



Geothermal Energy

technical solutions

butech[®]
PORCELANOSA Grupo

Geothermal Energy

Source of energy

Based on its Greek origin, "geo" (Earth) and "thermos" (heat), we can define geothermal energy as the heat coming from the Earth.

Solutions for butech geothermal systems

Under the current policies of energy saving and efficiency, low enthalpy geothermal systems are undergoing a high development.

Quoting the definition made by the Spanish Geological Mining Institute, geothermal energy is a source of renewable energy that is abundant, with a technically and economically viable exploitation that prevents the emission of greenhouse gases, and which has been proven to exist in our subsoil. It is an energy source in the form of heat that does not undergo supply variations, contributes to energy savings, has a non-existent visual impact, and adapts to new building demands.

From a certain depth on temperature remains practically constant throughout the year, increasing as we go deeper into the Earth's crust, causing a thermal gradient.

The ground is therefore a constant heat source.

Principle

Low enthalpy geothermal installations obtain heat energy from the subsoil through an exchange with geothermal collectors that are buried in the ground. This heat is transported to the geothermal pump through a heat-transferring fluid. Once it is in the geothermal pump, heat causes the evaporation of a refrigerant gas contained in the pump, with the gas being compressed afterwards in a compressor. With the increase in pressure, there will be a quick increase in temperature, making it available for use in the production of DHW (domestic hot water) and HVAC (heating, cooling, heating of swimming pools, etc.), providing a sense of well-being and comfort to indoor spaces.

The operation of a geothermal heat pump is comparable to that of a refrigerator or a standard HVAC system. The heat pump system is the same one: a refrigerant gas goes through different states (evaporation, compression, condensation, and expansion...) and with an energy contribution, in this case electricity, it provides heating or cooling. A refrigerator is a heat pump.

The amount of work that a geothermal pump needs to do is smaller than that of a traditional system because the subsoil temperature remains constant.

When we want to refrigerate, the system flow gets reversed.

In winter, the heat pump absorbs heat from the ground and introduces it into the building, and in summer it absorbs heat from the building and dissipates it into the ground.

Vertical Collection

The closed vertical collection system is the most recommended one. We must bear in mind that temperature is constant throughout the year at between 10 or 20 meters in depth, about 7 to 14 degrees Celsius, and for every 100 meters in depth the temperature increases 3 degrees Celsius, so that the calorie supply is always guaranteed and therefore the consumption of the appliance will be more stable.

Classification

Geothermal energy is one of the lesser-known sources of renewable energy and it is stored as heat under the Earth's surface.

Unlike other renewables such as solar, wind, hydroelectric, and biomass, geothermal energy comes from the Earth's inner heat; it is a heat that is fed on one hand from the disintegration of radioactive isotopes, and on the other hand from the differential movements between the various layers that make up the Earth and the latent heat from the crystallization of the outer core.

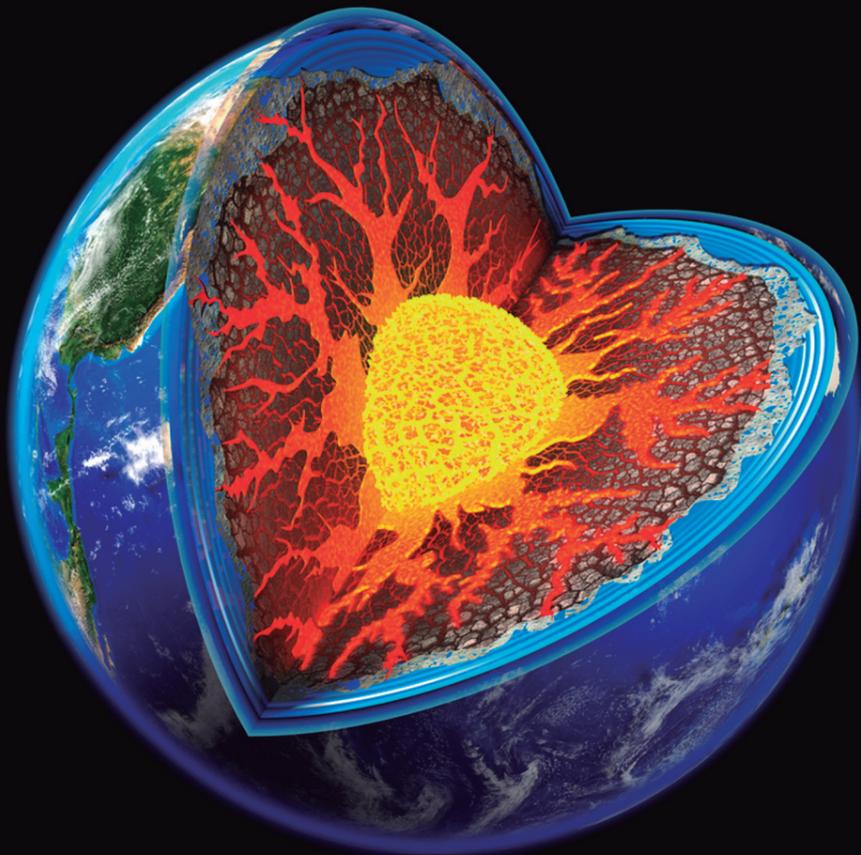
Taking into account the entire surface of the Earth, the total geothermal power that comes from the inside is $4,2 \cdot 10^{12}$ J. It is an immense amount of energy, but only a fraction of it can be used by mankind.

