The first and most important component in the design is the heliostatic mirror. These computer controlled mirrors focus the sun onto a predetermined position. 120 heliostatic mirrors with a total surface of 497 m² form the basis of the light machine.

The heliostatic mirrors placed in the roof of the light machine are constructed as a frame in a frame. Each frame is attached to an axis so that all mirrors revolve around two axes, one for following the sun’s elevation and one for the orientation.

In order to focus the reflected sunlight into the narrow shafts in the building, the heliostatic mirrors reflect their sunlight onto a fixed counter mirror. One fixed counter mirror is responsible for reflecting the sunlight of 15 heliostatic mirrors into a narrow shaft. In order to focus the light from 15 different sources onto a narrow shaft, the counter mirror is curved.

The mirror shaft canalises the light and forms the bridge between the covering frame with the heliostatic mirrors and the light shafts penetrating the building. The mirrors are attached to the same cables that support the perforated floor slabs.

The translucent light shafts distribute the light through the building. To give the residences an outdoor space, the shafts are not climatised and are accessible. Inside the shaft are internal balconies with black window frames providing a 360° view angle. The window frames contain awning windows that can provide additional ventilation.

The system with the heliostatic mirrors doubles the penetration of daylight. This makes it possible to transform the office into residences. However, this double in daylight penetration causes the building to accumulate twice as much thermal energy. That’s why pipes are milled in the existing screed to function as floor heating/cooling.

A heat exchanger then transfers this heat onto another cycle that stores this thermal energy in a ground well. When there is a heat request again, this heat is pumped up for direct usage.

A cold and a hot source are installed to buffer heat and cold for larger timespans. With a ground temperature of 11°C, the hot source is 6°C hotter and the cold source is 6°C colder. During summer, the building is heated with the excessive heat that is accumulated during the summer. During the winter, the building is cooled with the cold source that is accumulated during the winter.

The calculations show that no additional heat source was needed. The great amounts of heat however might cause a lack of cold. That’s why during winter nights the cold source should be charged with air coming directly from outside.

A cold and a hot source are installed to buffer heat and cold for larger timespans. The ground temperature of 11°C is 6°C hotter and the cold source is 6°C colder. During summer, the building is heated with the excessive heat that is accumulated during the summer. During winter, the building is cooled with the cold source that is accumulated during the winter.

The calculations show that no additional heat source was needed. The great amounts of heat however might cause a lack of cold. That’s why during winter nights, the cold source should be charged with air coming directly from outside.

Seasonal Storage
A cold and a hot source are installed to buffer heat and cold for larger timespans. The ground temperature of 11°C is 6°C hotter and the cold source is 6°C colder. During summer, the building is heated with the excessive heat that is accumulated during the summer. During winter, the building is cooled with the cold source that is accumulated during the winter.

The calculations show that no additional heat source was needed. The great amounts of heat however might cause a lack of cold. That’s why during winter nights, the cold source should be charged with air coming directly from outside.
Building entrance

Entree hall with mailboxes and the entree to the carpark

Looking up the shaft from the entree hall

Corridor leading to the residences

Bram van Hemmen TUD 28-06-2013 [bramvanhemmen89@gmail.com]
Corridor leading to the residences with light shaft at the end
Entrance to the residence in between the light shaft and bedroom
Internal balcony in the light shaft
Bedroom adjacent to the light shaft

haarlemmerweg molenwerf
Bram van Hemmen TUD 28-06-2013 [bramvanhemmen89@gmail.com]