



Life cycle assessment of urban stormwater management systems

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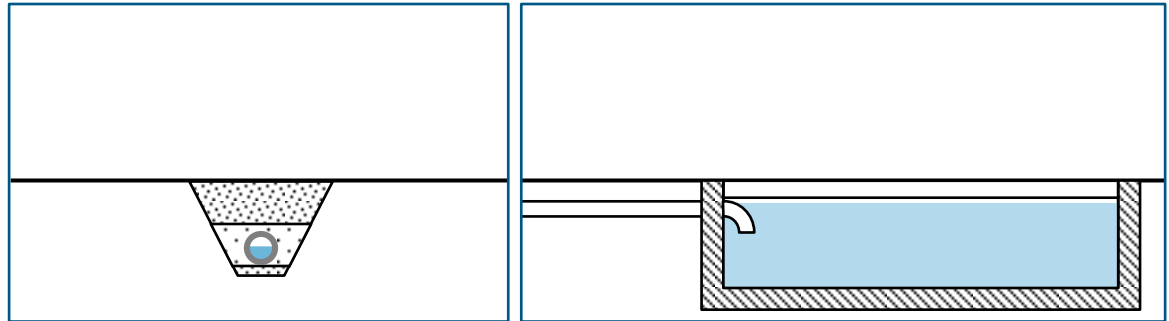
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of Denmark