Geothermal energy is therefore, in its broadest sense, the heat energy that Earth transmits from its inner layers to the outermost part of the Earth's crust.

Thus, we refer to the portion of heat from inside the Earth that can be exploited by mankind in technical and economic conditions, as a geothermal resource. They are classified according to temperature, and this will determine their uses and applications. The aim of geothermal energy is therefore to take advantage of that heat energy from inside the Earth.

When we are talking about resources at very low temperatures (below 25 °C) the possibilities for use are in air conditioning and hot water.

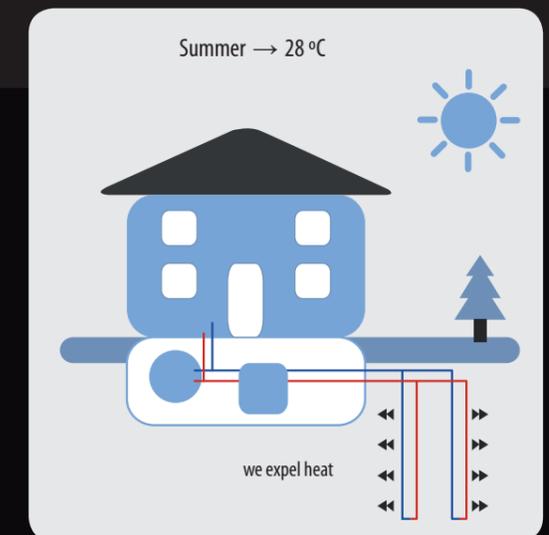
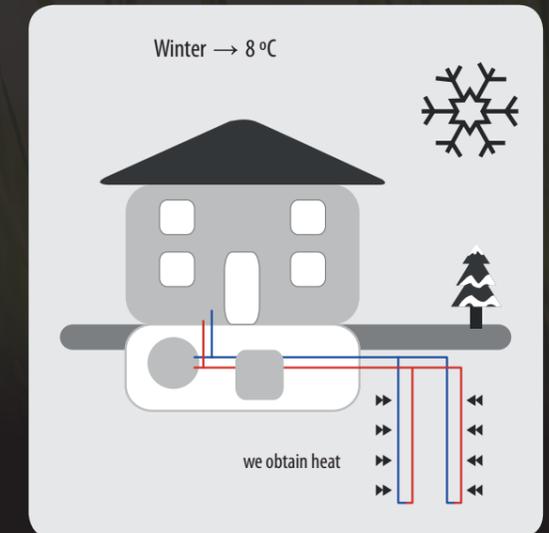
Geothermal energy is a form of sustainable energy use with a present and a future, both from a point of view of high-guarantee energy supply and from a thermal point of view, as a high energy efficiency alternative compared to conventional heating and cooling systems.



