Greenhouse gas emission and sustainability of green roofs and storm water system on a district level—comparisons with a lifecycle perspective

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Hypothesis

• Green roof might have a higher impact on GHG due to more material
• Green roofs reduce and retain stormwater
• This might lead to reduced greenhouse gas emission if an upgrade of existing systems is not necessary.
Developed framework for sustainable design

- BIM model
  - Quantity takeoff
- Energy model
  - Energy simulation
- Material and components database
  - EPD, PD, generic database
Stormwater model

• Used a hypothetical study
• It was tested if green roof could mitigate higher runoff volumes due to densification
• The results might indicate that green roofs only cannot compensate the higher runoff volumes
Optimization

• Connect Stormwater model with Sustainable design Framework

• Including CO₂ data for pipeline and construction work to expand the stormwater system

• Optimizing with help of an Algorithm

• “NO result”
Parameter study

- The parameter study was made in order to test and increase the density in all 4 stormwater areas

Result:

- Green roof cannot compensate the increased requirement for stormwater management
- Dimensioning and design of the stormwater system need to be extended
- Pipes need to be replaced
Result

- Green roof can not compensate higher runoff volumes due to densification
- Green roofs should be not solely implemented for reduce and retain of stormwater and for energy reduction in the Nordic climate.
- Other sustainable benefit such as urban air quality, water run off quality, reducing urban heat island effects and preventing noise pollution.