

NEXTGEN EDGE FACILITIES ALBA IULIA

Phase-change material and outside air within an extreme climate

UPC Romania

UPC Romania is one of the largest telecommunication companies on the Romanian market, leaders in the field of technology innovation. UPC Romania offer television services (digital, satellite and analog), broadband Internet and telephony in about 300 localities. The digital services offered by UPC Romania connect its 1,245,100 customers to the digital world and offer them amazing experiences. UPC Romania is affiliated with Liberty Global, Inc.

Challenge

The location in Alba Iulia was too small, inefficient and unreliable. Therefore UPC Romania decided to build a scalable, greenfield site according a new set of requirements to reduce the Carbon Footprint and to increase the Energy Efficiently and Uptime. In order to use the expertise of the group, UPC Romania setup an international team to design and built the site.



Solution

An integrated approach was chosen, where phase-change material was incorporated within scalable shelter design. Phase-change material was already positive used within the Liberty Global group. The integrated design is based on a modular cooling system with a 10kW phase-change material cooling system, extendible to 26kW. Each component is replaceable without affecting the operation. The EDGE Facilities were developed together with supplier Tizzon and a large international team of specialists. UPC Romania built the first EDGE Facilities with phase-change material, outside air and small-DX. The small-DX unit is used for the extreme high night temperature, in case of external circumstances (like fire) and can support the PCM.

Phase-change material

Phase-change material is a substance with a high heat of fusion which, melting and solidifying at a certain temperature, is capable of storing and releasing large amounts of energy. Heat is absorbed or released when the material changes from solid to liquid and vice versa.



Phase-change materials work on a natural principles and is as simple as it is revolutionary. The Phase-change material used within the EDGE Facilities consists of encapsulated salt hydrates and is a residual product from the Dutch salt mines. Depending on the desired temperature within the EDGE Facilities and the climatic conditions, the most ideal phase-change material with sufficient capacity are compounded. The heat in the EDGE Facilities is stored during the day in the phase-change material, and this heat is discharged at night by means of the cold outside air. As a result, the EDGE Facilities are at constant temperature. By the use of phase-change material, no refrigerants are necessary.



How does phase-change material work in the UPC Romania EDGE Facilities

During outside air temperatures between 18°C and 24°C, cooling is normally provided by outside air only at a nominal level of 10 kW IT load at a ΔT of 10K.

With temperatures above 24°C the fan speed decreased and phase-change material will melt as soon as the outside air temperature rises above the melting temperature. This absorbs the energy and cool down the system air within the ASHRAE range. When more air is needed the fan speed will increase.

Once the outside temperature is lower than the phase-change material, the process is reversed.

The phase-change material solidifies, as soon the outside temperature is lower than the phase-change material. Because the temperature of the outside air drops below the solidification temperature. The absorbed energy is once again ready to released into the system air.

Tizzon

Tizzon is a supplier of EDGE Facilities and manufacturer of air handling units based on phase-change material specially build for the world wide telecom industry.

TIZZON
● HIGH INNOVATION

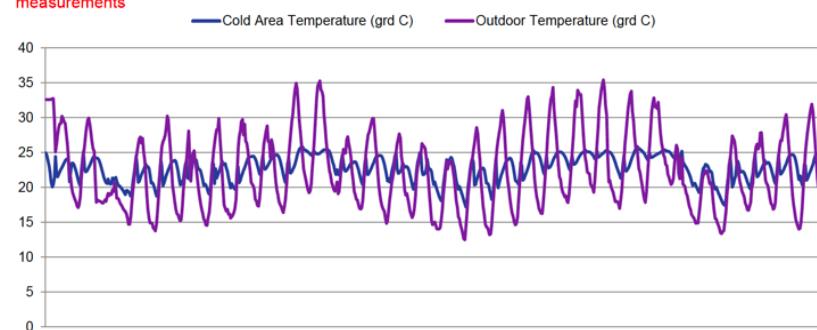
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Results

The use of phase-change material, outside air and small-DX result in a constant adjustment and lowering the system air temperature and humidity according the ASHRAE. UPC Romania reduced the Carbon Footprint and increased the Energy Efficiently and Uptime.



• Temperature evolution July 2017_New site based on DX_PCM_Free Cooling_Local site measurements

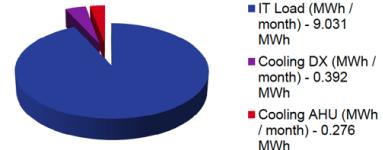


Electricity consumption_July_2016_Old DX System



PUEc=1.33 (July 2016)

Electricity consumption_July_2017_New system based on DX_AHU (Free Cooling and PCM)



PUEc=1.074 (July 2017)

The EDGE Facilities in Alba Iulia, based on phase-change material and outside air provide:

(compared to the old site, with higher IT-Load in the same time of year.)

- Higher availability
- Scalable shelter solution
- Modular cooling system
- Reduction of energy consumption for cooling systems from 2,3kW to 0,7kW with an increase of the IT-load.
- Increase of PUEc from 1.33 to 1.074



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