Advantages butech geothermal

- Endless energy source. Available throughout the year and steadily, regardless of the season and the weather.
- Thermal gaps far lower than any other HVAC systems. Higher performance, greater comfort.
- Annual average coefficient of performance of up to 5.
- It does not emit gases or odors. There is no combustion. It is ozone layer-friendly.
- Low and simple maintenance.
- It has a zero visual impact, it does not affect aesthetically as all the collection elements (probes) are buried and the machinery is inside the building in basements or boiler rooms.
- HVAC (heating, cooling, and swimming pools) and DHW production using one single system (reduced maintenance and energy use.)
- It complies with the CTE HE4 so that the installation of solar thermal panels is not required.
- The unsightly heat exhausts of a conventional HVAC system are not needed.
- High energy savings compared to conventional HVAC systems.
- Increase in value of the property due to the use of renewable energy resources.
- Safe installations as it does not have fuel tanks.
- Longer service life of the installation (50 years, as the most sensitive element - the heat pump - is inside the house.)
- There is no risk of legionella.
- Low noise level. Comparable to any appliance (refrigerator)
- Unlike other systems of renewable energy use, such as solar thermal energy, it does not need an auxiliary support system because it works under any weather conditions, day and night throughout the year. It does not need boilers, tanks, water heaters...
- Currently, geothermal systems offer an added appeal, derived from institutional efforts aimed at developing renewable energies. This type of installation is subsidized in the different Spanish Autonomous Communities in a percentage that is between 20 and 50%.
- It is an ideal system to be installed with any type of construction, because although the initial investment is higher than that for a conventional system, the maintenance and operation costs

are very low, so that the amortization periods are especially interesting.



All the advantages described above are reinforced by an added value because it is a PORCELANOSA product, with a quality and services that are globally recognized by its customers.

We will soon see how the use of energy in the form of heat given off from inside our planet will be more familiar, close, and economically viable to all.

Working System

How do I obtain a butech system estimate?

- Come over to one of our stores/distributors, where you will be assisted by our professionals, who will introduce you to the products that best suit your needs.
- In order to offer you the best service, we will need you to provide us with the project drawings and to complete a study form customized for your product.
- Once you have handed us the drawings and the correctly completed form, Butech's Technical Department will prepare a first estimate.
- In a short period of time, the same professional who assisted you will give you the estimate.
- In case you accept it, and if you wish, you will receive a visit from one of our technicians for the preparation of the final estimate.

Carrying out the installation

Preparation of the construction project for the probes and submission of drilling application at the Territorial Section of the Ministry of Industry and Mines.

It consists of carrying out a construction project of the collection field, endorsed by the Mining Engineers' Association and submitted at the competent body that authorizes us to carry out drillings.

Carrying out the vertical drilling

It consists of drilling with the method best suited to the ground composition (granitic, rocky, clayey...) and the use of the proper drill rig, including intubation if necessary.

It includes inserting collectors (polyethylene pipes), filling with a mixture of cement and bentonite, which apart from compacting the tubes and the ground, gives it conductive characteristics (ability to transmit heat.)



Construction of the drilling field.

Here the vertical drillings are connected up to the engine room entrance with ditches that are approximately 70 cm deep. The entire collection field will be filled with antifreeze, and the necessary pressure tests will be carried out.

Construction of boiler room.

It includes installing the engine room with all its main components: geothermal pump, DHW accumulator, inertial accumulator for the cold, and all secondary components, heat exchangers, expansion tanks, circulation pumps, shut-off valves, piping... Leaving connections prepared for connecting with the distribution circuits.

The room circuit will be filled with antifreeze, and the necessary pressure tests will be carried out.



