THE HEAT PUMP IN THE BASE OF NATURAL ENERGY (SPACE OF LIFE – PEOPLE – HOUSING – ENERGY)

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ABSTRACT

A serious problem of Earth is the environmental pollution. "Save the Earth!" The improvement of the human life's quality, and a better meeting of higher comfort claim the renewed energies. The heat pump is an energy saving and environment protecting machine, installation creates the harmony of the building with the environment, it makes use of the Earth's heat and reduce the harmful air pollution. We can find a man friendly heating systems with their use. The usage of equipment with the renewed energy can be decentralised and its operation cost is much cheaper than the cost of the traditional equipment. The "transition" from the traditional energy sources to the using of new sources will be gradual.

Homo non est instituor naturae, sed utitur in operibus artis et virtutis, ad suum usum, rebus naturalibus. Unde providentia humana non se extendit ad necessaria, quae ex natura proveniunt.

S. Thomas Aquinas : Summa Theologiae, De providentia Dei, art.2.

„The man isn't creator of nature, but he use to act the natural things in his trade and virtue. Therefore the human providence doesn't extend to the necessities provided from nature" (Fig. 1).

All form of the organisation has an internal equilibry, because it can stabilise its state. The most simple form of this equilibry is the refrigerator, what has its theoretical base of the Carnot-cycle (Fig. 2) [1].

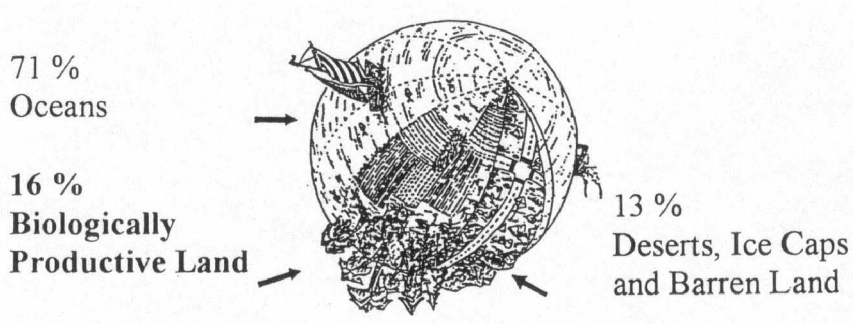

FIGURE 1: *The biologically productive areas on our planet. The Earth has a surface area of 51 billion hectares, of which 36.3 billion are sea and 14.7 billion are land. Only 8.3 billion hectares of the land area are biologically productive. The remaining 6.4 billion hectares are marginally productive or unproductive for human use, as they are covered by ice, find themselves with unsuitable soil condition or lack water.*
Source: Ecological Footprints of Nations, How much nature do they use? - How much nature do they have? Centro de Estudios para la Sustenabilidad, Mexico, 1997. 03. 10. p. 5.

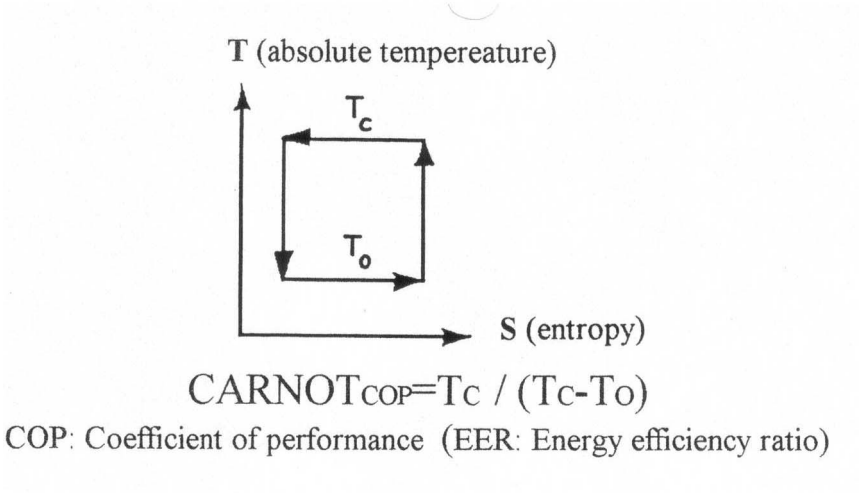

FIGURE 2: *Carnot-cycle (2 ISOTHERM, 2 ISENTROPIC).*
Source: Hungarian (and EU) Standard: MSZ EN 255 and prEN 14511-1:2002.

