Verwertung von Abwärmepotenzialen in Thermo Chemischen Netzwerken

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Energienetz Adlershof (Eneff Stadt)
Thema Solenetze

Bundesministerium für Wirtschaft und Technologie

WE4CC Use of Low Temperature Residual Heat Desiccant Networks (EU EIT, Climate KIC)

eit Knowledge & Innovation Community
Climate-KIC

Intelligent Hybrid Thermo-Chemical District Networks, EU Horizont 2020

Co-funded by the Horizon 2020 programme of the European Union, Grant No. 695780

KU LEUVEN

watergy
water and energy solutions

berlin

Zurich University of Applied Sciences
zhaw School of Engineering
IEFE Institute of Ene and Fluid Engineerir

Sir Joseph Swan Centre for energy research

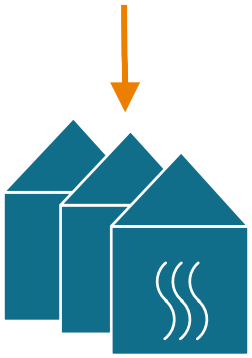
Aurubis

thermaflex®

H-DisNet

Excess heat and heat demand

Excess heat from industry 11,274 PJ / a



Heat demand in buildings 11,724 PJ / a

"Too much energy is being wasted: the amount of heat produced from industrial processes and wasted in the atmosphere or into water in the EU is estimated to be enough to cover the EU's entire heating needs in residential and tertiary buildings"

EU Heating and cooling strategy, Press release, Feb 2016

Data source: Persson et al. 2014

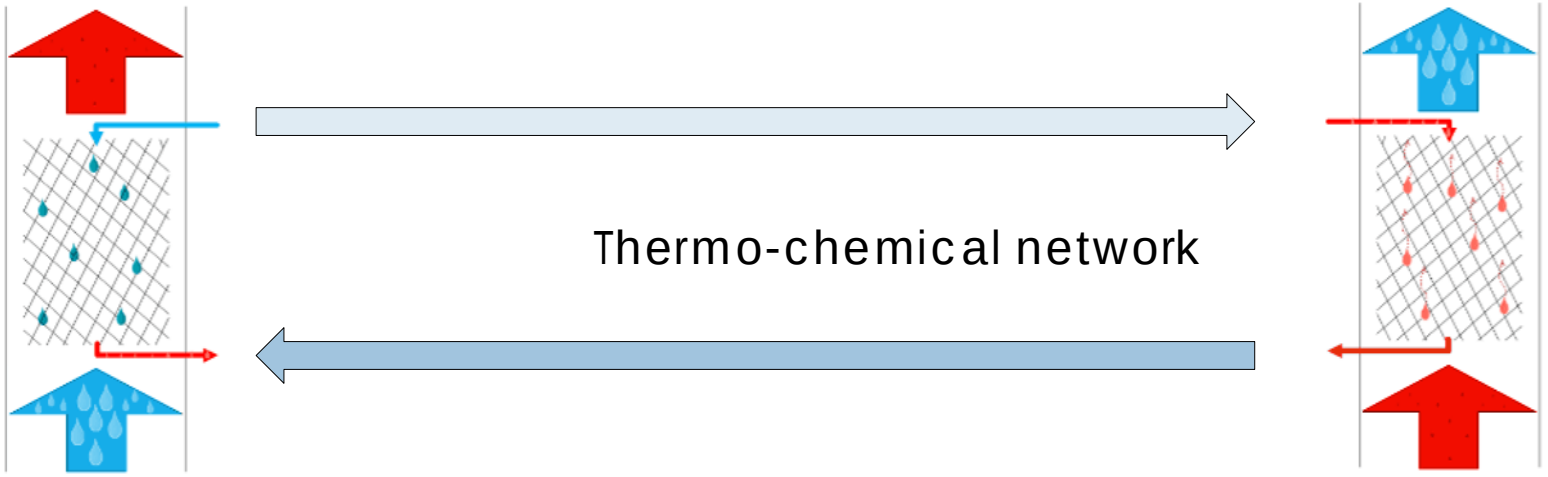
Thermo-chemical technology
Absorption / Desorption

Absorption

- Humidity uptake
- Heat generation
- Dehumidification, Support of cooling
- Heat recovery / latent energy recovery

Desorption

- Regeneration by excess heat / renewables
- Air humidification



Desiccant Networks

Watergy Desiccant Energy Networks

Waste heat valorisation for desiccant regeneration, transport and storage of concentrated desiccant solutions within an urban desiccant network to applications with high humidity load.