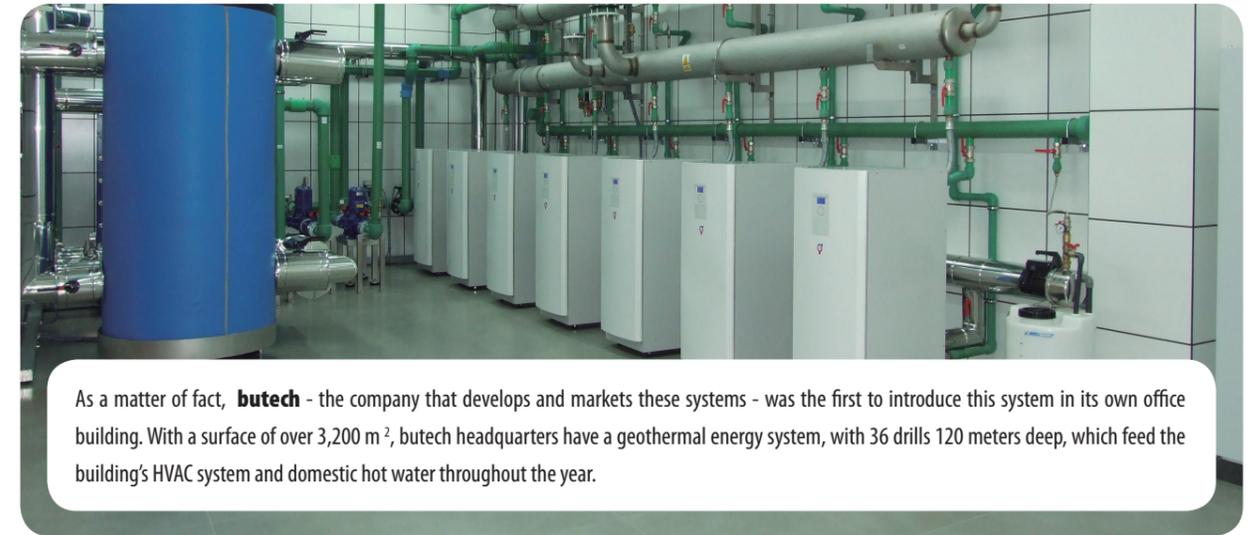
Why butech geothermal energy?

Originally from the Nordic countries, taking advantage of the energy stored in the form of heat beneath the Earth's surface - commonly known as geothermal energy - is at an optimal moment for its establishment in our country.

This is the result of the gradual adjustment of existing legislation and a greater ecological awareness of society, strongly driven by the growing interest in the search for renewable, aesthetic, and cost-effective alternatives.

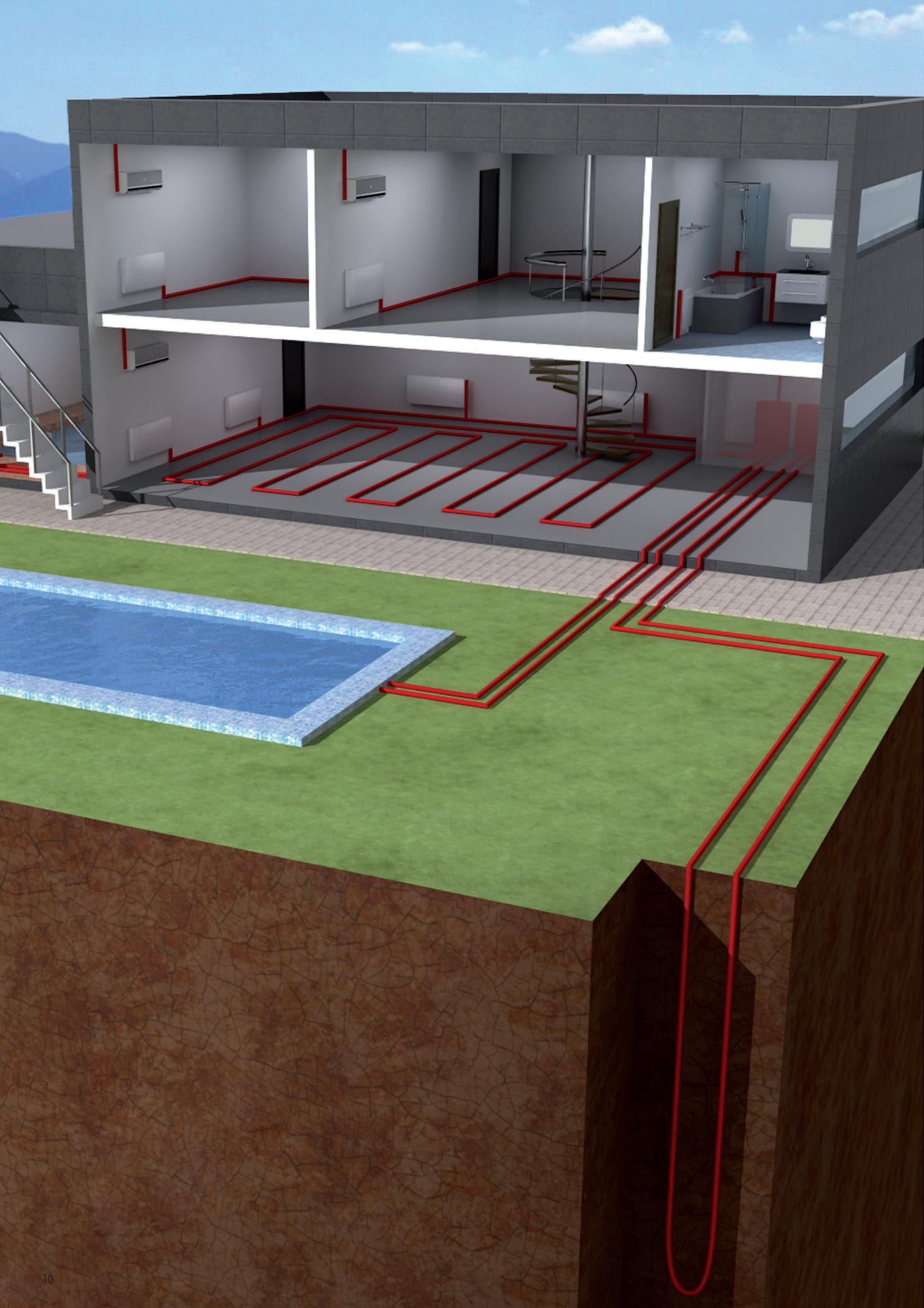
Parallel to the development of these new social trends, we find a greater ease of access to knowledge and material means, essential for transforming the concept of Geothermal energy into a real and viable alternative. This new alternative available to us is not only a source of renewable energy resources, but is considered in many countries as the most efficient of all of them.

