

Sustainable Data center cooling Technologies and their optimised implementation for heat recovery

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Publieke samenvatting / Public summary

Aanleiding

This project will offer solutions for recovering heat from Data centers and reusing it to fulfil urban energy demands. Netherlands stands at 2nd position in Europe in terms of Data center facilities and infrastructure. In 2017 Dutch data center capacity stands at 1,247 MW of which 71% of data center area is located in Amsterdam. Data center Cooling uses 30-40% of the energy delivered to data center. Currently, this energy is not being entirely recovered and reused which not only increases CO2 emissions but also makes it expensive to run a data center. With efficient cooling technologies which facilitate heat recovery and reuse, overall energy reduction of 20-30% can be realized. With the recovered heat, it is theoretically possible to heat around half a million households with the heat generated from data centers, assuming each household consumes 20 GJ per year. With this project, we investigate solutions for efficient cooling methodologies for heat recovery and reuse. Solution will include research on heat recovery and reuse technology, business case for use of recovered heat and finally optimising cooling and heat recovery components using nanofluid as coolants.

Doelstelling

Purpose of the project is to investigate cooling methodologies for data center cooling, which can facilitate heat recovery and reuse for fulfilling urban energy demands. The aim is to use this recovered

Projectinformatie / Project information

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Algemene informatie / General information

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Publicaties en materialen / Publications and attachments

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heat from data centres in the form of warm water which is an attractive commodity with demand throughout the year for urban or industrial uses. As a result of this feasibility study, the most optimum cooling technologies for data center cooling will be obtained for the use in energy recovery. As a follow-up, pilot project might be conducted which will prove the concept of energy recovery and reuse of data center heat for industrial and urban applications. The cooling technology will be integrated within data centers and heat recovered will be used to heat water which will be supplied for district heating or industries in the nearby areas. This entire installation will fulfill the system integration program by connecting different industries/stakeholders and creating a circular and sustainable energy usage loop.

Korte omschrijving

The scope of this project is to conduct a feasibility study to investigate and optimise methods of heat recovery and reuse from data centers. Deerns will carry out Investigation of available/ best practiced solutions for data center waste heat recovery and reuse. Economic feasibility of such technologies and recovered heat will be studied to prepare business case for reuse of heat such as consumption by industry or district heating. Based on these calculations, most optimal methods/ equipment will be selected and recommended. Synano will investigate and optimise liquid based cooling and heat recovery systems recommended by Deerns for data centers, by replacing water (other coolants) with nanofluid coolants. Basic calculations and simulations will be made to highlight the reduction in energy consumption of various cooling and heat recovery equipment while using nanofluid coolants. Final reporting and conclusion highlighting the most optimum cooling and heat recovery technology in terms of efficiency, energy consumption, economic expenditure and other relevant parameters will be documented by both partners. The final compilation and submission will be done by Deerns.

Resultaat

This project will be concluded with a report which

outlines the following results: 1. Most optimal cooling technologies for data centers, both technically and economically 2. Waste Heat recovery from data centers with minimal additional energy 3. Cooling methods to achieve theoretical PUE as close to 1 (or below) as possible with recovered heat 4. Potential uses for recovered heat in urban environment 5. Business case and economic analysis This report will lead to a demonstration project with the suggested cooling technology in urban data centers. With this demo project, the economic, technical and practical feasibility for adopting such a solution will be proved.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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