About simulated influence of roof- and wall-greening on an old people's home in Helsinki, Finland, during the 2018 heatwave event

EMS2021-221

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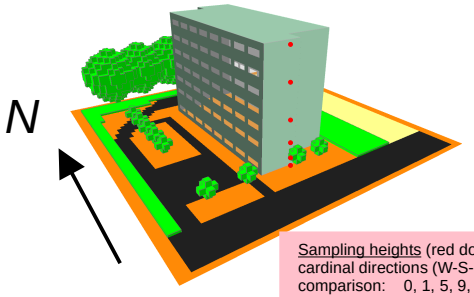


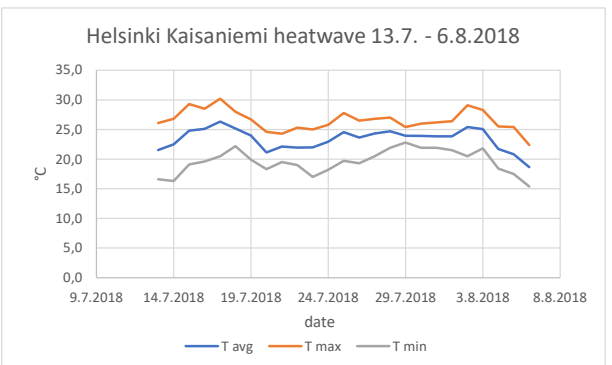
Sampling heights (red dots) on three cardinal directions (W-S-E) used for simulation comparison: 0, 1, 5, 9, 16, 22 m

Old's people home, north-south orientation, 22-m high, separte building, build 1976, six storeys, moderated isolation, concrete slab (white cross (left), red dots are sample heights (right))

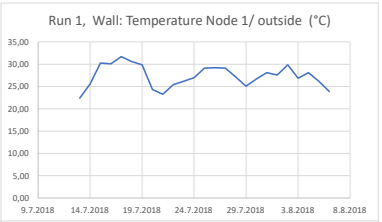
Simulation run 1: extended heat-wave, 13.7. - 5.8.2018, roof greening (control run)
run 2: 15. - 26.7.2018, roof greening
run 3: 15. - 26.7.2018, roof and wall greening
run 4: 15. - 26.7.2018, without any greening

Simulated parameters (among others)
(1) Wall: Temperature Node 1/ outside (°C)
(2) Wall: Temperature Node 7/ inside (°C)
(3) Wall: Shortwave radiation received at the facade (W/m^2)
(4) Wall: Incoming longwave radiation (W/m^2)
(5) Building: Temperature of building (inside) (°C)

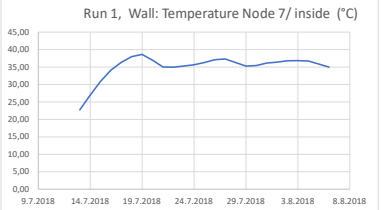
Green infra settings: Funkia (hosta), ENVImet ©, v.4.4.5 default settings



The daily maximum, average, and minimum temperatures of the Helsinki Kaisaniemi heat wave 7/13-6/8/2018 (26 days, top) and five local simulated parameters (right).



(1)



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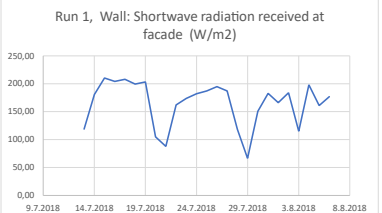

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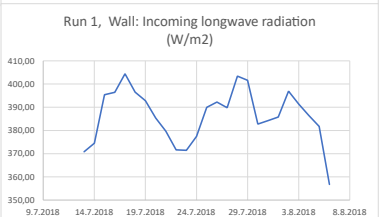

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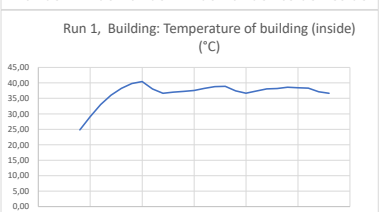

(5)

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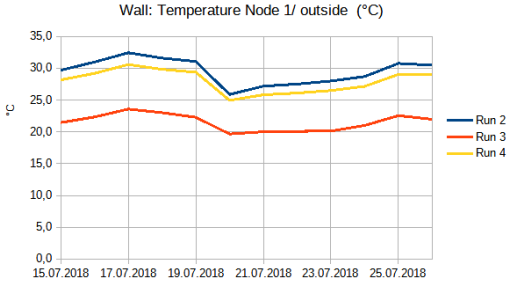
The simulated influences of the 2018 heatwave on wall temperatures (exterior and interior), incident short- and longwave radiation, and building interior temperature