butech, as a cutting-edge and dynamic company, echoes new trends in construction technology as well as the growing need of combining environmental awareness with more efficient and cost-effective building solutions for customers.



As a matter of fact, **butech** - the company that develops and markets these systems - was the first to introduce this system in its own office building. With a surface of over 3,200 m², butech headquarters have a geothermal energy system, with 36 drills 120 meters deep, which feed the building's HVAC system and domestic hot water throughout the year.





Standards and Certifications



The Spanish Geological Mining Institute defines it as: "A source of renewable energy that is abundant, with a technically and economically viable exploitation that prevents the emission of greenhouse gases, and which has been proven to exist in our subsoil."



The European Geothermal Energy Council (EGEC) defines it as: "the energy in form of heat below the earth's surface."

Directive 2002/91/EC of the European Parliament and of the Council of December 16, 2002 on the energy performance of buildings

"The energy performance of buildings should be calculated on the basis of a methodology, which may be differentiated at regional level, that includes, in addition to thermal insulation other factors that play an increasingly important role such as heating and air-conditioning installations, application of renewable energy sources and design of the building..."

Directive on the promotion of the use of energy from renewable sources of 01/23/2008

"Thermal energy generated by heat pumps using geothermal energy from the ground or water shall be taken into account for the purposes of paragraph 1(b), provided that the energy efficiency of such heat pumps meets the minimum requirements of eco-labelling laid down pursuant to Regulation (EC) No 1980/2000, where applicable, in particular the minimum coefficient of performance established in Decision 2007/742/EC, and reviewed in accordance with that Regulation."



Technical and Administrative Conditions

Alternative solutions, understood as those that deviate total or partially from BD. The designer or the project manager can, under their responsibility and after having received approval from the developer, adopt alternative solutions, providing that they prove with documents that the projected building complies with basic CTE requirements because their benefits are at least equivalent to those that would be obtained from the application of BD.



Regulation of Thermal Installations in Buildings

Alternative solutions may be adopted provided that it is proven with documents that the designed thermal installation meets the technical requirements of this section because their performance is at least equivalent to those that would be obtained by the direct application of the simplified procedure.



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