Industrial Drying

Loundry, Wood, Paper, Textile, Food, etc.

Swimming- and sport facilities

Buildings

High internal occupancy (schools, conference rooms)
Restaurants, Kitchen

Building integrated greenhouses

Facade- and rooftop greenhouses
Urban gardening
Climate envelopes
Humid air - solar collectors

Greenhouses

Production greenhouses
Research greenhouses

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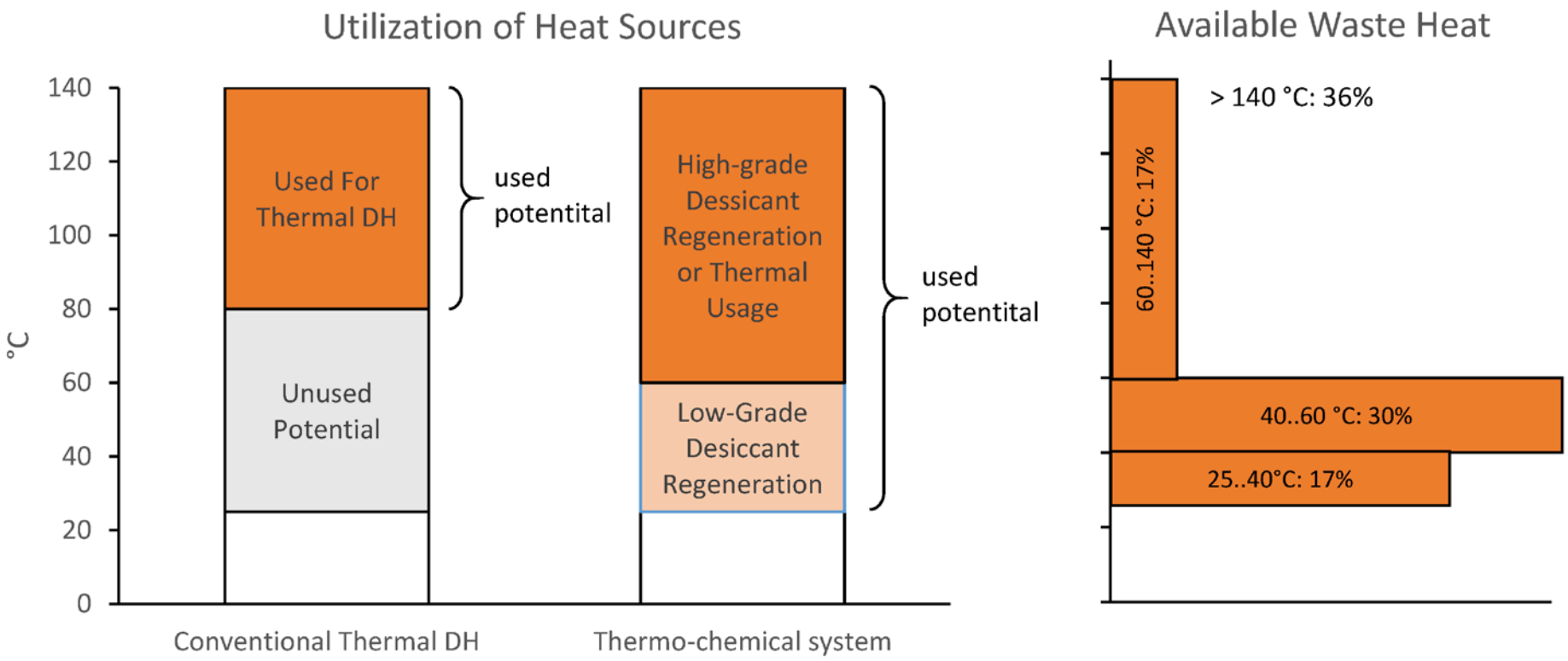
Excess heat temperature levels



Data source: Enova, Utnyttelse av spillvarme fra norsk industri - en potensialstudie, 2009.