This process modellize all the form of organisation, and has an importance about the heating systems, too [2].
Fig. 3 presents the utilisation of this system in the heating.

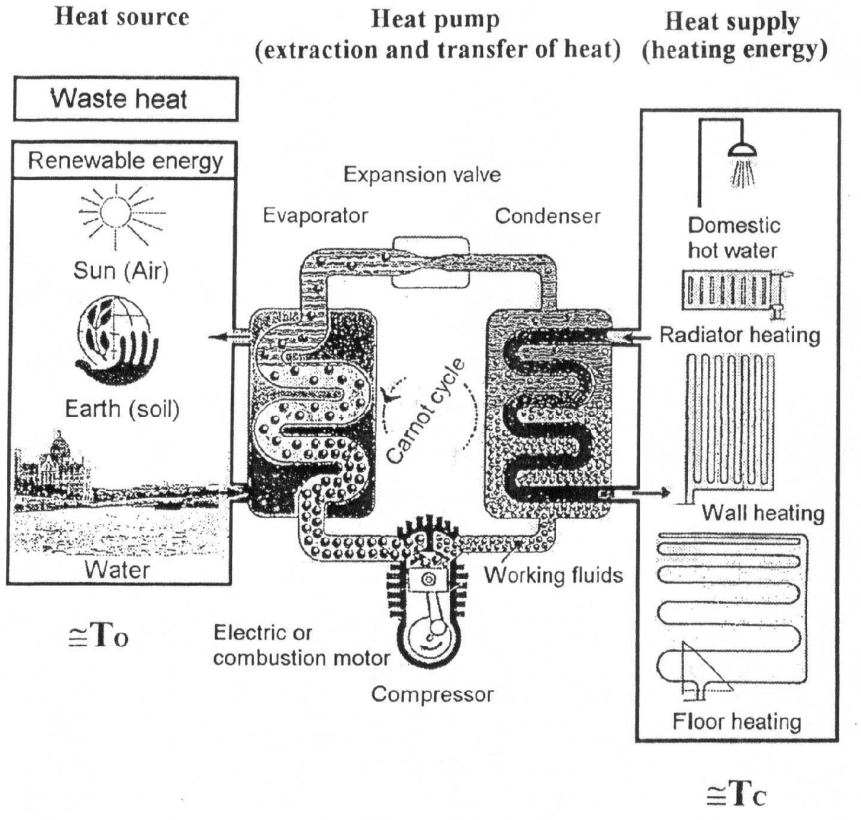

FIGURE 3: *The Principales flow of a compressor driven heat pump.*
Source: EVN Energie - Versorgung Niederösterreich Aktiengesellschaft 1994. p. 4 (Schema einer Wärmenpumpe).

Charles J. Kibert had an opinion (1994): The sustainable development, the construction of the healthy artificial environment and his responsible functioning, it's possible only in ecological base and with aspiration to the efficiency of the energy sources (Fig. 4) [3, 4].