Run 2: roof greening
Run 3: roof and wall greening
Run 4: no greening

(1)



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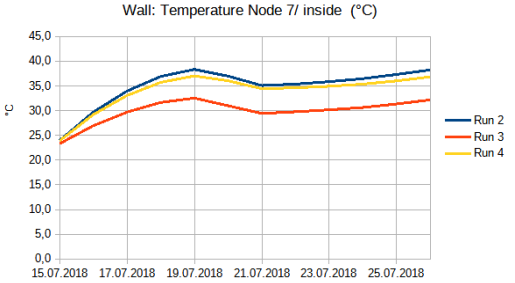

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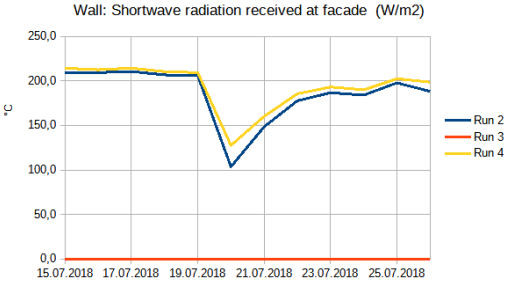

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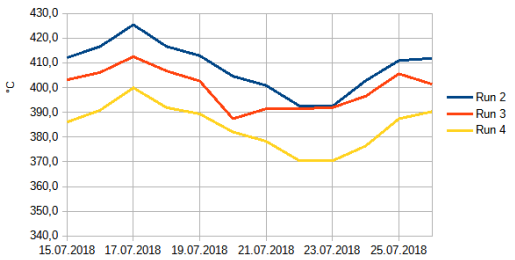

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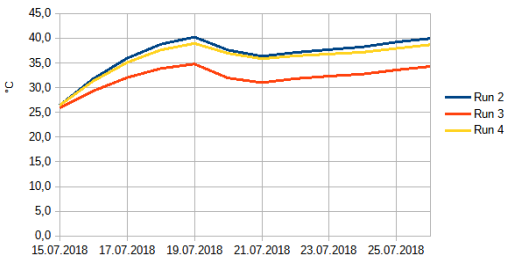
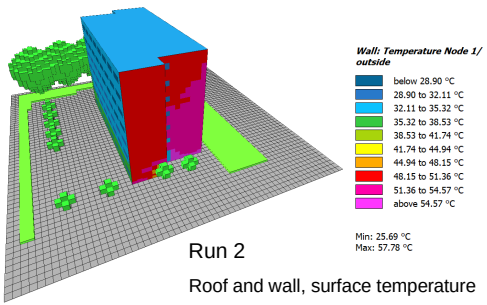


Simulation results, 15. - 26.7 2018

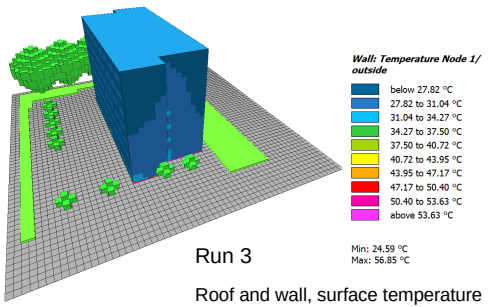
A combination of green roofs and green walls (run 3) decreases wall (exterior and interior) ja building interior temperatures, compared to green walls alone or no greening (runs 2 and 4). For building interior temperatures, the difference is about 5 °C.

The results of run 2 differ from the expectation that green roofs provide cooling to the building. A possible reason for this may be the averaging of the simulation values.



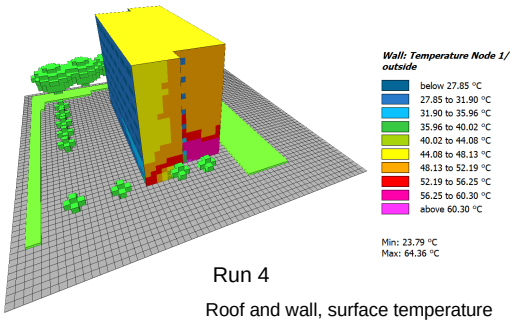
Run 2

Roof and wall, surface temperature



Run 3

Roof and wall, surface temperature



Run 4

Roof and wall, surface temperature

Simulation results, examples, left 17.7.2018, 12:00

Run 2: Roof surface essentially cooler due to greening, wall surface temperatures follow the daily sun circle

Run 3: Roof and wall surfaces essentially cooler due to greening throughout the day

Run 4 High roof surface temperature due no greening shelter, wall surface tempera-tures follow the daily sun circle

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