Thermo-chemical networks

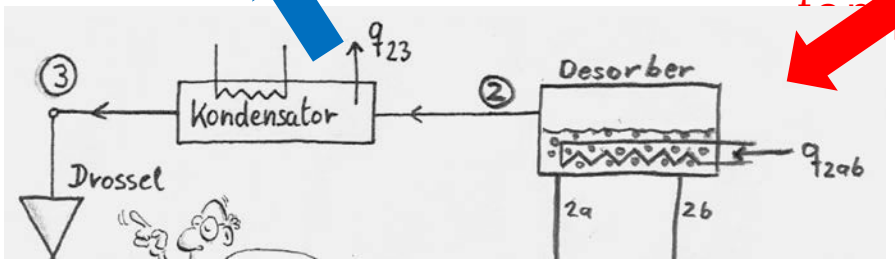
Cutup of the process

=> Process at different location and time => Lossless transport and storage

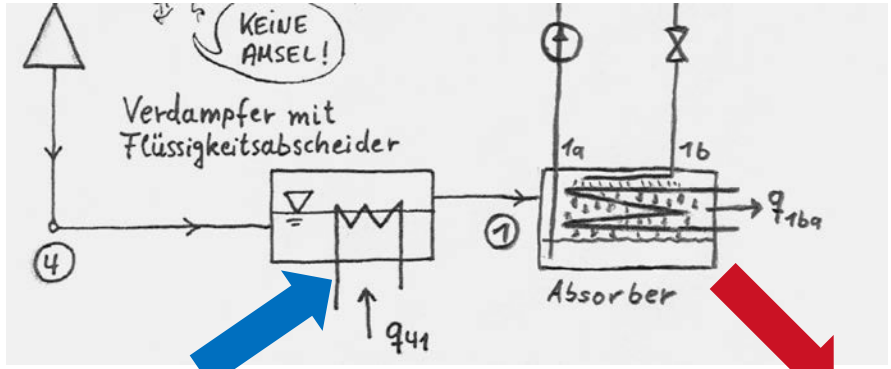

Residual heat from regeneration
(lower temperature)

Driving heat
(high

Regeneration



Services



Environmental heat

Useful heat

Energy Networks, Berlin Adlershof, BmWi funded
Development of Desiccant Dehumidifier using waste heat for regeneration

Bundesministerium
für Wirtschaft
und Technologie

Wäscherei
DÖRSCHEL
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Complimentary Activity: Energy Networks, Berlin Adlershof, BmWi funded

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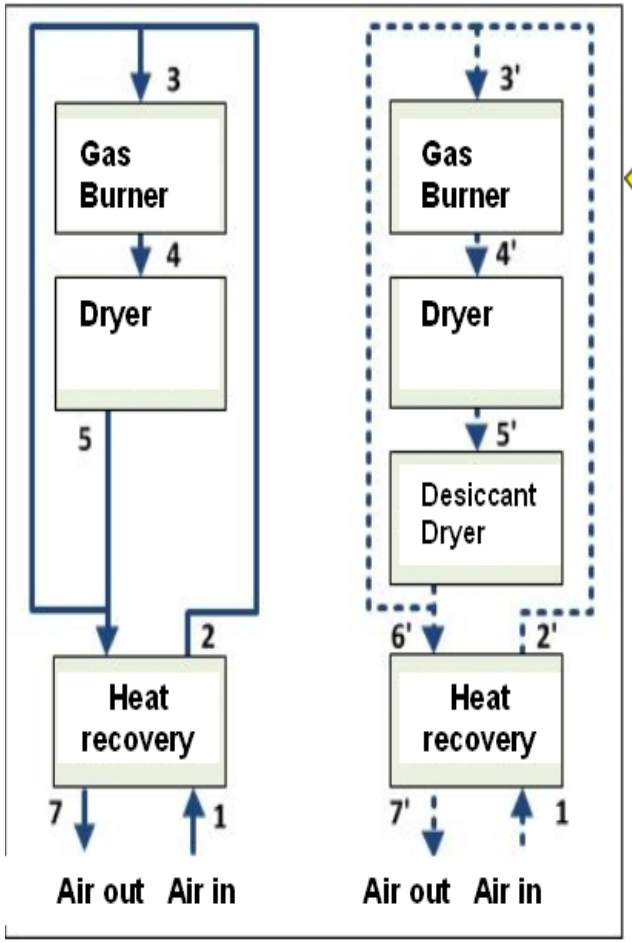

