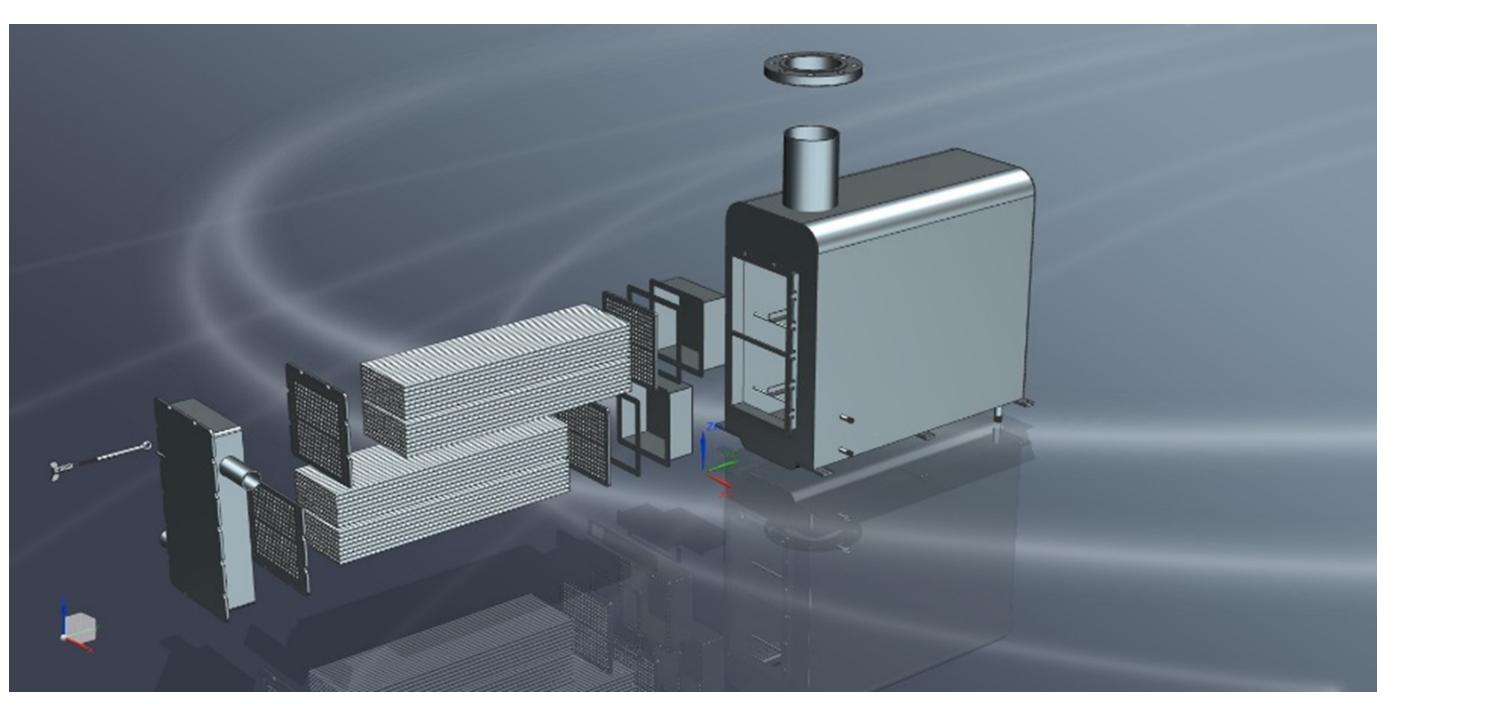
Desalination of brackish and seawater remains as top priority of iiDEA, including the development and evaluation of new coatings aiming to mitigate fouling and corrosion in evaporation chambers.



Modular Geothermal Desalination Unit (MGDU)



Test bench of evaporation chamber with sprinklers (MGDU)



Evaporation chamber of MGDU



iiDEA Group research update, part of CeMIE – Geo



Héctor Miguel Aviña Jiménez (HAvinaJ@iingen.unam.mx)
Miguel Ángel Benítez Torreblanca (MBenitezT@iingen.unam.mx)
iiDEA Group, Engineering Institute
National Autonomous University of Mexico

Abstract

The Mexican Center for Innovation in Geothermal Energy (CeMIE – Geo) is an alliance comprised of academy, government and private sector, aimed for research and development of projects involving the exploitation of geothermal energy. iiDEA Group, an applied research group part of the National Autonomous University of Mexico (UNAM), participates in this consortium through the technological development of three major projects: a Flash Evaporation Binary Cycle (FEBC), a Modular Geothermal Desalination Plant (MGDP), and a Geothermal Food Dehydrator (GFD). An update of the major goals accomplished by iiDEA is presented, covering the following areas: technical approaches, logistics, entailment, economic analyses, field practices, academic links, and research keypoints. These actions converge not only toward innovation, but also to the professional growth of human resources, meeting the emerging needs of geothermal energy applications.

