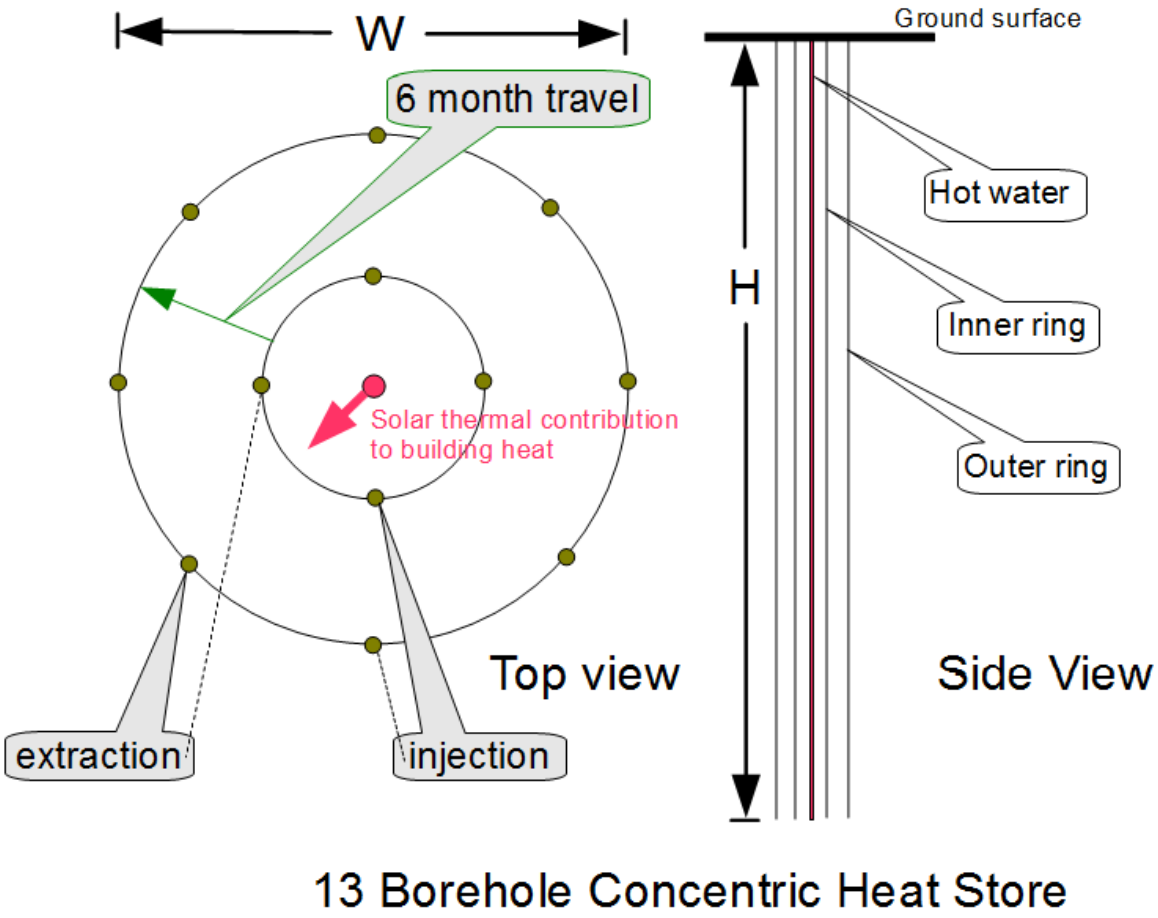
Our buildings are all surrounded by 4 energy sources	Capacity
Air (heat in the summer, cold in the winter)	Virtually unlimited
Waste heat, e.g. from air conditioning	Proportional to population
Solar thermal (and PV for electricity)	Approx. 900 (+100) w/m^2
Natural ground heat	Provides a heat reserve

