

# Predrying (Drying) Rooms for Reusable Wooden Materials that Use Geothermal Water as Fuel

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**Abstract:** The energy affects all the aspects of the modern life. The International Council of Energy has presented many scenarios that come to meet the future need of energy, which consider as important problems the economic development (technological progress), the environment's protection and the international ethic. Because, on the one hand, the fossil fuel is a polluting source of energy and on the other hand, its amount is in a continuously diminution, one has given a greater importance on using unconventional sources of energy, especially geothermal energy, that is a clean energy source. Considering all these aspects, the author is going to show the possibilities for using the geothermal energy in the industry of wood and forestry. Starting from the knowledge that one has gained about process' characteristics of predrying and the characteristics of using the geothermal water, one proposes a solution for insuring the warm air at a temperature of 35-70°C and of the hot water at a temperature of minimum 40°C.

**Keywords:** geothermal water, predrying room, wooden material

## 1. Memorial presentation

The key to a high life standard is given by the access to the clean energies and by the price people can afford to pay. Energy affects all the aspects of a modern life. The International Council of Energy has presented many scenarios which welcome the future need of energy and which focus on the economical development, technological progress, environment protection and international ethics. The top period of fossils fuel within all the scenarios is almost exceeded. At the same time, the suggestions to work together for the renewable resources of energy on the market of world energy are very conservative.

As the researches done so far have revealed, the new energy sources in our country present a quite important energetic potential, i.e. almost 15 million tcc of conventional fuel (Table 1).

TABLE 1

Disposable energetic potential	Sun energy	Eolian energy	Geothermal energy	Biogas
Mills tcc	7.000 – 10.000	2.000-3.000	900	600

### The present stage of knowledge in Romania

The research of hidrogeothermal deposits started in Romania between 1962 – 1965, by digging up the first derricks in the West Field, Felix, Calacea and Timisoara. Up to now, almost 200 derricks have been drilled and given geothermal indications, most of them being financed by the state budget, within the geological research programme and carried out by the companies Transgex S.A. (former IPEG Cluj) and Tradex S.A. (former IFLGS Bucharest). By putting into practice and working of more than 100 geothermal derricks in the last 15 years, it has given the opportunity to evaluate the workable heat resources and tanks of hidrogeothermal systems from Romania.

The total capacity installed through the present park of derricks, only for energetic uses and considering the reference temperature of 25°C is more than 350MWt. In present, 130 MWt are used effectively by working of approximate 65 derricks in 25 localities. These derricks produce water with temperatures between 55 and 115°C, more than 90% of the extracted water being obtained through artesian system.

At the beginning of the 80's, due to a coherent and unitary way of thinking, the geothermal resources of Romania allowed the development of a small industry which turns to good account this energy.

The main usages are: heating of different places and preparation of hot tap water, greenhouses heating, milk pasteurization, flax and hemp melting, intensive breeding of fish, etc. (see Figure 1). The total annual saving of energy is more than 35.000 t.e.p.: by space heating 36%, greenhouses heating 23%, industrial applications 7%, aquaculture 2%, balneology 32%. There are approximate 30 derricks used for balneotherapy purposes (with a total flow of more than 360 l/s, the water having temperatures between 38-65°C), which ensure the functioning of 16 thermal resorts, where more than 500,000 persons are cured / year. One has also opened 24 swimming places and 7 covered pools.

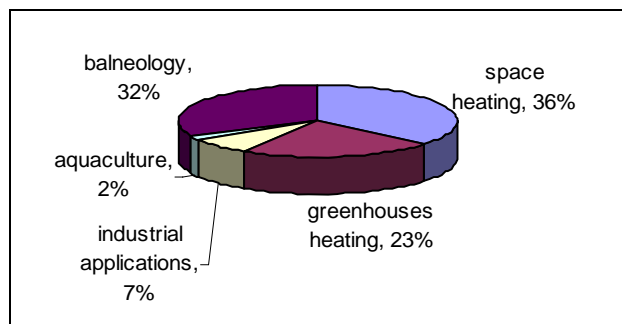


Figure 1. The use of geothermal water in Romania

The placement of geothermal deposits is presented in Figure 2.



Figure 2. The situation of the geothermal deposits in Romania

One can easily notice that most of the geothermal deposits are located in the western part of Romania.