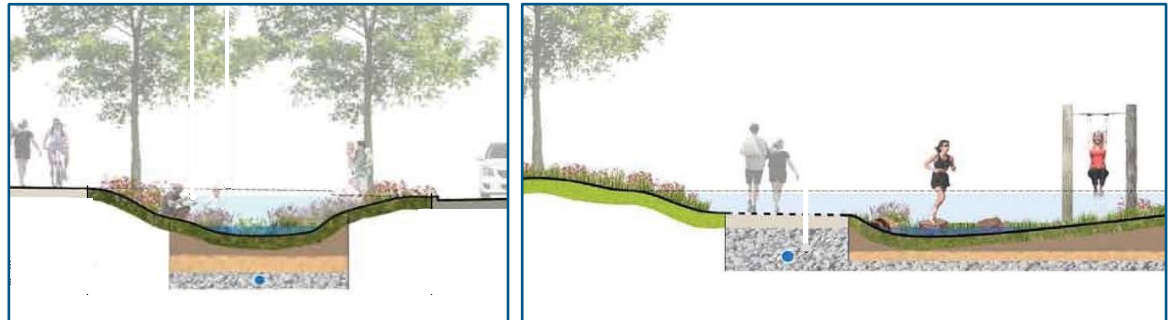
Introduction



Subsurface solution



Cloudburst Management Plan

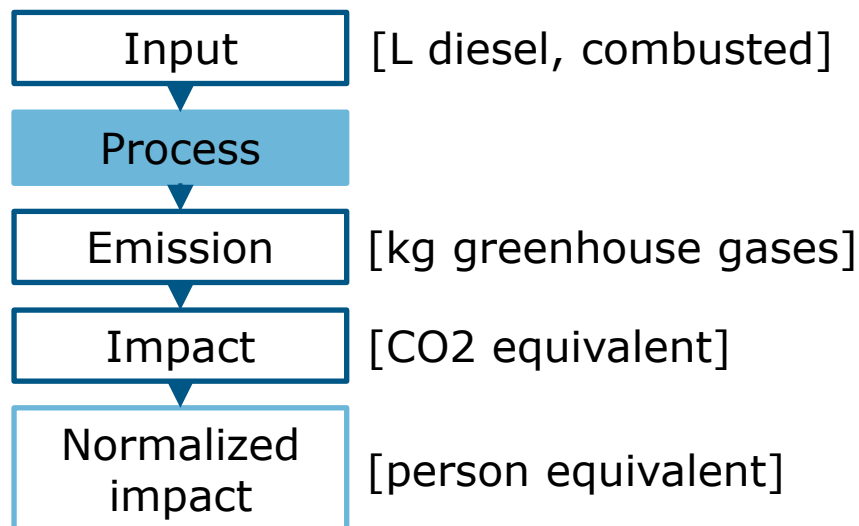
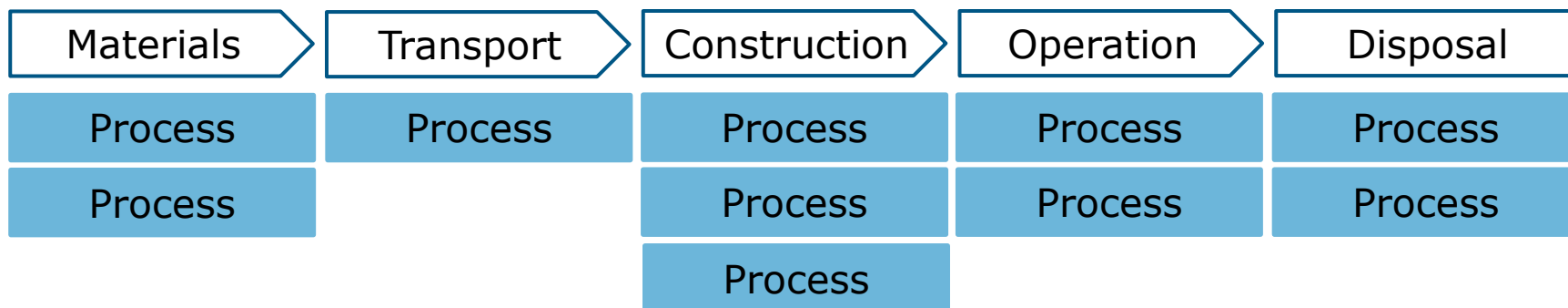


→ What solution is most **sustainable**?

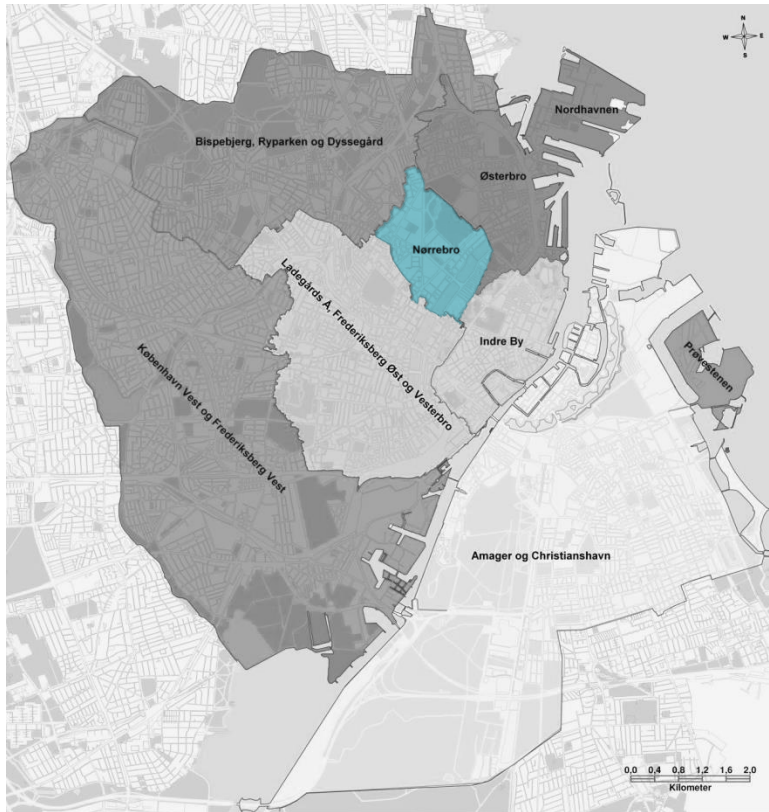
Research questions

- Which approach to stormwater management is most sustainable?
- How does the flood safety target affect the environmental impacts?
- How important are local emissions from runoff in the overall environmental evaluation?