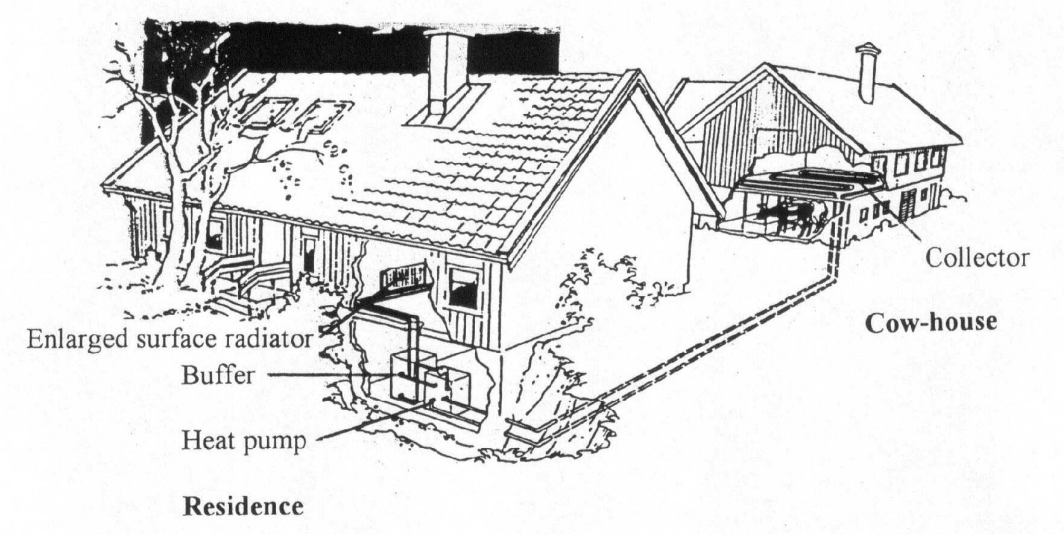

FIGURE 4: *Heat pump for the recoverable of heat losses. (animal).*
Source: LODAM Co.

Evidently the energetic is one of the most important factors in the economy and quality of life. The base is the energy. The 21. Century will be the competition of technologies for energy making. Therefore we need to think about the heat pump in the view-point of the modern techniques with theoretical and practical knowledge (Fig. 5, 6) [5, 6, 7].

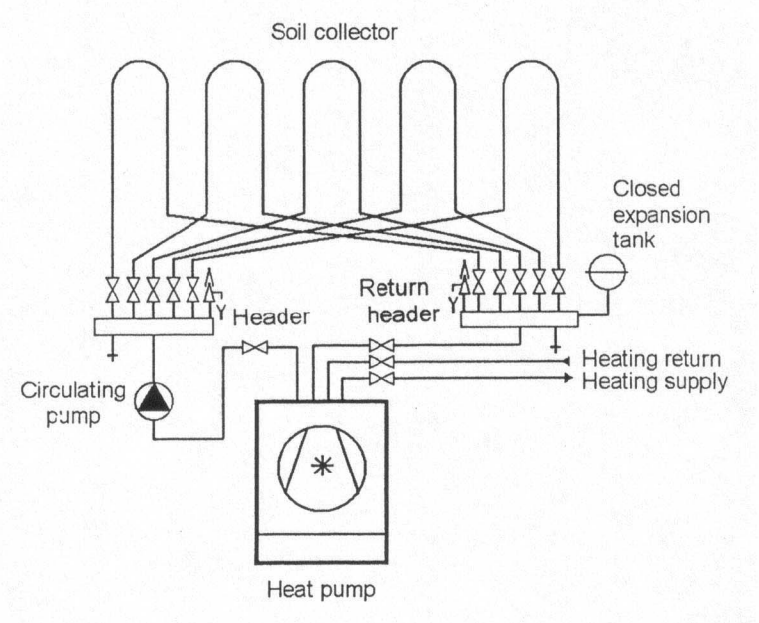

FIGURE 5: *Connecting Draft of out door horizontal collectors (i. e. Tichelmann-type circles).*
Source: SIEMENS Co.