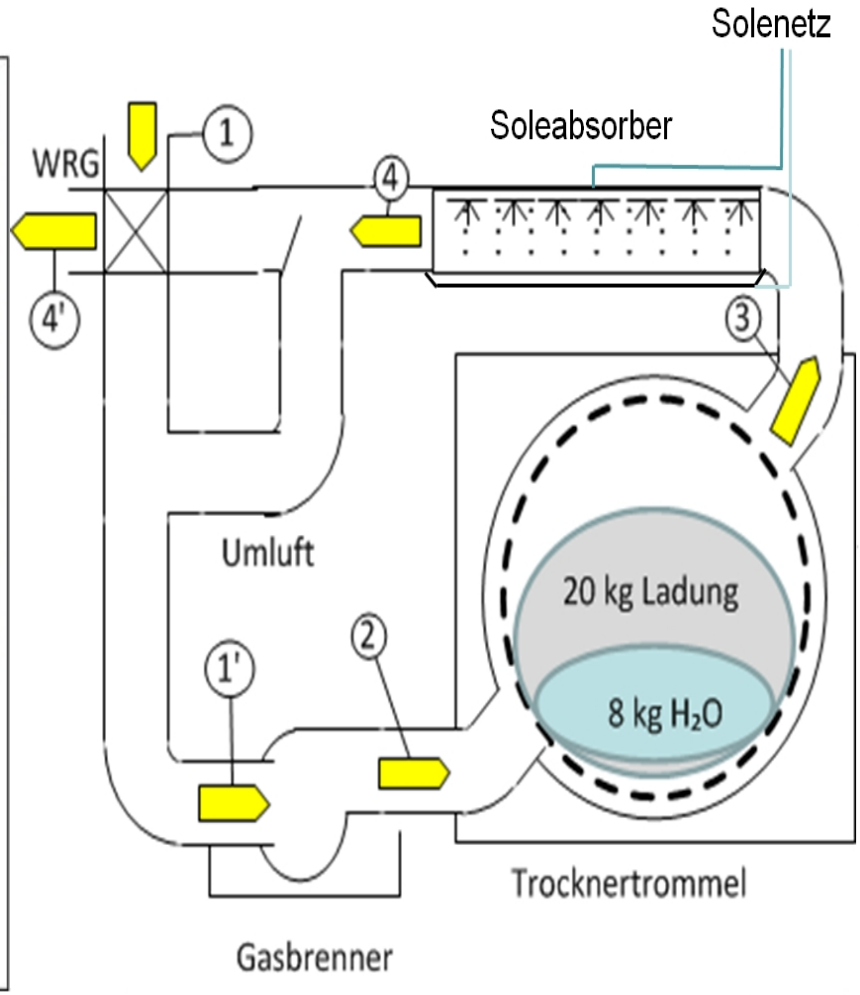

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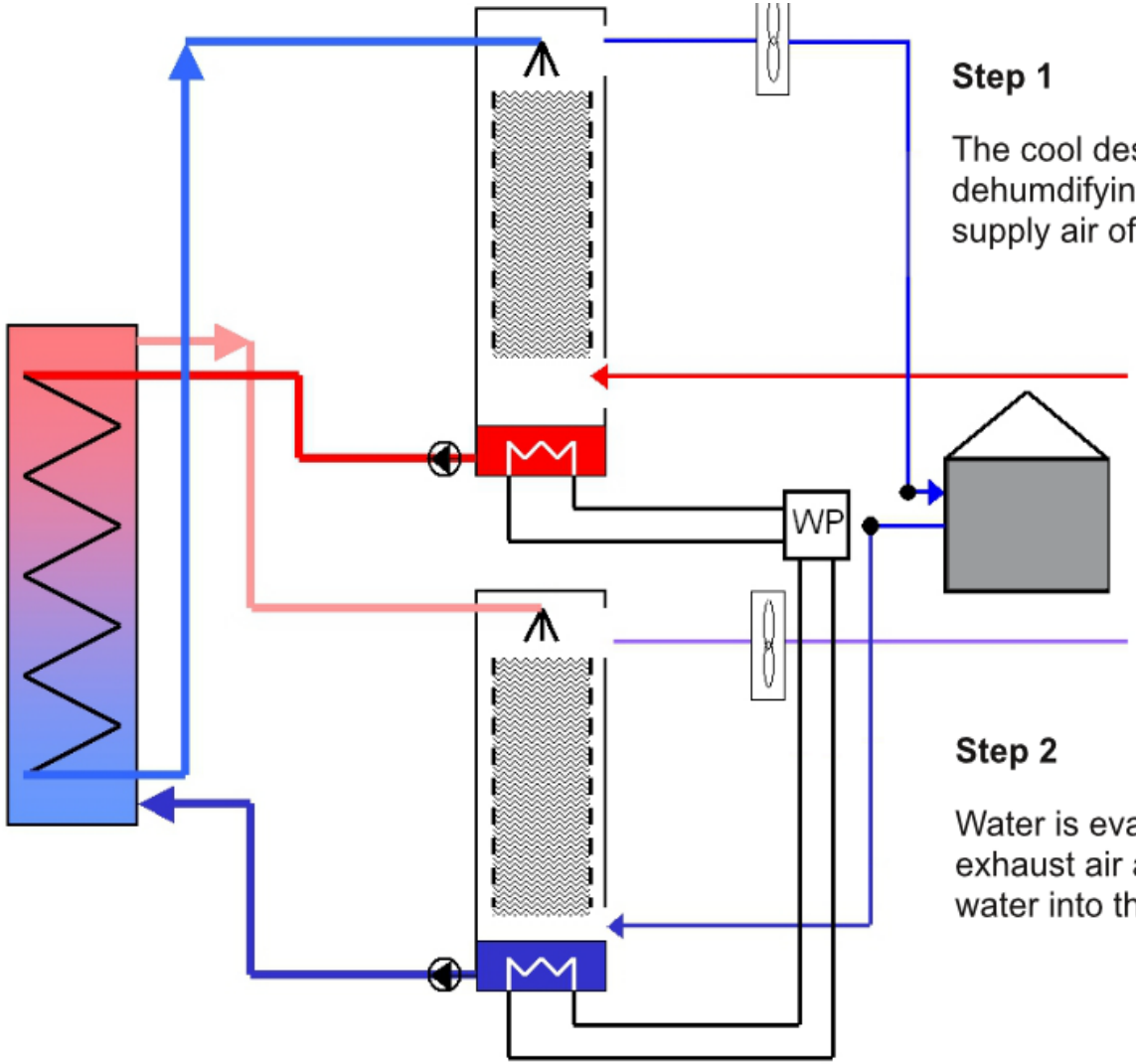
Watergy LDAC Air Conditioning System

Cooling

Step 3

The desiccant is taking up cool from the storage and accumulates heat during daytime that is used for desiccant regeneration in the night.



