De Reus van Schimmert

from water tower to data center

Konstantinos Tzanakakis [1], **Madeleine Gibescu** [1] , **Ed Nijssen** [1], **Nico Eurelings** [2]

[1] *Eindhoven University of Technology*
[2] *De Reus van Schimmert*

Abstract

The water tower of Schimmert was built in 1926 to cover the needs of water of Schimmert and the surrounding areas as well. This imposing 38 meters high tower dwarfs any nearby buildings, providing a 360° view of the surrounding area and deserves its pseudonym de Reus van Schimmert (the Giant of Schimmert). In the attempt to find a sustainable business model for the iconic building the concept of installing a data center in its core is investigated. The waste heat from the servers will be transferred to the reservoir on the top and from there used to power a district heating system in Schimmert.

Keywords

Schimmert; Reus van Schimmert; data center; waste heat; district heating system

Tzanakakis, K., Gibescu, M., Nijssen, E., Eurelings, N. (2017). De Reus van Schimmert: From water tower to data center. SPOOL, 4(2). doi:10.7480/spool.2013.1.624

100% of the electricity fed to a server is transformed into heat.

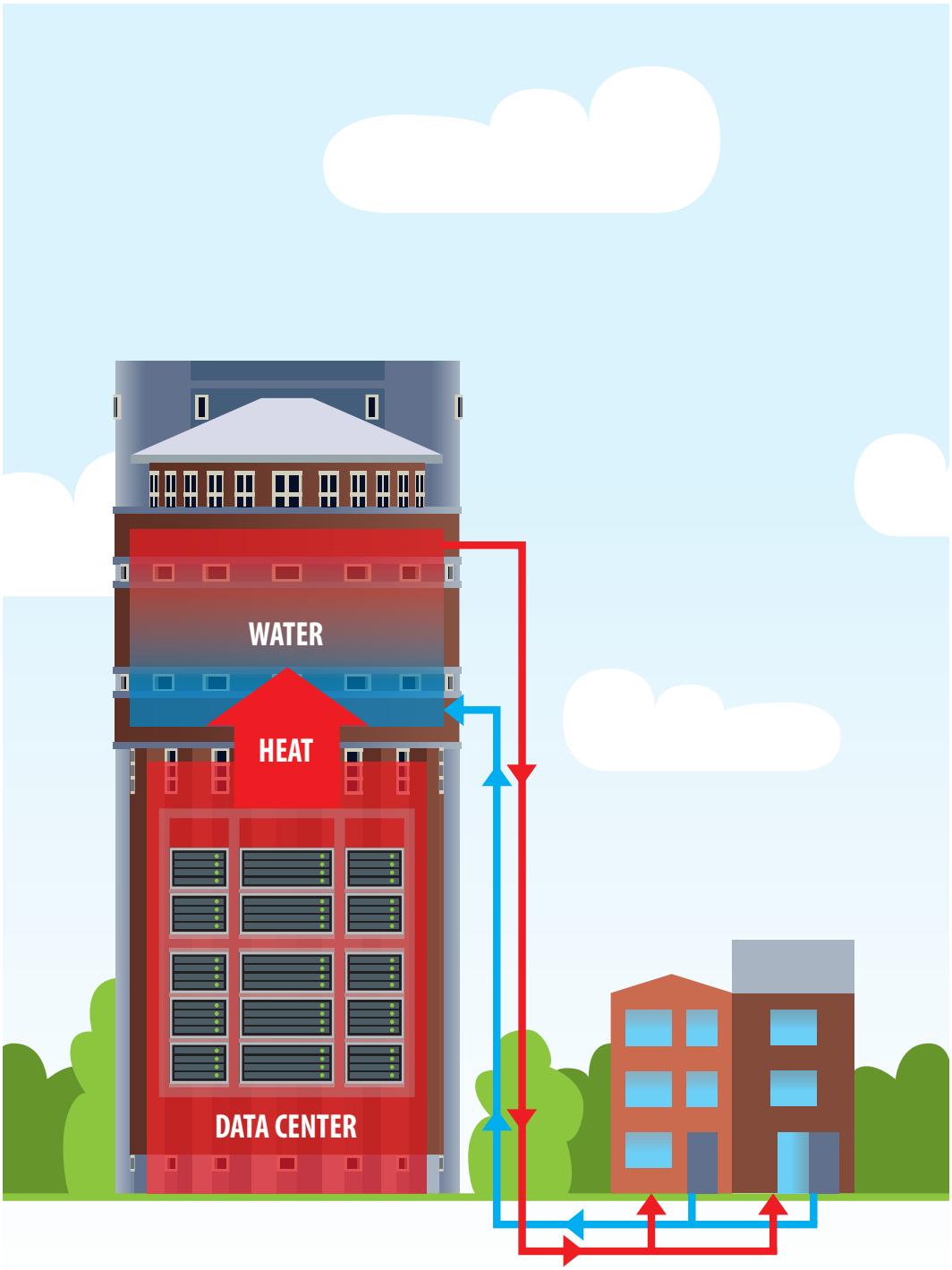

FIGURE 1 raphical abstract

Tzanakakis, K., Gibescu, M., Nijssen, E., Eurelings, N. (2017). De Reus van Schimmert: From water tower to data center. SPOOL, 4(2). doi:10.7480/spool.2013.1.624

The waste heat from the servers will be transferred to the reservoir on the top and from there used to power a district heating system in Schimmert.