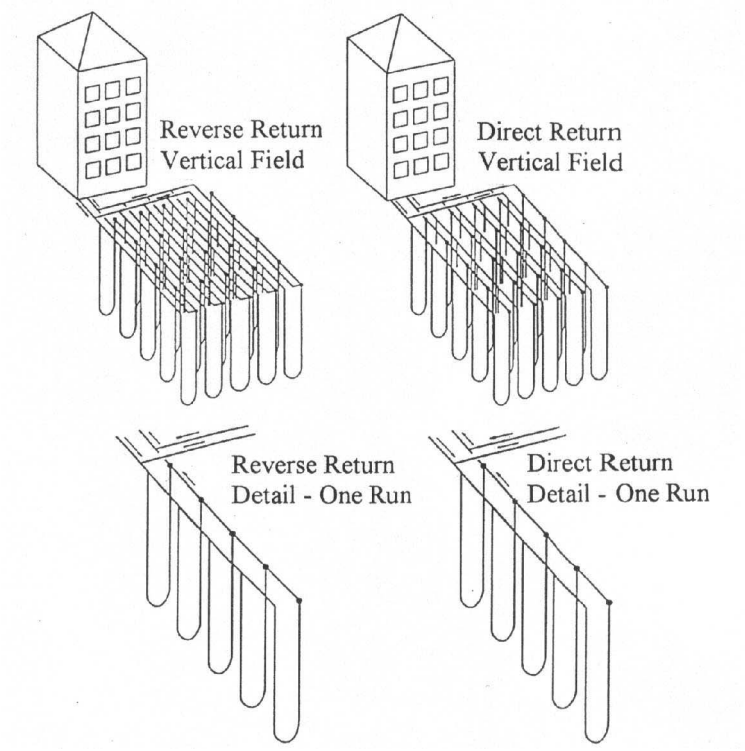

FIGURE 6: *Piping principals of outdoor heat traps of a heat pump (i. e. vertical fields or soil collectors).*
Source: ELECTRIC POWER RESEARCH INSTITUTE (EPRI).

The development involves the satisfaction of the human comfort (Fig. 7).

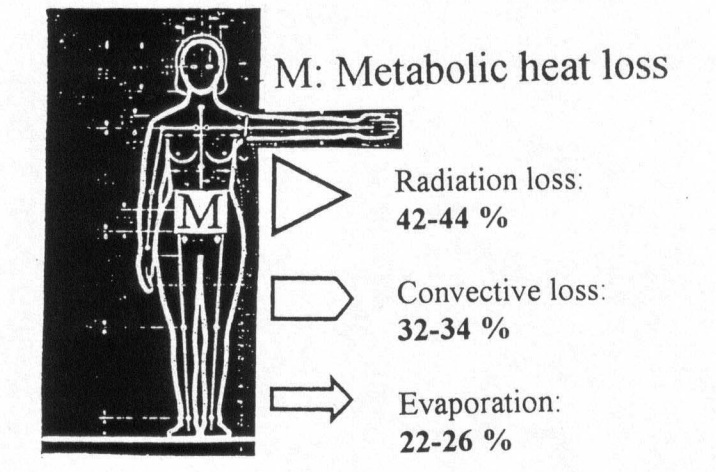

FIGURE 7: *Draft of heat transfer between the human body and the environment.*
Source: Ref. - 8

The directives of the heat insulation must be more rigorously, that can be achieved by realising with systems of low-temperature heat instrument. The repairing of the heat insulation, has a very high importance in the heating, cooling and environmental pollution (Fig. 8) [9, 10].