Source	Efficiency
Air	High extraction efficiency is not required because supply is virtually unlimited
Waste heat	High efficiency achieved because the ground is a cold heat sink
Solar thermal	Provides DHW - surplus supply and heat losses are used for building heat
Solar PV	Enhanced electrical output in hot summer periods if the panels collect air-heat

Heat storage makes it possible to meet all of the thermal energy needs for buildings



13 Borehole Concentric Heat Store

AE test bed system in Kingston (5000 sq. ft. house)

Solar PV panels

Solar thermal panels

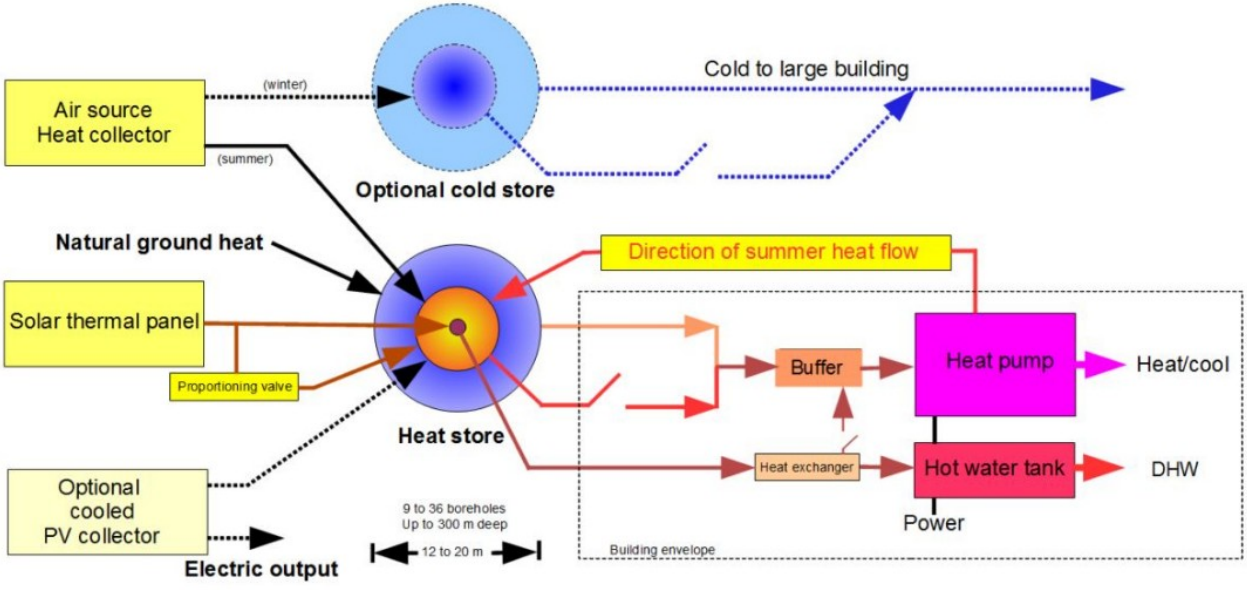
Air-heat injector
(behind shrub)

Six boreholes
(20 m deep)

Air handler

Heat pump

Buffer



City Block concentric store. Large buildings primarily need cooling so the system can add an optional store that is chilled in the winter and that uses the same concept for keeping the average temperature of the periphery at the ambient ground value.

PRO	CON
Needs only 5 m of borehole per kW of capacity	Fixed ring spacing imposes capacity limit
Provides heating, cooling and DHW	Ground water flow can carry heat away
4 energy sources = great flexibility	Requires cooperation for community use
Scalable from single home to large blocks	Does not store electricity (but offers load shifting)
Applicable to most building types	Does not generate revenue for governments
Natural ground heat provides backup energy	Relies on wide seasonal temperature swings
Dual use cooled PV collectors = high efficiency	Limited construction skills available
Compact, silent, almost invisible	Public is not familiar with the concept
Long life, low capital cost, free energy!	Requires "energy charging" for initial use