**The block scheme of predrying system with geothermal agent**

Starting with the knowledge of the characteristics of predrying and those of application of geothermal water process, one proposes a viable solution in order to insure warm air at temperatures between 35-70°C and warm water at temperatures of minimum 40°C. This solution is subordinated to the idea of geothermal water used as a fuel in drying rooms with adjustable temperature and humidity system.

In Figure 3, it is presented a specific system which can insure the drying characteristics in drying rooms having a variable temperature system.

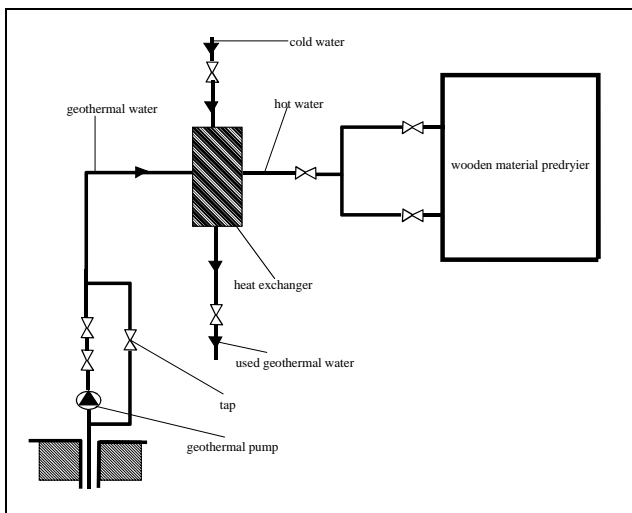


Figure 3. The predrying system of the wooden material

In order to use geothermal water as a fuel in the predrying process and taking into account the possibilities and endowments existing at the University of Oradea, a

specific system will be drawn up, which will have the following constituents:

- the derrick station - Figure 4.

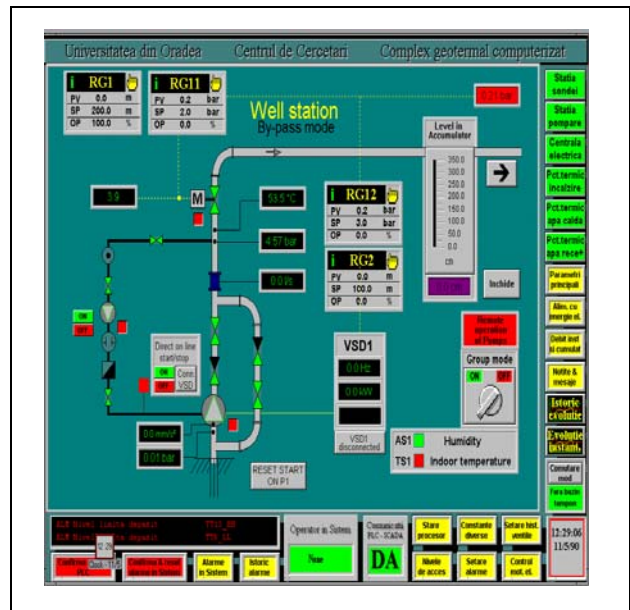


Figure 4. The derrick station

The derrick station has the following components:

- a depth pump - "axle" type. The pump can be placed at a depth of 90 m and it has a 65kw engine, situated at the upper side of the axle pump.
- a VSD1 frequency converter, which ensures a variable speed for the depth pump.
- a CV0 adjustment tap, which controls the geothermal derrick flow.

- the pumping station - Figure 5.

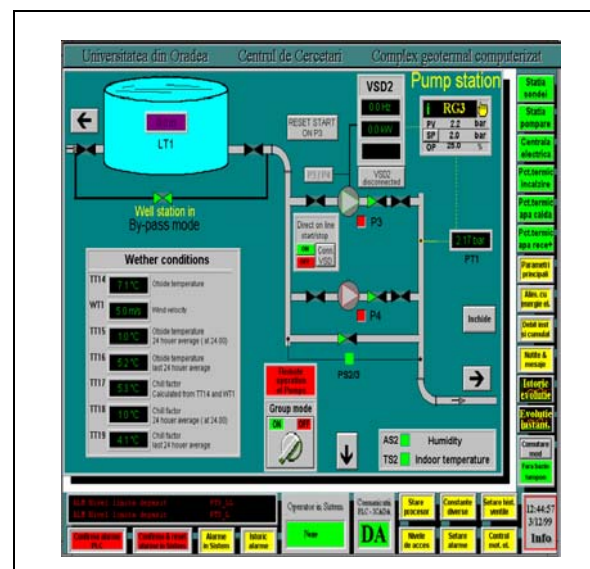


Figure 5. The pumping station

One of its components is a blotter basin destined for degassing the geothermal water and for avoiding the perturbation within the geothermal water circuit, due to the flow vibration which appears while the depth pump functions.

