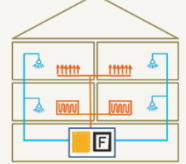


Les Vergers, Geneva – Switzerland

An eco-district including 33 high performance buildings heated by a 5 MW_{th} HP on shallow groundwater.

A5 (F1.5)



Key facts

Building

Location	Geneva, Switzerland
Construction	2015-2020
Type	Multifamily building
Heat distribution	Underfloor heating
Heated area	170'000 m ²
Level of insulation	High performance
Number of apartments	Ø41 per building

Heat pump and source

Number of HP	1
Installed capacity	5000 kW _{th}
Operation mode	Monovalent
Heat source	Ground water & heat recovery
Backup heat source	Geneva's main DH (gas boilers & waste incineration)

Heating system

SH share, demand	64%, 46 kWh/m ² /y
Heating temperature	Max. 35°C at -5°C

Domestic hot water

DHW share, demand	36%, 26 kWh/m ² /y
Type of system	Central per building
Max. temperature	60°C
Circulation system	Yes

Other information

HP share, SPF	85%, measured: 3.7
Backup heat source	15%
Heat cost (LCOE)	CHF 13.-/m ² /year
PV installation	12'000 m ²
Ventilation	Double-flow, or Single-flow with decentralized exhaust air HP for heat recovery

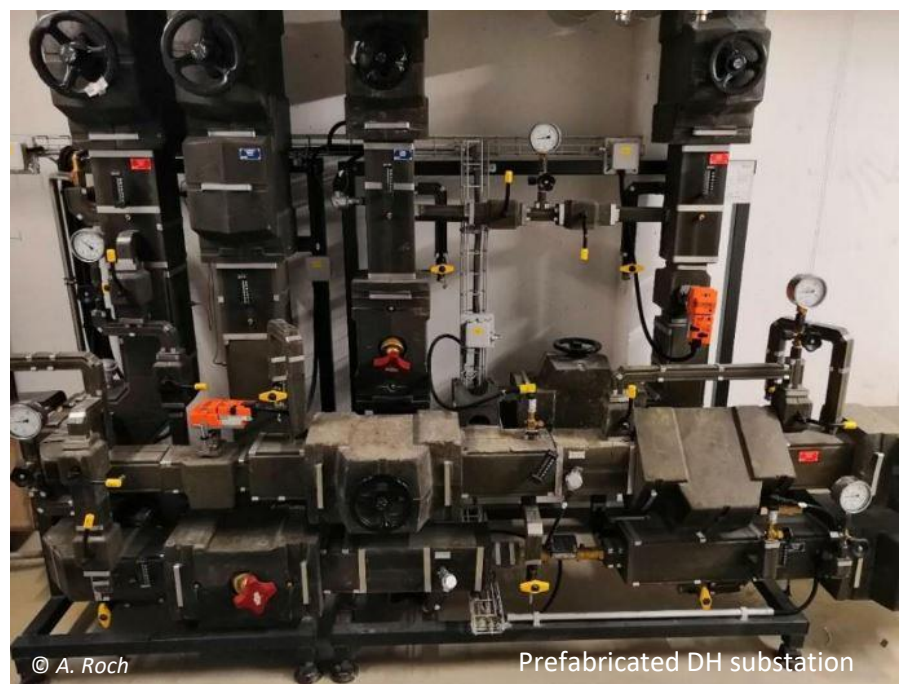
Lessons learned

- High DH return temperature (mainly in mid-season in SH mode, all year round in DHW mode) causes a degradation of the HP SPF, or causes HP shutdowns.



“Les Vergers” is an eco-district composed of 33 high performance buildings, whose main heat source is a low temperature district heating network. This network is mainly supplied by a water-to-water HP using two resources: groundwater from the Rhone River and waste heat from the neighboring industries.