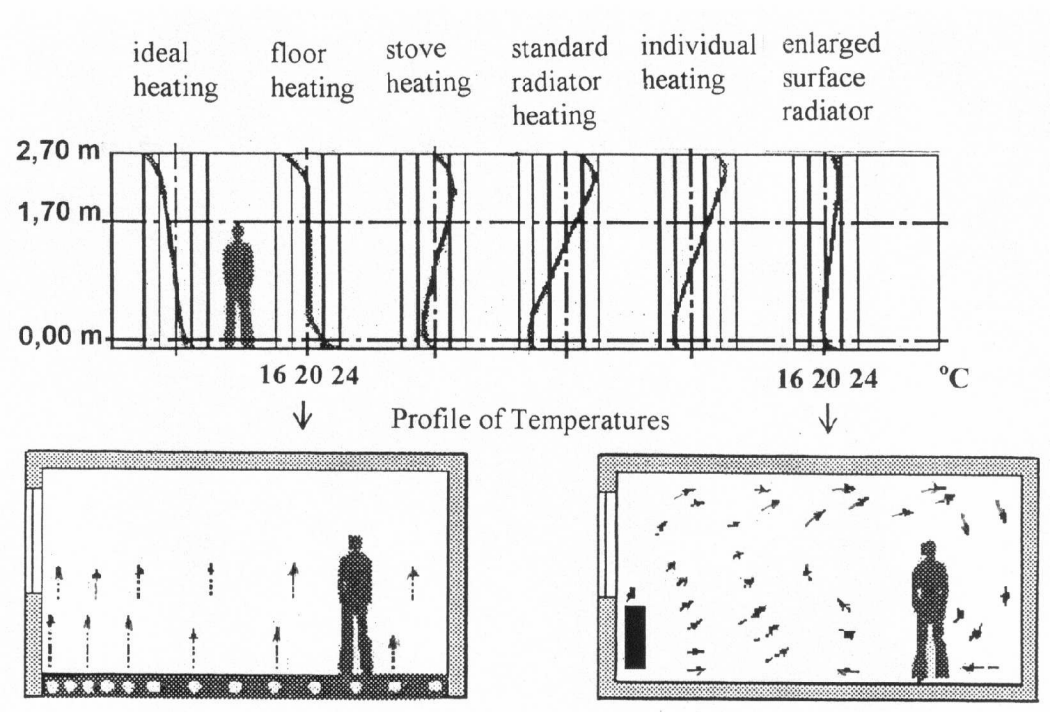

FIGURE 8: *Vertical features of space temperatures at different heating types. Source: MULTIBETON Co., Dr. Ing. A. Kollmar.*

The bigger part of the described heat pump can utilise the heat, what is in unlimited quality, but low temperature in the environment :

- heat pump with electricity - heat pump with gas-engine (Fig. 9),

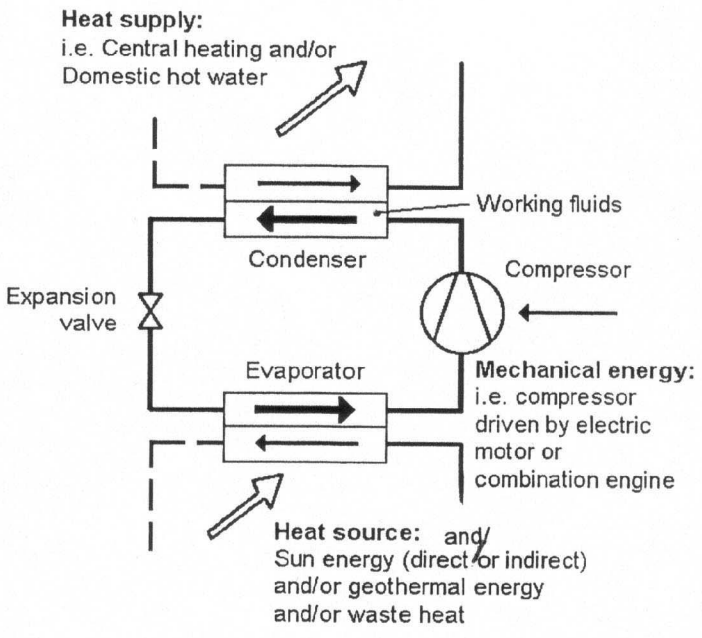

FIGURE 9: *The Principale ofasimple Carnot-cycle heat pump.*

- heat pump with gas-absorption (Fig. 10).