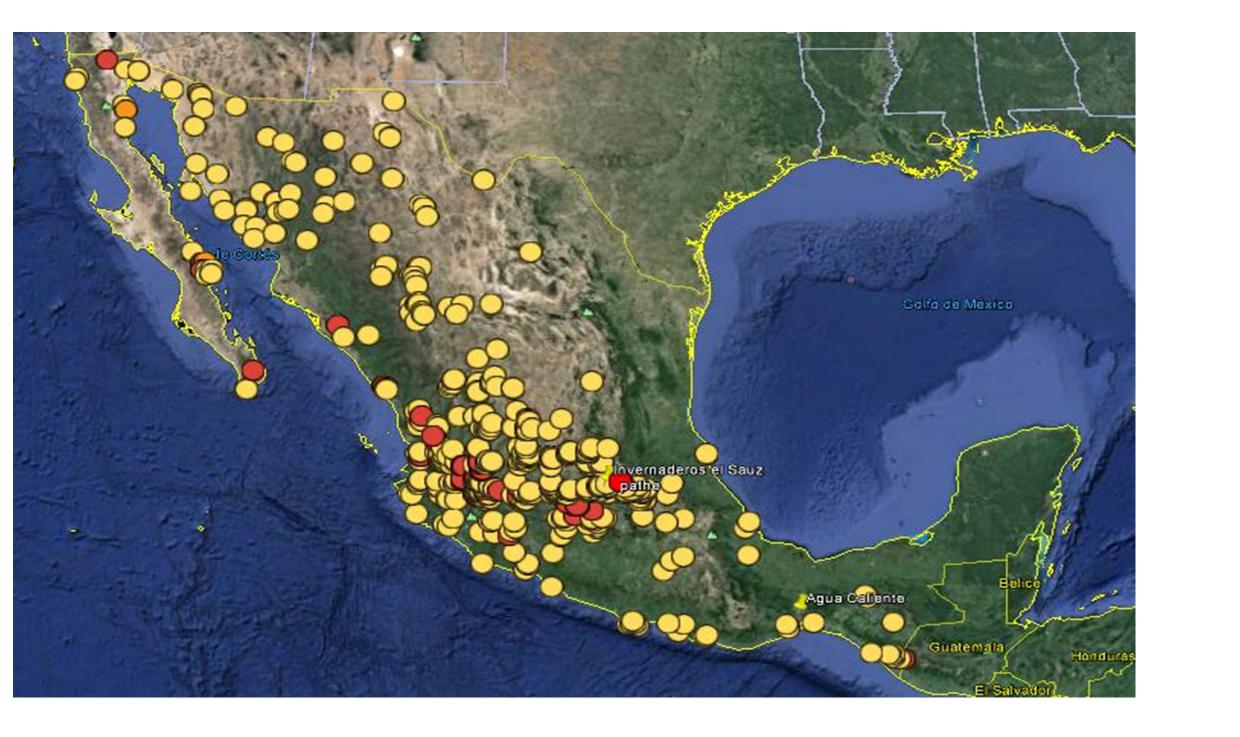






Renewable energies

iiDEA is developing side projects using other renewable energies; this new line of research is improving the capabilities of current designs and equipment, turning them into a new area of opportunity.