Step 1

The cool desiccant is dehumdifying and cooling the supply air of the building

Step 2

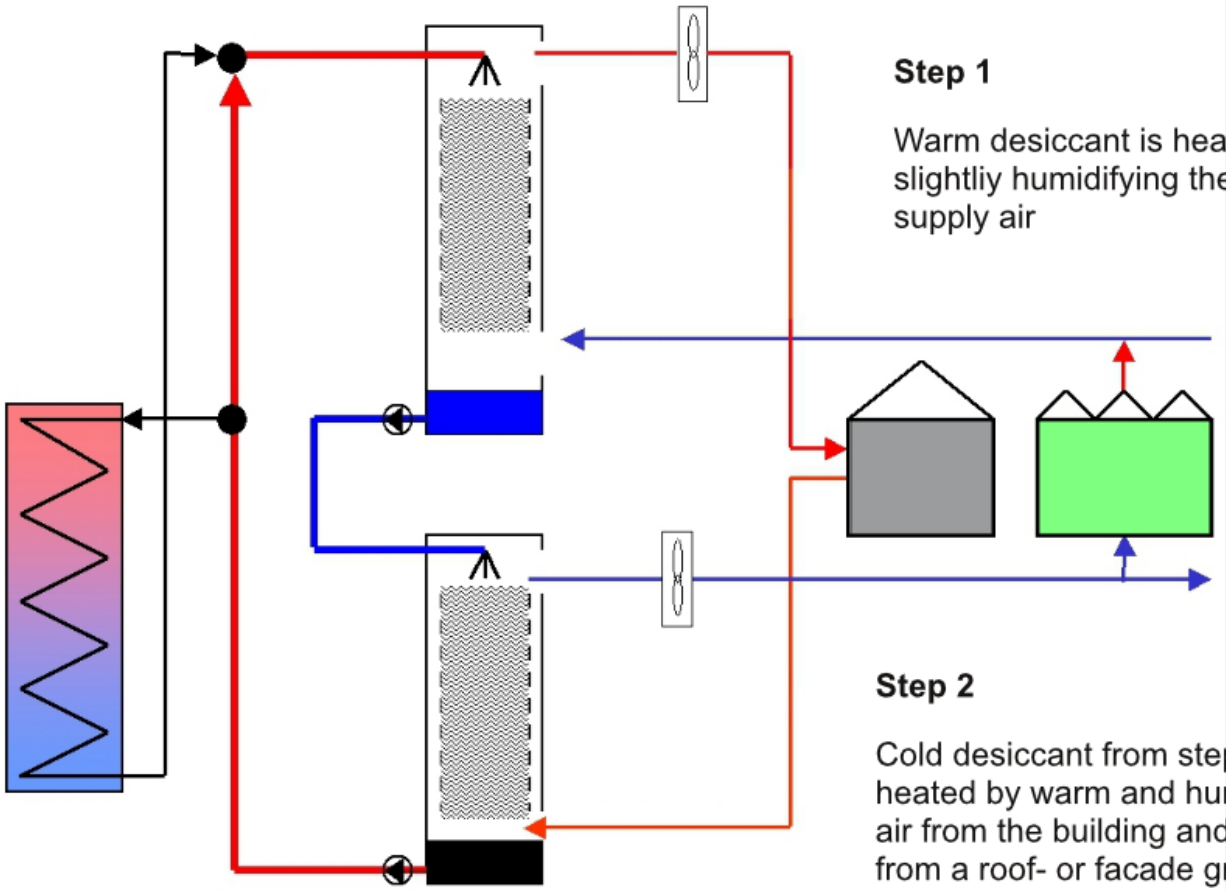
Water is evaporated in the exhaust air and is led as cool water into the thermal storage

Watergy LDAC Air Conditioning System

Heating:

Step 3

During heat and humidity peaks in the building and in the greenhouse, heat from the desiccant can be accumulated in the thermal storage and can be used for space heating during cold periods



Step 1

Warm desiccant is heating up and slightliy humidifying the building supply air

Step 2

Cold desiccant from step 1 is again heated by warm and humid exhaust air from the building and optionally from a roof- or facade greenhouse

Research LAB at TU Berlin, Building Technology and Design for Liquid Desiccant Air Conditioning System and integrated urban greenhouse for solar humid air supply

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Pilot plant for air dehumidification in Tropical Greenhouse;
Absorber/Dehumidifier and Desorber/Regenrator

Pilot Botanischer Garten, Installation under the Greenhouse and connection to greenhouse and to environment

