



GLOBAL  
GEOTHERMAL  
ALLIANCE



## *A Case Study:*

# Agri-food uses of geothermal energy in Tuscany Region

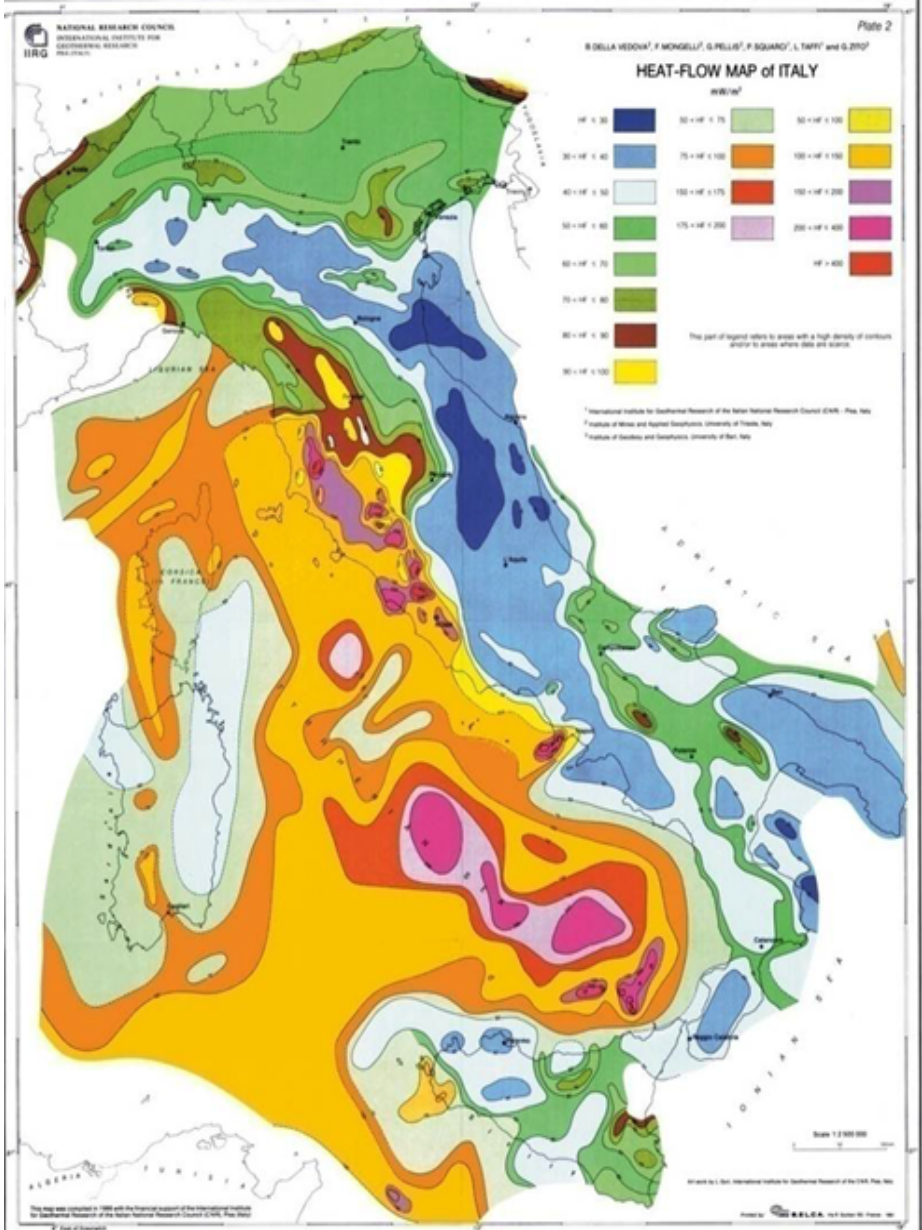
**(R.Cianella, Ministry of Ecological Transition, Italy)**