Life Cycle Assessment



Nørrebro, Copenhagen

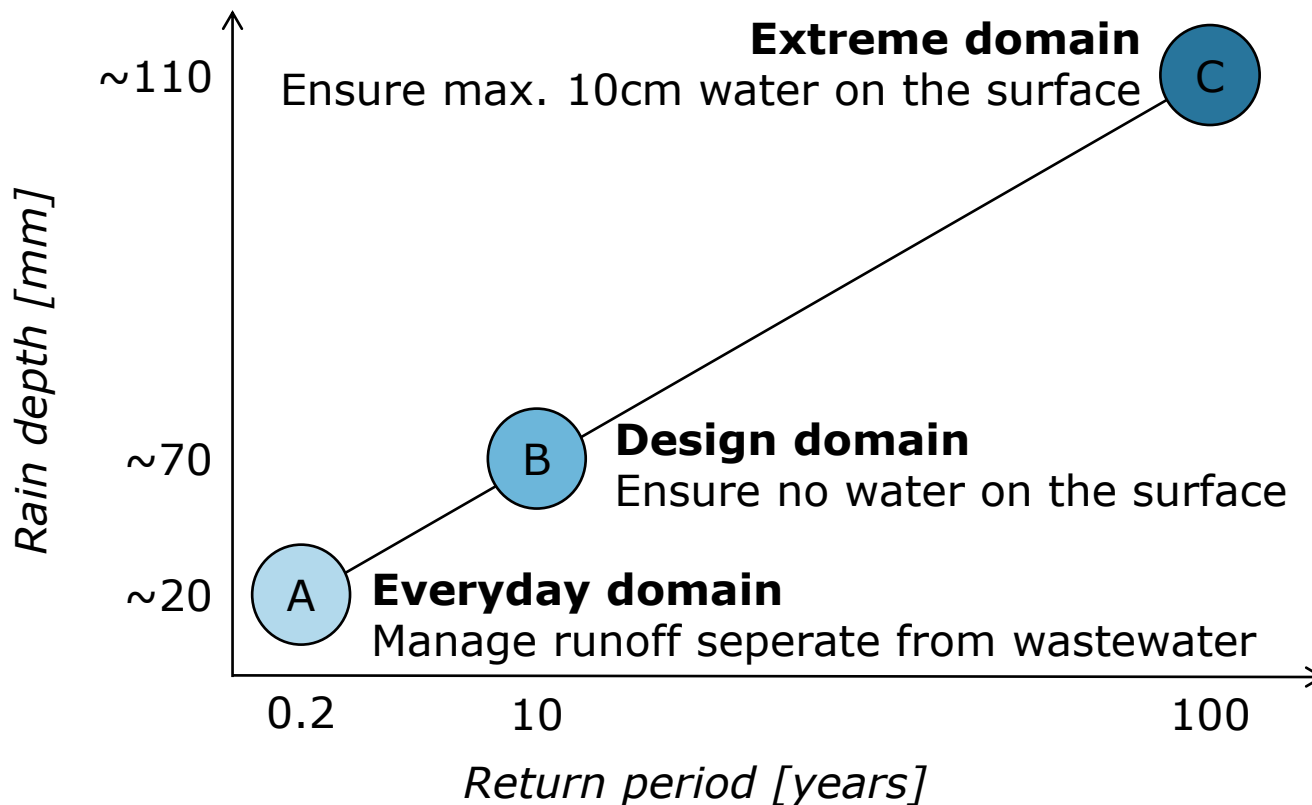


- Densely populated urban catchment
- Commercial, residential, and recreational areas

