Plezura indoor capacity calculation.

Capacity calculation of any kind of heating system is always an exercise between "average room/building conditions", the surrounding exterior climate and technical properties of the specific heating system.
EPG has made a very easy to use calculation method that is to be seen as a guideline of the capacity calculation of horizontal ceiling mounted panels (maximum ceiling height 3 meters) in an "average quality building" in a European climate" with "standard Plezura panels".
The calculation is done room by room. The entire capacity of a building is the sum of all room capacities.
If you know the building is of very poor quality or the climate is extremely cold you might add some correction factors as mentioned below to the capacity calculation.

Calculation

Basic room capacity = room floor surface (m²) X 50 Watts/m²
(eg, capacity a room with a floor of 20 m² = 20 X 50 = 1000 Watts/)

For outside windows and doors we need to add extra capacity to the room. This is also calculated per m² of the windows or doors.

Extra room capacity for outside single glazing window = window surface (m²) X 2,5 X 50 Watts/m²
(eg, extra capacity an outside single glazing window of 5 m² = 5 X 2,5 X 50 = 625 Watts/m²)

Extra room capacity for outside double glazing window = window surface (m²) X 2 X 50 Watts/m²
(eg, extra capacity an outside single glazing window of 5 m² = 5 X 2 X 50 = 500 Watts/m²)

Extra room capacity for outside door = door surface (m²) X 2 X 50 Watts/m²
(eg, extra capacity for an outside door of 2 m² = 2 X 2 X 50 = 200 Watts/m²)

So in this example the installed room capacity (20 m² floor, 1 single glaze window 5m², 1 double glaze window 5m² and 1 door 2m²): 1000 +625 + 500 +200 = 2325 Watts

Correction factors

FACTOR HUMIDITY

Water is the biggest enemy of infrared heating. If there is many water accumulated in walls and floors the infrared system will start evaporating the water inside the walls and floors. This is the effect of conditioning (see below). If the floors and walls are not connected with a water source they will dry out and once this happens the infrared heating system will become very energy efficient. –However if your floor are walls are connected to a water source the infrared heating system will work as a continuous evaporator. In this case you required capacity will be higher. It is impossible to say how much higher because that is depending on so many local parameters. In some cases the required capacity might be even double.

FACTOR ENVIRONMENT

If the building is standing in a very cold climate it will require extra capacity. Below an indication of the correction factors to apply.

FACTOR ISOLATION

If the outside walls are very poorly isolated, the heat accumulated in the walls coming from the infrared system will not be reemitted into the room but rather escape to the outside. In such cases one might correct the overall capacity of the installation with a factor related to the total surface of the outside walls and add this to the already calculated capacity.
Correction capacity for bad isolated outside walls = wall surface (m²) X 0,5 X 50 Watts/m²
(eg, extra capacity for bas isolated outside walls of 40 m² = 40 X 0,5 X 50 = 1000 Watts/m²)
Again this is to be seen only as a guideline figure. All is depending on local conditions.

FACTOR WIND

When the building is standing in a very windy environment, the outside walls will lose their accumulated heat very quickly. One might also correct this very similar to the FACTOR ISOLATION.

Distribution

When the required installed capacity of a room is calculated it now comes down to selecting the right Plezura panel. In our (not corrected) example we require 2325 Watt. So it might be ok to use two Plezura panels of 1400 Watt. However it is not only a question of capacity but also of distribution.
When considering how to distribute/place Plezura panels in a room the most easy thing to do is to imagine that you hang an ordinary bulb lamp (100 Watt) on the place where you want to hang a Plezura panel. You must make sure that with the imaginary bulb lamps you hang up, and with an empty room, the floor is a homogenous lighted as possible. This might mean in our example that maybe it is better to hang up four bulb lamps (4 X 50 Watt) instead of two bulb lamps (2 X 100 Watt).
There were you will have the most light with your imaginary bulb lamps, you will have the most heat with the Plezura panels.
So in our example we also could install four Plezura panels of 700 Watt instead of 2 Plezura panels of 1400 Watt. It will give more equally distributed comfort.