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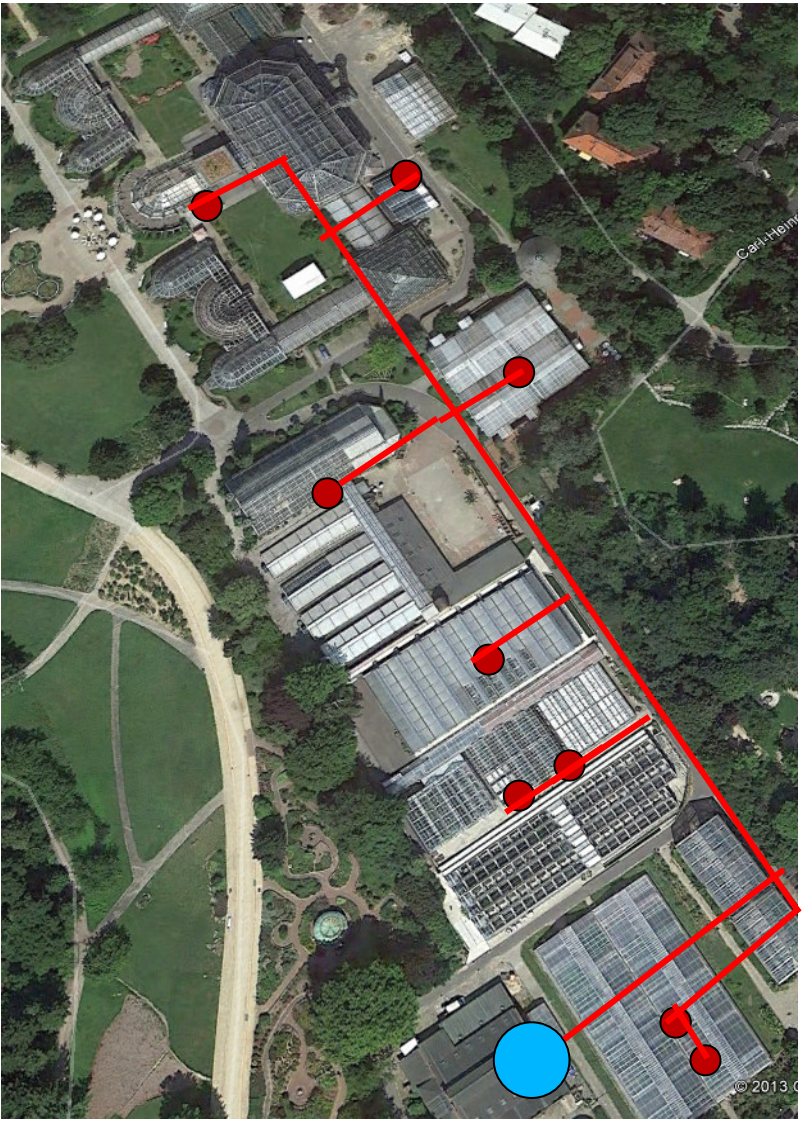
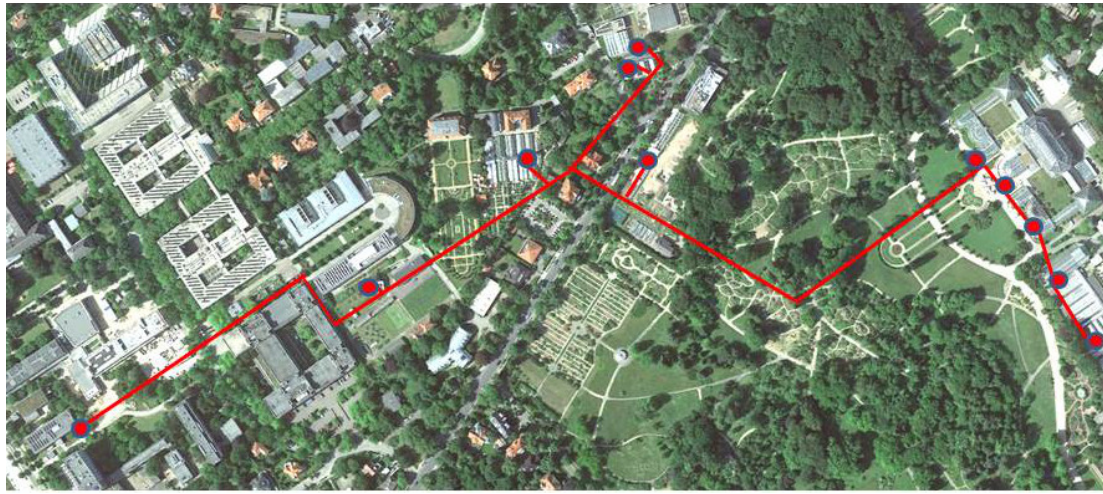