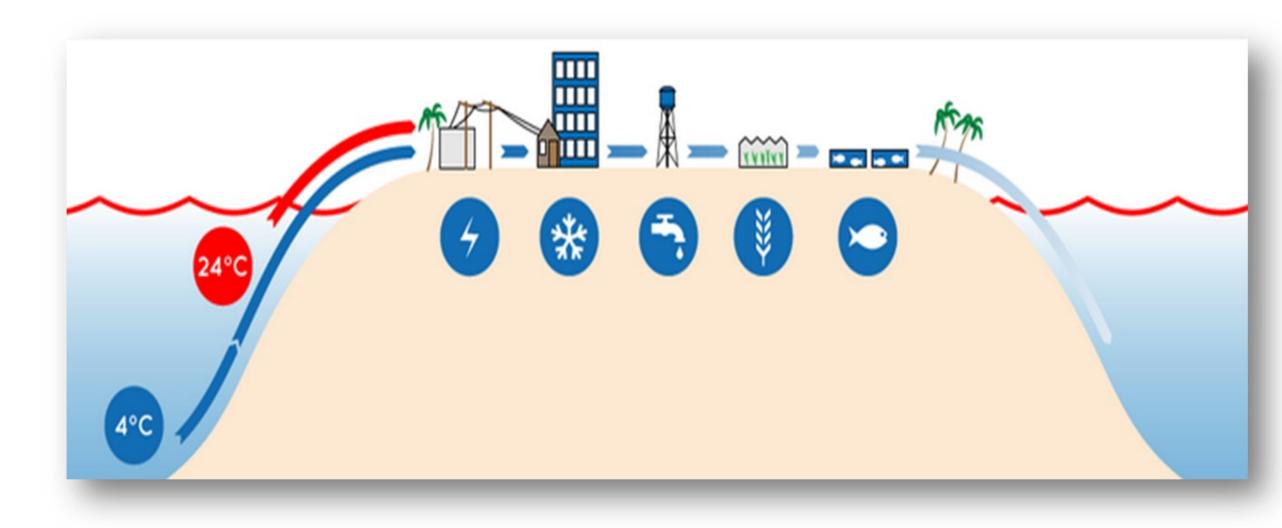
Localization of low-enthalpy geothermal spots in Mexico



Design of geothermal greenhouses



Onsite test of Photovoltaic Desalination Unit (PDU)