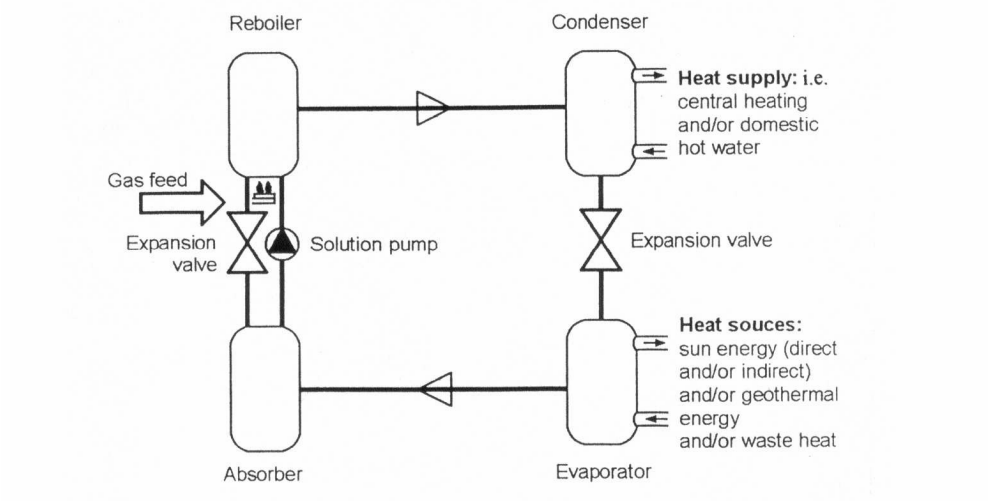

FIGURE 10: *The Principal of absorption driven heat pump.*
Source: AWT ABSORPTIONS - UND WÄRMETECHNIK Co.

The course of the heat pump is based on the Carnot-cycle. (Fig. 2).
The heat quantity can be pumped between two temperature state, this is the base of the refrigerator, too, but the heat pump is a reversed refrigerator.

The demonstration of the heat pump with energy stream (Fig. 11) [11].

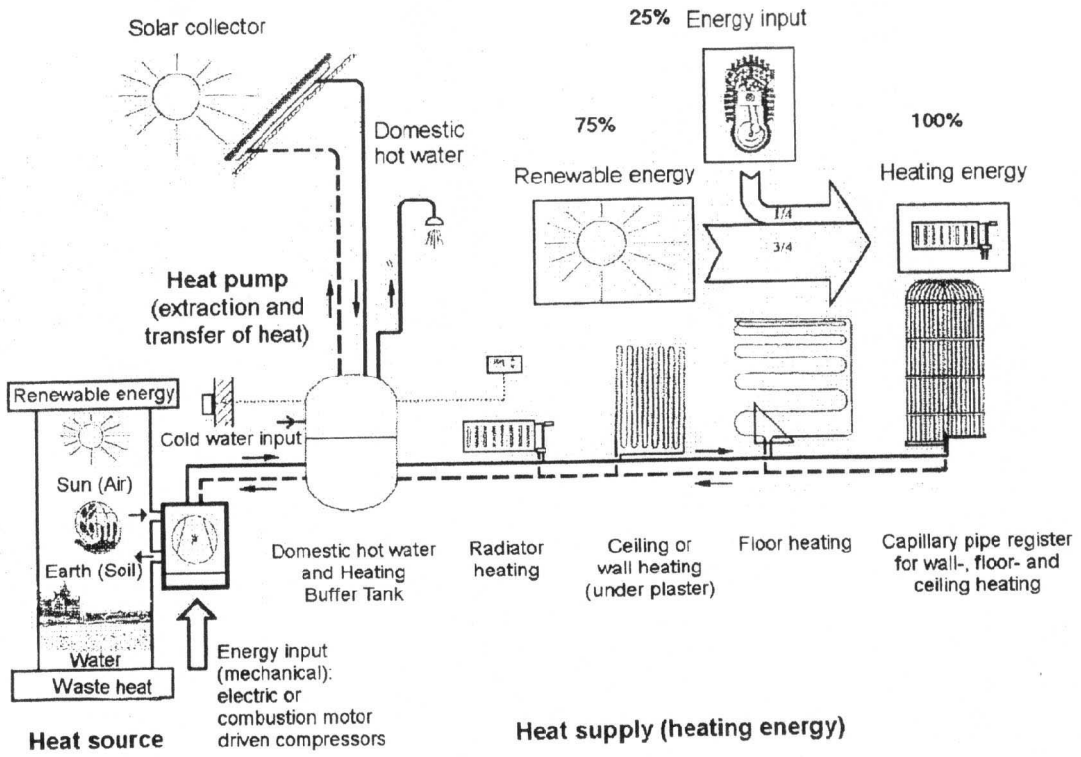

FIGURE 11: *The Principles and Sankey-energy flow of a compressor driven heat pump.*
Source: EVN Energie - Versorgung Niederösterreich Aktiengesellschaft
1994. p. 5 (Energieflußschema).