Spot heating

With infrared heating it is possible to heat a spot/part of a room more or less. This is impossible with convection heating. This spot heating can generate huge energy savings.
Suppose you have a room that you only use a small corner to work/sit/relax and the rest of the room is just used as storage. With infrared heating you might heat up the room to 12°C. For this you use one general thermostat that you place in the “cold” part of the room. There where you work/sit/relax you place one Plezura panel with its own thermostat and there you heat up till 18°C (equivalent to 21° convection).

Energy consumption

Under construction

Conditioning

When a room/building is heated for the first time with a Plezura infrared heating system it will take some time to bring the building into the ideal conditions. In all walls and floors/ceiling of a building heated with convection systems (or after construction) a certain amount of humidity is accumulated. When we start heating with infrared for the first time, the accumulated humidity is evaporated. Think of it as a wall in the garden, the South side (the infrared side) is dry and clean, the North side is humid and grown with mosses (the convection side).
So when you start up the infrared heating system it will be working almost at full capacity and it might even feel as if you don't reach good enough comfort level. Once however enough water is driven evaporated, the walls and floor/ceiling will start to reemit the infrared back into the room, the consumption will drop down and it will feel as if the radiation is coming from all sides (what it actually does). This conditioning is depending on the amount of water accumulated and migt take a few hours ton in some cases, a few months.
This is a very important guideline for first time infrared heating users.

Notes

IMPORTANT NOTE 1

If the result of your calculation is very close to the capacity of a given Plezura panel, then maybe it is better to pick the panel with the next higher capacity.

IMPORTANT NOTE 2

The total installed capacity in a house has no linear relation with the energy consumption. You might think that the more capacity installed, the higher the electricity consumption might be. This is NOT TRUE. It is even the reverse. When the capacity of the installation is too small, the Plezura heaters will be working some days or weeks at full capacity. At this point the energy efficiency of the panel might drop with even more then 50%. When the capacity of the installation is just high enough, the Plezura heaters will never work at full capacity and when they stay just below this full capacity point the energy efficiency is maximum. However if you would have exaggerated and the capacity of your installation is (eg) two times higher than calculated, the Plezura panels will work at very low capacity, in this case the energy efficiency will also drop with about 30%.

IMPORTANT NOTE 3

The capacity of a Plezura heating panel (number of Watts) does not reflect the actual consumption. It is an indication of the maximum consumed power at operating temperature. When a Plezura panel works it actually consumes only about 30% of the installed power. When you start using a Plezura panel it will heat up towards a certain maximum operating temperature. The speed in which it heats up the first time depends on many factors but it will be typically between 5 minutes to 20 minutes. Once it has reached that maximum operating temperature it will shut down and start cooling a little bit to just a few degrees below the maximum operating temperature. From this point on the panel enters into an operation mode where it heats up a few degrees towards it maximum operating temperature and then cools down a few degrees. This cycle is typically about 5 to 10 seconds heating (30%) and then 12 to 25 seconds heating (70%).

IMPORTANT NOTE 4

The capacity is also an indication of the speed in which it can reach its maximum operating temperature. For instance when you start up a panel of 1000W it might take 20 minutes to reach its maximum operating temperature. When you start up a panel of 2000W it will only take about 10 minutes to reach its maximum operating temperature.

IMPORTANT NOTE 5

The maximum operating temperature of a Plezura panel is defined by some set-points in the built in electronic controller. In residential applications the factory setting is 120°C, this is defined by law (CE regulations). Depending on the behavior of the room thermostat that is controlling the Plezura panel it is possible that the built in electronic controller lowers the maximum operating temperature. As a consumer you don't notice this, it is made for creating you optimum comfort. Only for specific applications the maximum operating temperature might exceed 120°C. This can only be set by an EPG trained technician.

IMPORTANT NOTE 6

In the calculation we consider m^2 instead of m^3 (as normally considered in convection systems). This is because we are talking about infrared. With infrared heating in average rooms (up to 3 meters ceiling height) the temperature difference between floor and ceiling is 1°C. In convection systems this difference is rather 3°C to 4°C.