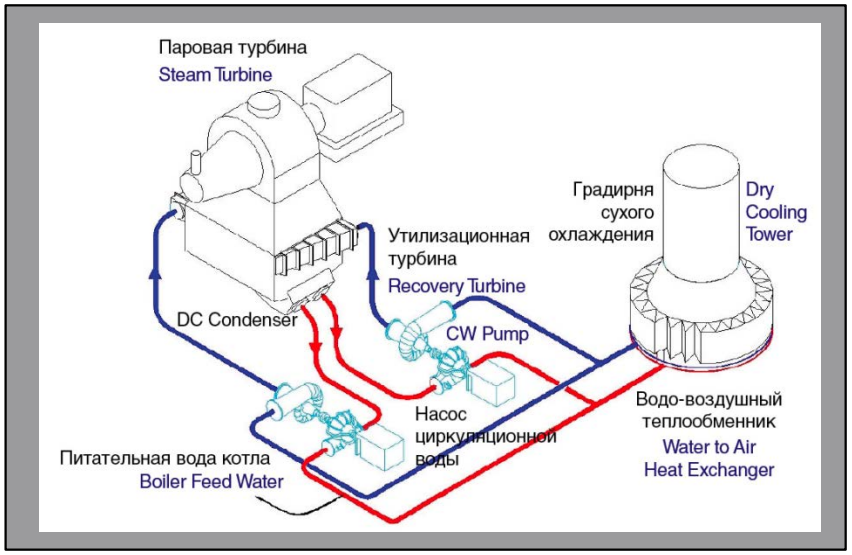
Concept to integrate desiccant network in Botanic garden, supplying several greenhouses with central desorber/regenerator using

- the return flow of the distance heat network, or
- using a source of waste heat in the neighbourhood

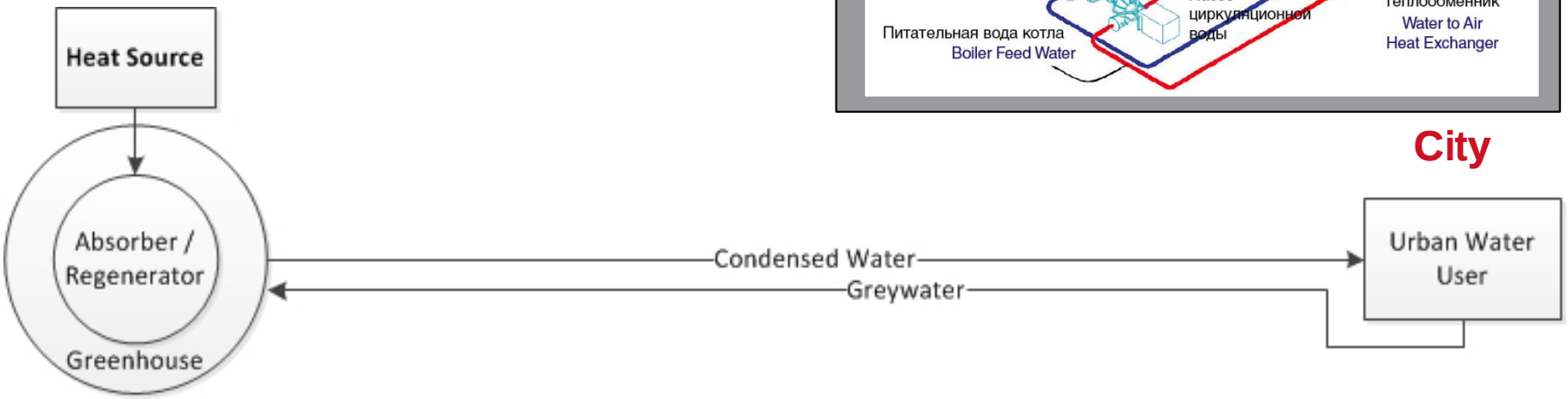
New Generation Desert Green House Project

Watergy/TUB, FAO, UAE MoWE

CSP Solar Plant



City



Greenhouse Plant

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Complimentary Activity: New Generation Desert Green House Project

Watergy/TUB, FAO, UAE MoWE

UNITED ARAB EMIRATES
MINISTRY OF ENVIRONMENT & WATER

UAE, Ministry of Environment and Water

UN, Food and Agricultural Organisation

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Greenhouse for Water Desalination in Desert Climate (BmBF, ERSF)

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