- **the preparation station** of the thermic treating agent - Figure 6.

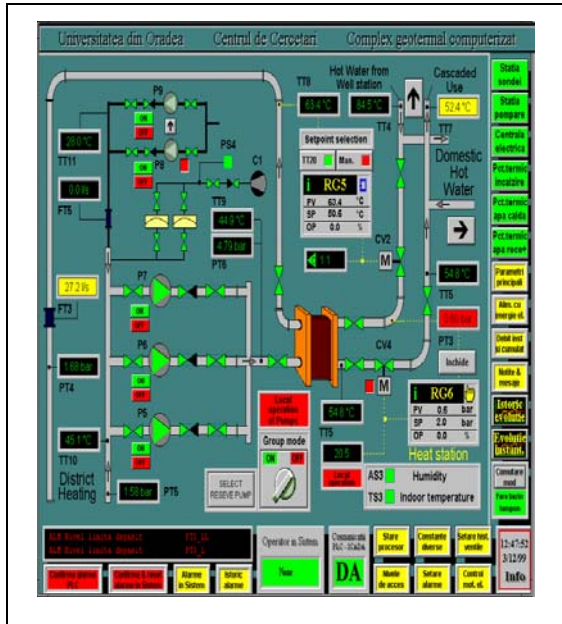


Figure 6. The preparation station of the thermic treating agent

The preparation station of the thermic treating agent has the following constituents:

- two heating exchangers with plates, for heating the thermic treating agent.
  - a pump for liquid, to pump the thermic agent in the predrying room.
- **the predrying room** - Figure 8.

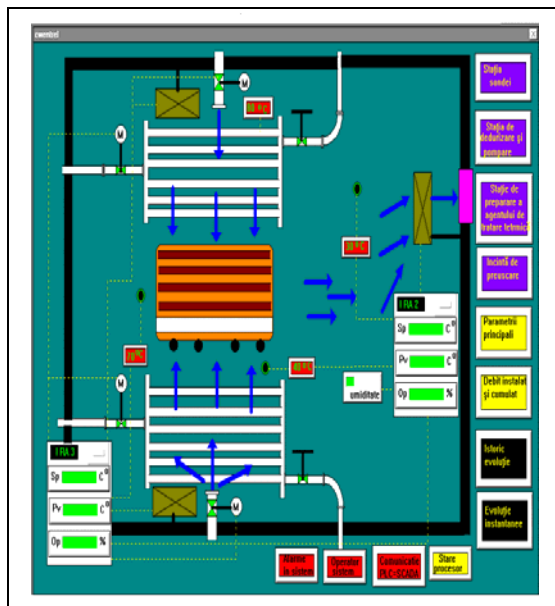


Figure 8. The predrying room

The thermic treating agent used in the room is stipulated to be the water obtained from the running waters which are in the surroundings of the predrying room.

## Conclusions

The use of geothermal water in the predrying (drying) process within a completed automatic system has the following advantages:

- ⇒ the geothermal energy is available the whole year, constantly and continuously, different from other sources of energy which depend on weather conditions (eg. sun energy, eolian energy) or a fuel supply (other types of driers).
- ⇒ the total elimination of the fossil fuels.
- ⇒ the decrease of expenses with 90%.
- ⇒ the total elimination of pollution, the geothermal water being a complete unpolluted agent.
- ⇒ the decrease of drying timing with 75% as compared to the classical procedures.
- ⇒ the use of a completely automatic system, with the possibility of permanent control of parameters which interfere within the drying process.
- ⇒ the presence of real possibilities for the development of the presented process to other forest products which need predrying or drying before processing (cones, branches of fir tree and bark and also to dry forest fruit which are demanded for export).
- ⇒ the possibilities to determine and adjust the disturbing factors within the drying process by using computer semblance. Thus, the direct intervention in the system is eliminated.

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