Ocean Energy Thermal Conversion

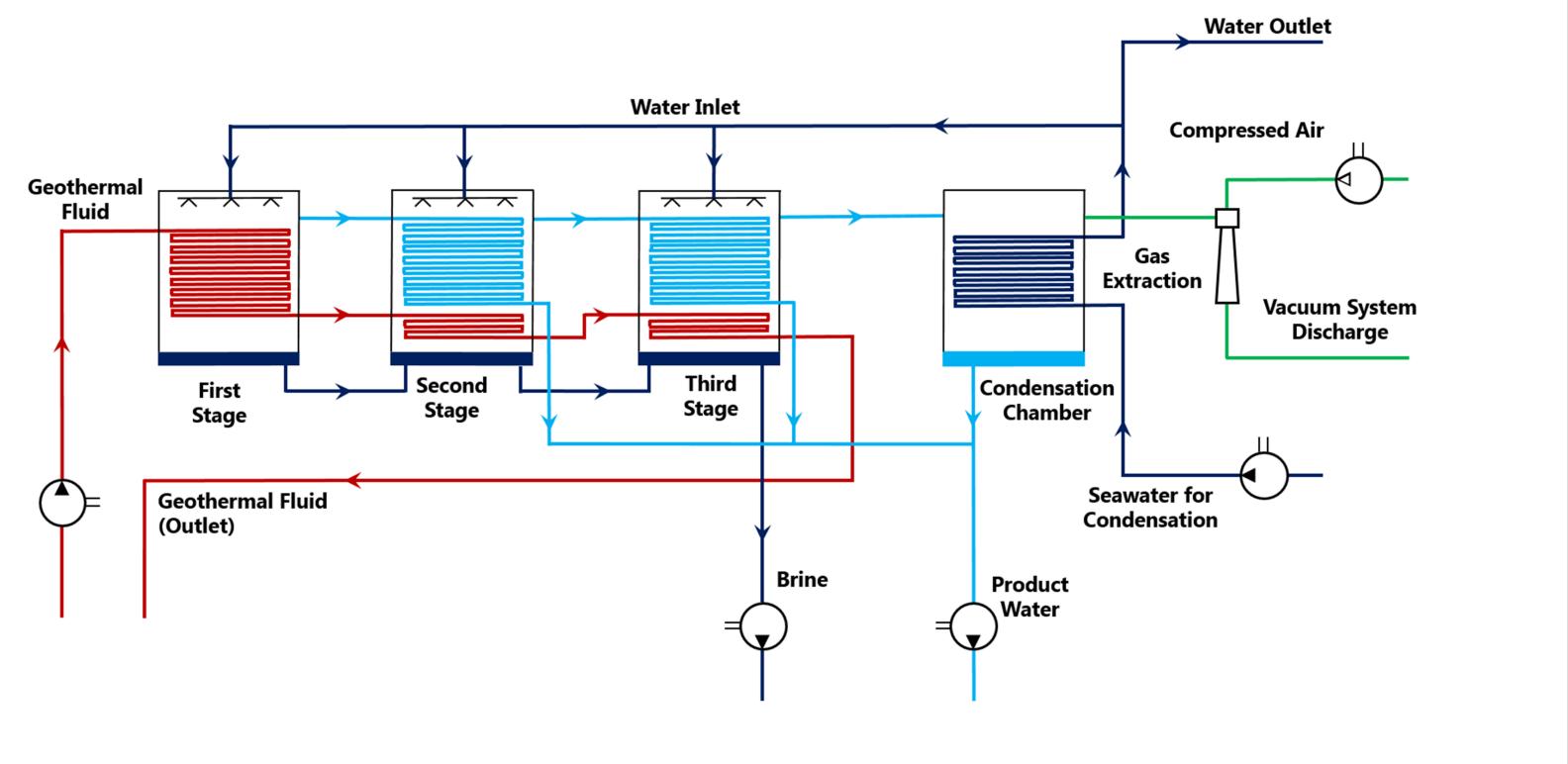
Modular Geothermal Desalination Unit

The fact that desalination technologies are being used with renewable energies such as solar, wind and even geothermal power, has a major impact on desalination processes, since an excellent quality product can be obtained through this favorable synergy between technology and environment. This is the background and opportunity that iiDEA takes advantage of, developing a Modular Geothermal Desalination Unit (MGDU).

While conventional desalination units use waste heat, needing up to 120 °C, the MGDU uses low-temperature geothermal fluid, with temperatures as low as 90 °C, optimizing the exploitation of its thermal energy and showing good water recovery rates.