The choose of the heat pump in view-point of the efficiency (COP), what is depended from the $\mathbf{T_C}/(\mathbf{T_C}-\mathbf{T_0})$ (Fig. 2) [12].

The heat pump associated with sun collector.

The application of comfort theory (Fig. 12., 13., 14., 15):

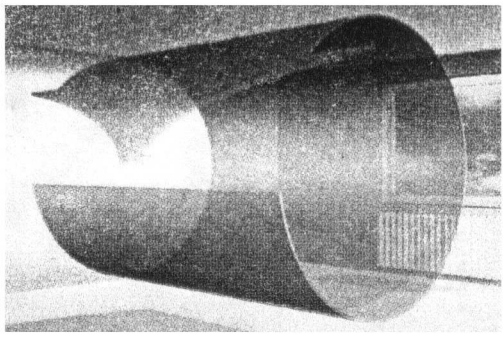

FIGURE 12: *Cylindrical powder phenomena existable of standard heat drop radiator heating.*
Source: WIKINGER Co., HARREITHER Co.

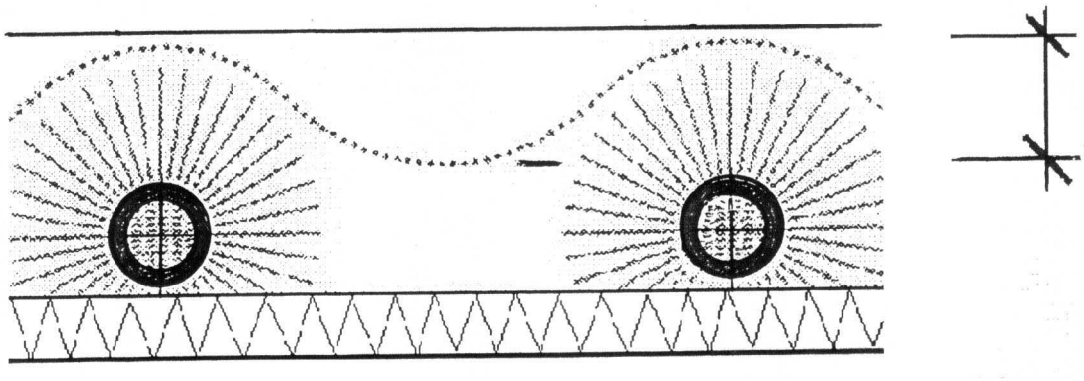

FIGURE 13: *Profile of Temperatures of heating or cooling at normal size and distance of pipes.*
Source: WIKINGER Co.

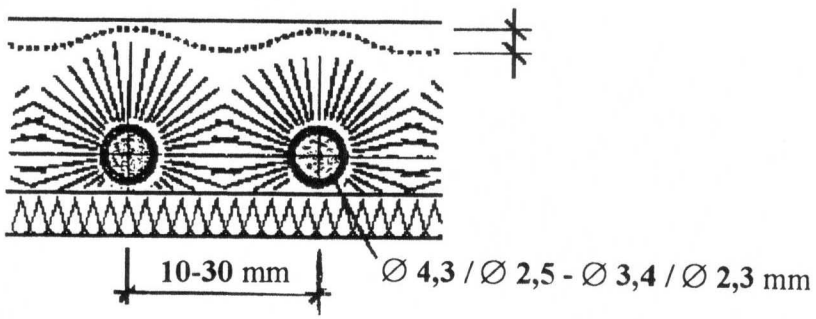

FIGURE 14: *Profile of temperatures of heading or cooling at capillary design pipe register.*
Source: Ref. - 2 (BioClina).