*“Powering agri-food value chains with geothermal heat”*

CAPACITY BUILDING WEBINAR

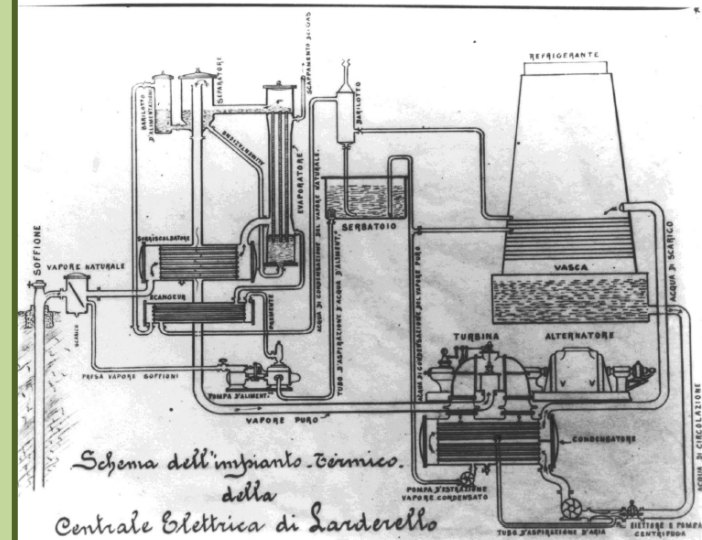
19 July 2022

# Geo-thermoelectric energy in Italy



# Geothermal tradition in Italy

- The geothermal tradition in Italy dates back **more than 100 years**
- Italy was the **first country** in the World to exploit geothermal energy for producing electricity (1907)
- The world's first geothermal power plant was built in 1913 in **Larderello**: the plant supplied electricity in the area surrounding the village
- **Until 1958**, only Italy in the world was able to produce geothermal electricity for supply
- Geothermal power history: **source of pride** for the Italian energy industry



# Geothermal figures: capacity

**Installed nominal power :**

Year	2020
Installed nominal power (MWe)	918,8

**Gross efficient power:** gross figure, referred to the sum of capacity values measured to the terminals of the generator.

Year	2020
[Gross] Efficient power (MWe)	817,1

**Net/Plant efficient power :** net figure, referred to the sum of capacity values measured as output of the plants (values equal to the generator capacities minus the power absorbed by the auxiliary services of the plants).

Year	2020
[Net] Efficient power (MWe)	771,8

# Geothermal figures: production

Year	2020
Net production of electric energy from geothermal source (TWh)	5,647



**34** plans located in Tuscany

a quarter of the region energy needs covered by geothermal energy

(equal to about **2 million homes** energy consumption)



# Direct use of geothermal energy for agri-food application in Tuscany Region

---



# The Community of Food and Renewable Energy of Tuscany/1

---

- The **Community of Food and Renewable Energy of Tuscany** was established in 2009
- It joins together **20 small enterprises** which are active in the agri-food sector
- The initiative was promoted by the **CoSviG and SLOW FOOD**
- Characteristic features of the local food business part of the Community are:
  - ✓ the **dominant use of renewable energies** in the production processes;
  - ✓ **the recovery of traditional high-quality productions** and local risk-disappearing food;
  - ✓ the relaunch of forms of **sustainable agriculture**
  - ✓ the presence of a **short supply chain** (raw materials only from the tuscan region)
- A **collective label** on their products as a guarantee of clean energy use and respect for the 3 slow food principles (“**good, clean and fair food**”).

# Craft brewery

---





# The geothermal craft brewery

---

The geothermal **craft brewery** is a specific example of a member of *Community of Food and Renewable Energy of Tuscany*:

- Since 2014 the brewery has used the heat from geothermal steam for the production of **high quality beer** according to the techniques of **craft production**.
- The use of geothermal steam allows to quickly reach the necessary temperatures for the production and a **saving on energy consumption**
- The produced beer has **evocative names** related to geothermal matter: the Geyser, Sulfurea, Magma

# Cultivation of Spirulina

---



# Cultivation of Spirulina

---

- A pilot facility was built for the **experimental cultivation of Spirulina** using geothermal fluids
- It is located close to the geothermal power plant of Chiusdino ( Tuscany Region)
- Spirulina (*Arthrospira platensis*) is a cyanobacteria (improperly an alga), which **generally is present in the alkaline and warm water lake....** but It can be also cultivated
- Spirulina has been included in the *“Novel food catalog of the European Union”* and it is considered a **“super food”** (very rich content of protein material - Dry spirulina biomass contains about 60% of proteins).
- The pilot facility for spirulina cultivation in Chiusdino:
  - ✓ the **waste heat from the geothermal plant** is used to keep the cultivation fluid within the right temperature range for the vegetative phase
  - ✓ the **purified CO<sub>2</sub>** produced by the plant is used to stabilize the pH of the cultivation fluid and to provide the right amount of carbon to the microalgae,

# Greenhouses





# Greenhouses

---

- **Production of plants and vegetable** through the use of geothermal heat.
- **Example 1:** the last greenhouse in the area, in the order of time, entirely heated by the nearby geothermal power plants, which has set its own business in the production of **basil** for pesto, an Italian condiment.
- **Example 2:** the first geothermal greenhouse, even in the order of time (active since 1970) and is specialized in the **cultivation of exotic and indoor plants**.

The greenhouses are kept at the ideal cultivation temperature (25-27 ° C) thanks to the heat coming from the nearby geothermal power plant which allows to save a very significant quantity of diesel fuel (9% of the diesel consumption of province of Siena).

**Thank you for attention**