Prototype of Modular Geothermal Desalination Unit

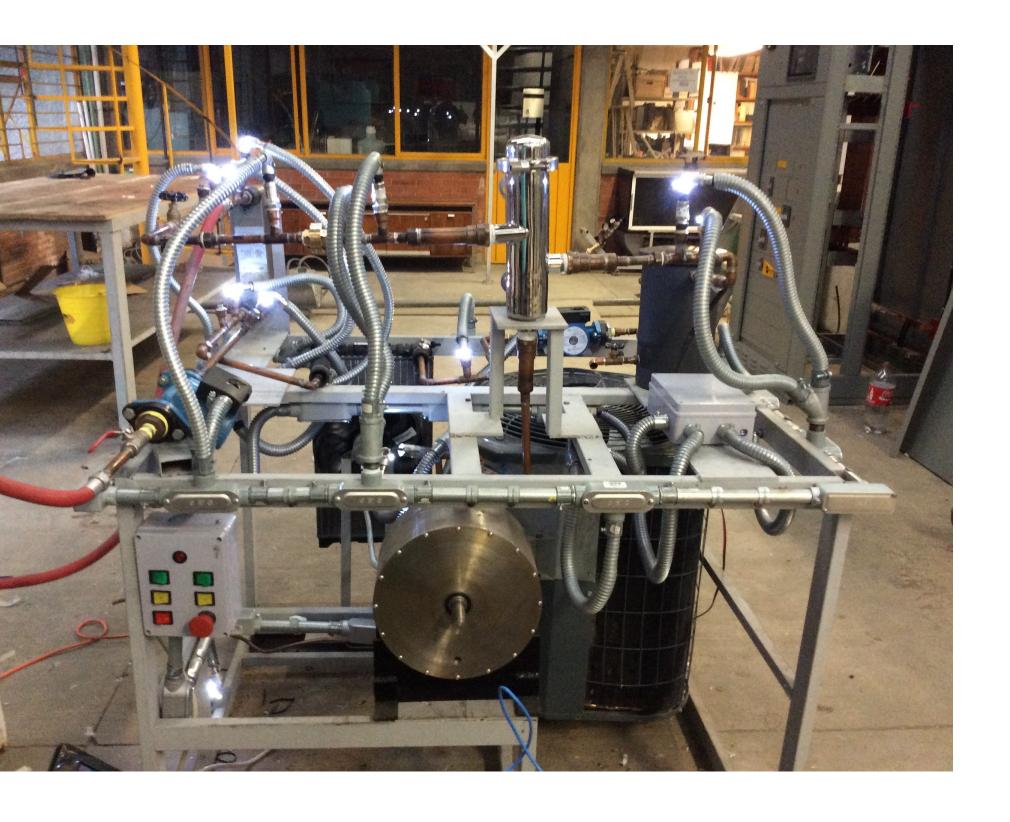


Schematic diagram of MGDU

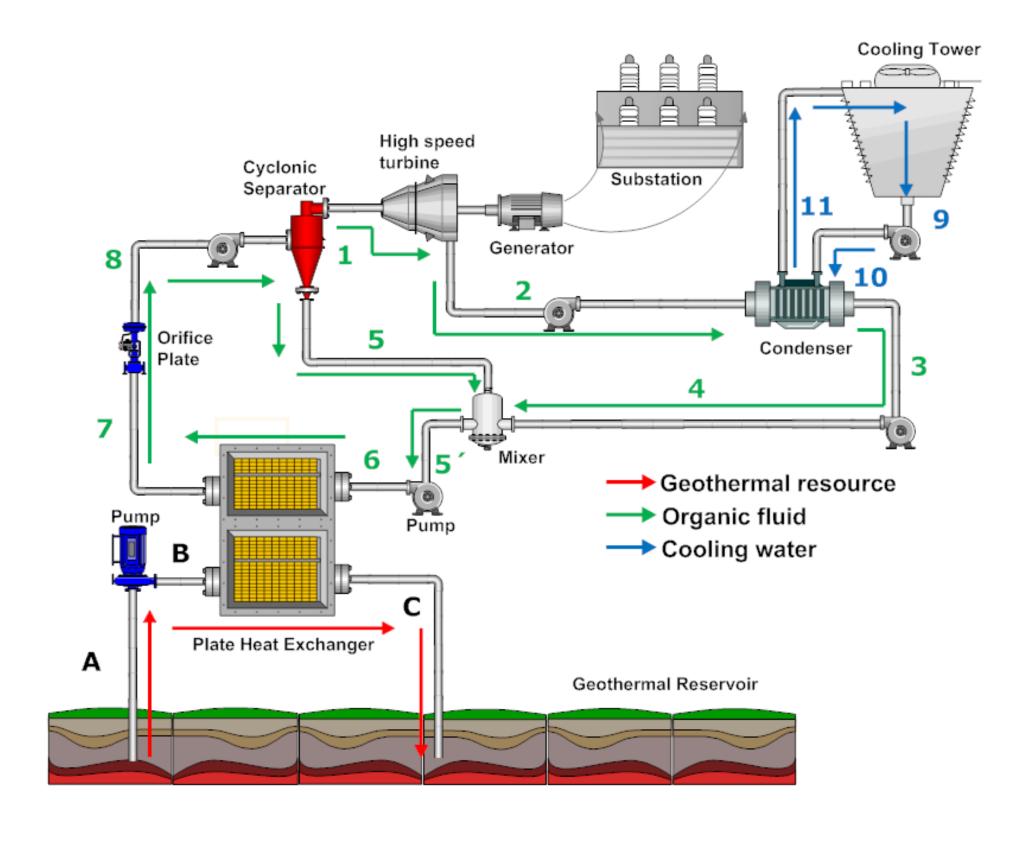
Flash Evaporation Binary Cycle

Self generation of electricity, as well as local power generation are part of the new hype. Most of these projects are based on low-power generation, focusing on the use of local energy sources, providing the freedom of off-the-grid eco-friendly power.

iiDEA is currently working on a low-power generation cycle which may be used with waste heat, or low-enthalpy geothermal energy, named Flash Evaporation Binary Cycle (FEBC) after one of its principles of operation. FEBC is a modular equipment that, as its name suggests, uses two fluids: one of them carries and transfer the heat, the other, acts as working fluid. This principle has already been used in Organic Rankine Cycles (ORC) and Conventional Binary Cycles (CBC), however, the FEBC has reduced dimensions and is practically maintenance- free, since the required time for this procedure is drastically reduced.



Prototype of Flash Evaporation Binary Cycle



Schematic diagram of FEBC

Geothermal Food Dehydrator

A growing developing city has many needs and issues that can be solved using versatile methods. One example of this kind of solutions is the fact that dehydrated food may help to diminish waste food and, at the same time, be a profitable product in select markets, like gourmet bistros and avant-garde restaurants, without adding the cost of using fossil fuels.

Based on the above, iiDEA developed the Geothermal Food Dehydrator (GFD) with the following major objectives in mind: to provide improved dehydrated products using low-enthalpy geothermal energy reducing costs associated with packing, transportation and storage, guaranteeing a high-quality conserved food that may supply and meet population demand.



Samples of dehydrated product



Geothermal Food Dehydrator