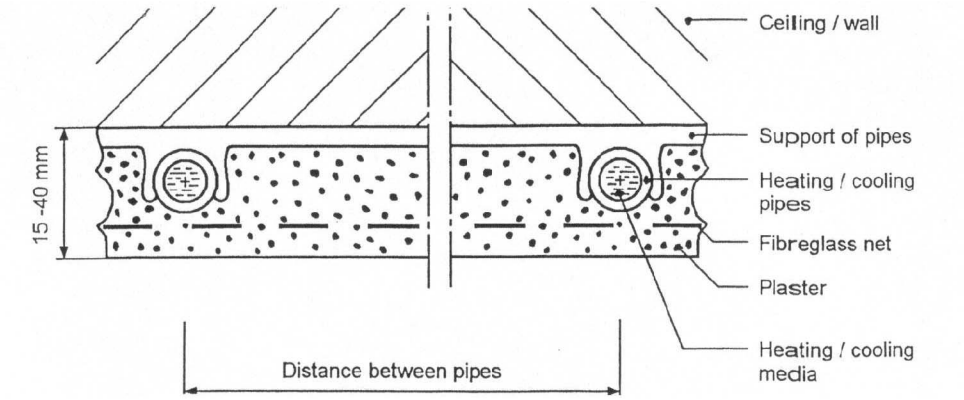

FIGURE 15: *Cross section of wet installation of the ceiling and/or wall heating and ceiling or wall cooling.*

- radiator heating with enlarged surface (f.e. **55/45 ^{O}C** temperature scale),
- floor heating - wall heating - wall cooling (Fig. 16),

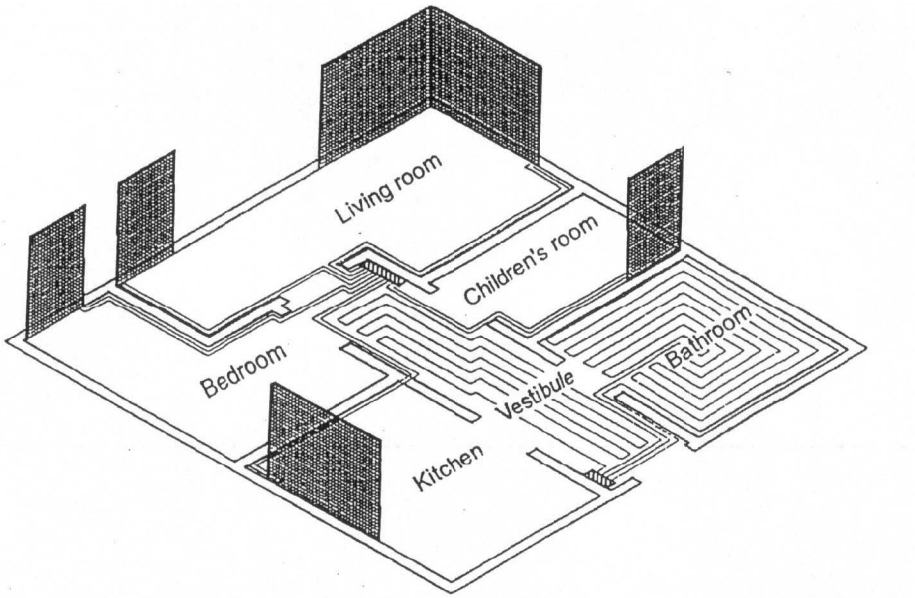

FIGURE 16: *The draft of wat design floor and wall heating.*
Source: VARIOTHERM Co.

- ceiling heating - ceiling cooling.

In the Carpathian Basin it's huge geothermic energy, that is important in ourview-point, too [13,14].

Heat pumps can cut global CO_2 emissions by more than 6%. Perspective of more than 16% emissions saving [15].

The life-style with systems using heat pump, is a clear and civilised method of the third millennium to harmonise with the environment (Fig. 17) [16,17].

FIGURE 17: *From overloading to caring. Sustainable development means to move from overloading planet Earth to living decently and equitable within the means of nature.*
Source: See FIGURE 1.

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