The cloud, mobile services, Big Data, Internet of Things and social media have become important services in today's digitalized society. And data centers are what enables them. The need for IT infrastructure is ever increasing and their operation is critical. Although the data center business is booming, the growing demand of these services not only directly translates to higher energy demand and operating costs but also leads to a more severe impact on the environment.

However, within these very same data centers lies the potential to address such environmental, economic and societal concerns. Data centers are uniquely positioned at the crossroads of both energy and data networks and will have the opportunity to become key players within their local sustainable energy systems.

The IT equipment generates heat throughout its operation. Actually, 100% of the electricity fed to a server is transformed into heat and this heat needs to be removed from the server rooms. For this reason, data centers need cooling in order to maintain environmental conditions suitable for the operation of the information technology equipment.

Heat disposal is of paramount concern in the design of data centers. Typically the heat is dissipated away from the IT equipment and practically wasted into the atmosphere. However this waste heat can be re-used for many applications, providing an extra source of revenue to the data center operator while at the same time improving the energy efficiency of the facilities. This has as a result a smaller CO2 footprint and a reduced cost of ownership.

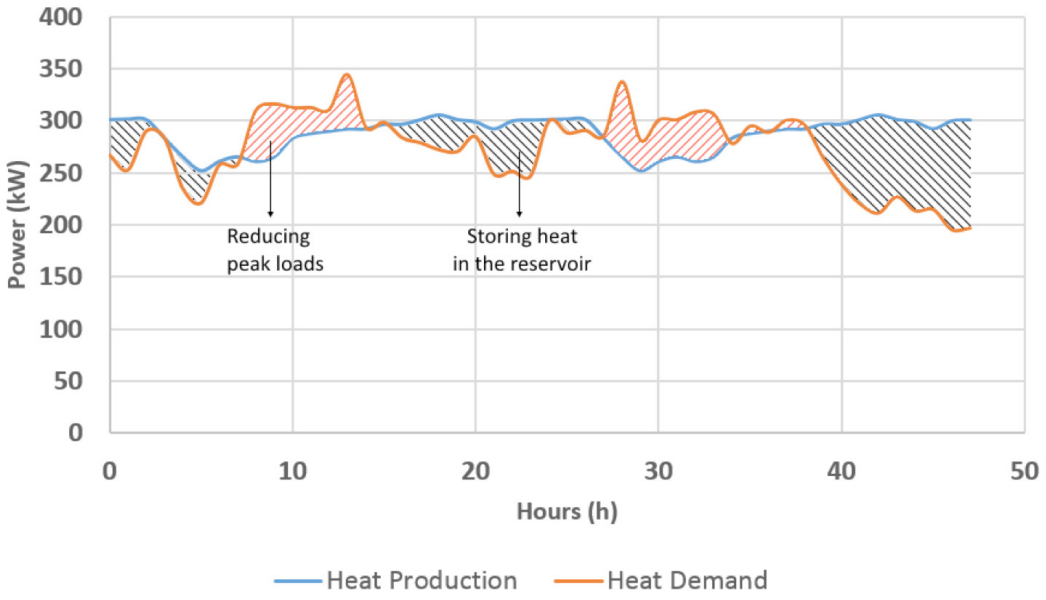

FIGURE 2

Tzanakakis, K., Gibescu, M., Nijssen, E., Eurelings, N. (2017). De Reus van Schimmert: From water tower to data center. SPOOL, 4(2). doi:10.7480/spool.2013.1.624

De Reus van Schimmert has the potential to be transformed into a data center that smartly utilizes the waste heat that is generated by the IT operation. The proposed design, consisting of the data center and the corresponding district heating system fueled by the data center's waste heat, is a venture that can position itself strategically in the local growing ICT market. In addition to that, selling the waste heat provides an additional income source while providing once more a service to the citizens of Schimmert.

Sixty five houses can be heated using the waste heat. However, a difference exists between the time the waste heat is available from the IT operation and the actual demand in the houses. Storage technology has the potential to give a solution to the challenge of this mismatch, providing security of supply without the need of oversizing the system in order to guarantee a continuous energy flow. For this reason, the reservoir on the top of the tower will be used as a buffer, a heat storage system. During times of low demand the excess heat is stored in the tank while when the demand surpasses the supply, the difference is covered by the stored energy.

Data centers are likely to remain an important part of the global economy for many years to come. At present the demand for such facilities is increasing and, as users find more ways to enjoy and exploit access to vast amounts of data, the demand will increase even further. De Reus van Schimmert can be once again a lighting beacon of the area, this time because of its sustainable paradigm. It can showcase that although data centers demand massive amounts of electricity and as a consequence are responsible for CO2 emissions, they can put this energy in good use by providing sustainable heating to the local area.

Tzanakakis, K., Gibescu, M., Nijssen, E., Eurelings, N. (2017). De Reus van Schimmert: From water tower to data center. SPOOL, 4(2). doi:10.7480/spool.2013.1.624