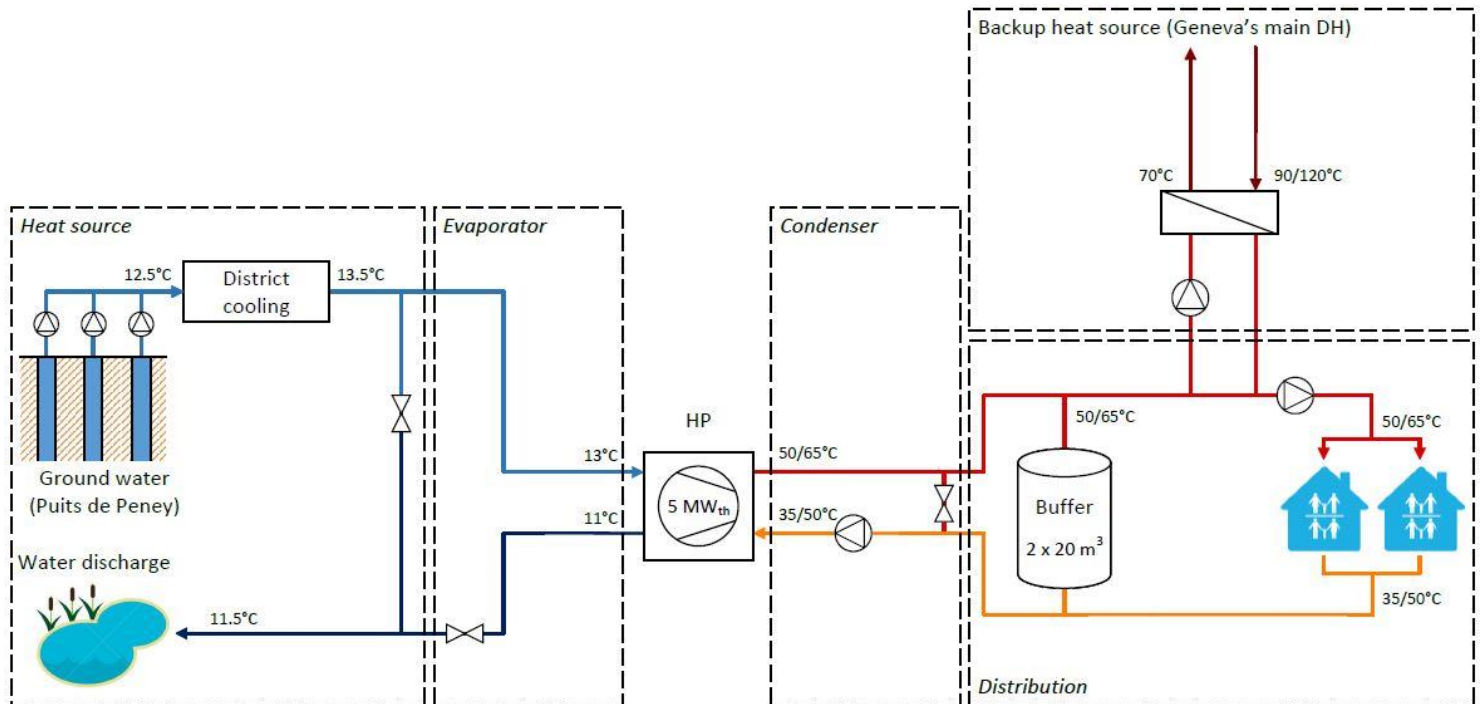
The results show that this eco-district is in line with the cantonal energy master plan, both in terms of building energy efficiency and massive integration of renewable energies.



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Prefabricated DH substation

Les Vergers, Geneva – Switzerland: Technical details



Description of the technical concept

“Les Vergers” is an eco-district including 33 high performance buildings, with around 1’350 dwellings and various activities, totaling 170’000 m² of heated area. A local low-temperature district heating network (LTDH) distributes heat to the buildings for SH and DHW. Since all connected buildings meet high energy performance standards, the LTDH supplies heat at a low temperature level (50°C). At fixed time, twice a day, the supply temperature of the network is raised from 50°C to 65°C to heat up DHW tanks located within the buildings over a 2-hour period. Compared to a network with a constant supply temperature of 65°C, this lowers DH heat losses and increases the energy performance of the heat production. The LTDH is supplied by a 5 MW_{th} HP, whose heat source is shallow groundwater. Before reaching the HP, this cold water at approximately 12°C supplies a district cooling network, recovering waste heat from the nearby industries, thereby increasing the resource temperature for the HP and improving its efficiency. As complementary or back-up heat source, the LTDH is connected to Geneva’s high-temperature main district heating network, which is supplied by gas boilers and heat recovery from the city’s waste incineration plant.

The DH substations consist here of two parallel primary heat exchangers, one for SH distribution and the other for DHW production. Buildings are equipped with ventilation heat recovery, mostly by way of exhaust air HP, producing heat for DHW preheating and/or SH.

The LTDH heat production (July 2019 – June 2020) is covered at 85% by the HP and at 15% by CAD-SIG (due to HP maintenance). The monitored HP SPF is 3.7, the COP reaches 4.3 in SH mode (condenser outlet at 50°C) and 3.3 in DHW mode (condenser outlet at 65°C). The heat source/evaporator inlet varies between 13-16°C.

Final report: SCHNEIDER, Stefan, BRISCHOUX, Pauline, HOLLMULLER, Pierre (2022). Retour d’expérience énergétique sur le quartier des Vergers à Meyrin (Genève). Url: <https://archive-ouverte.unige.ch/unige:164877>