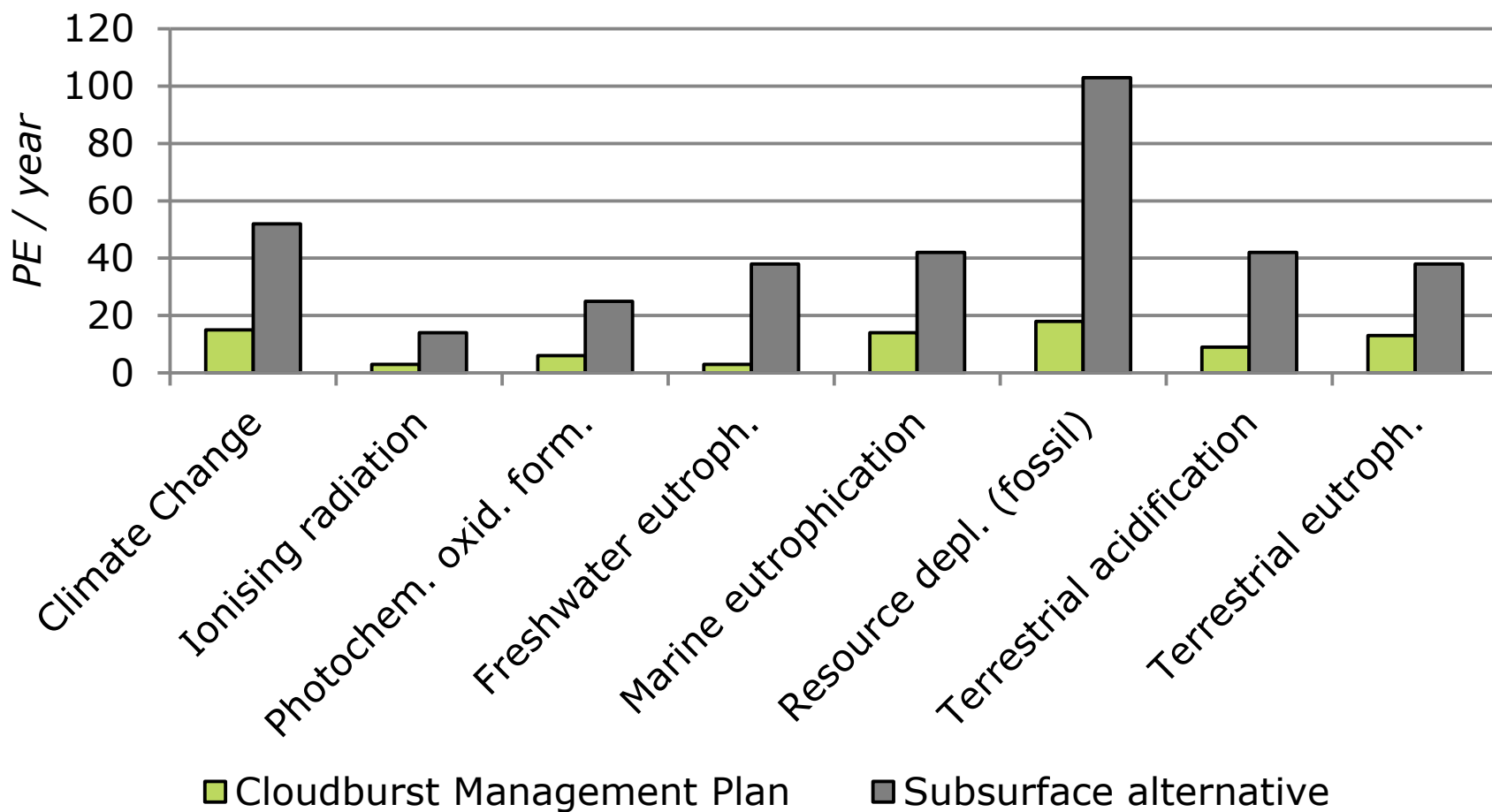


System design: flood safety levels

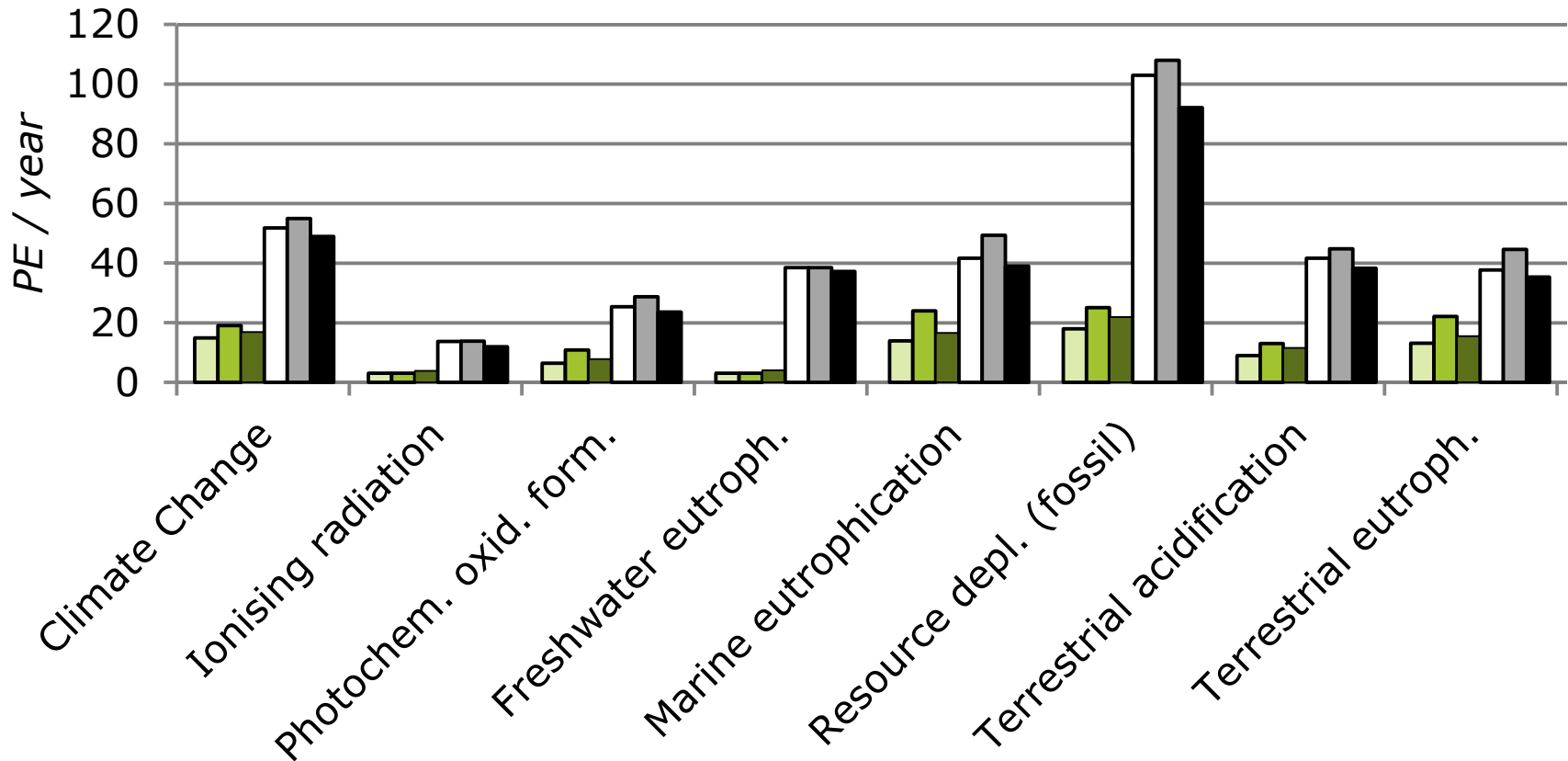
Three Points Approach



Environmental impacts



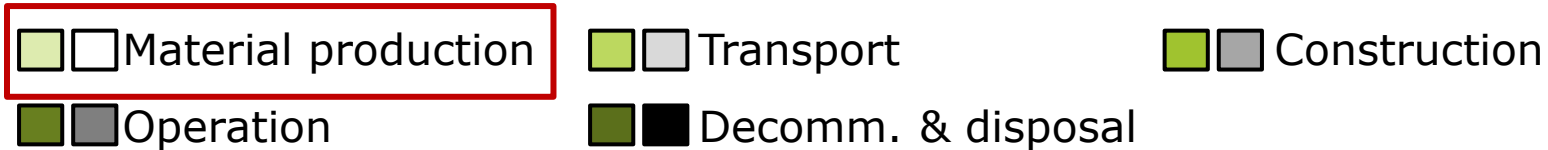
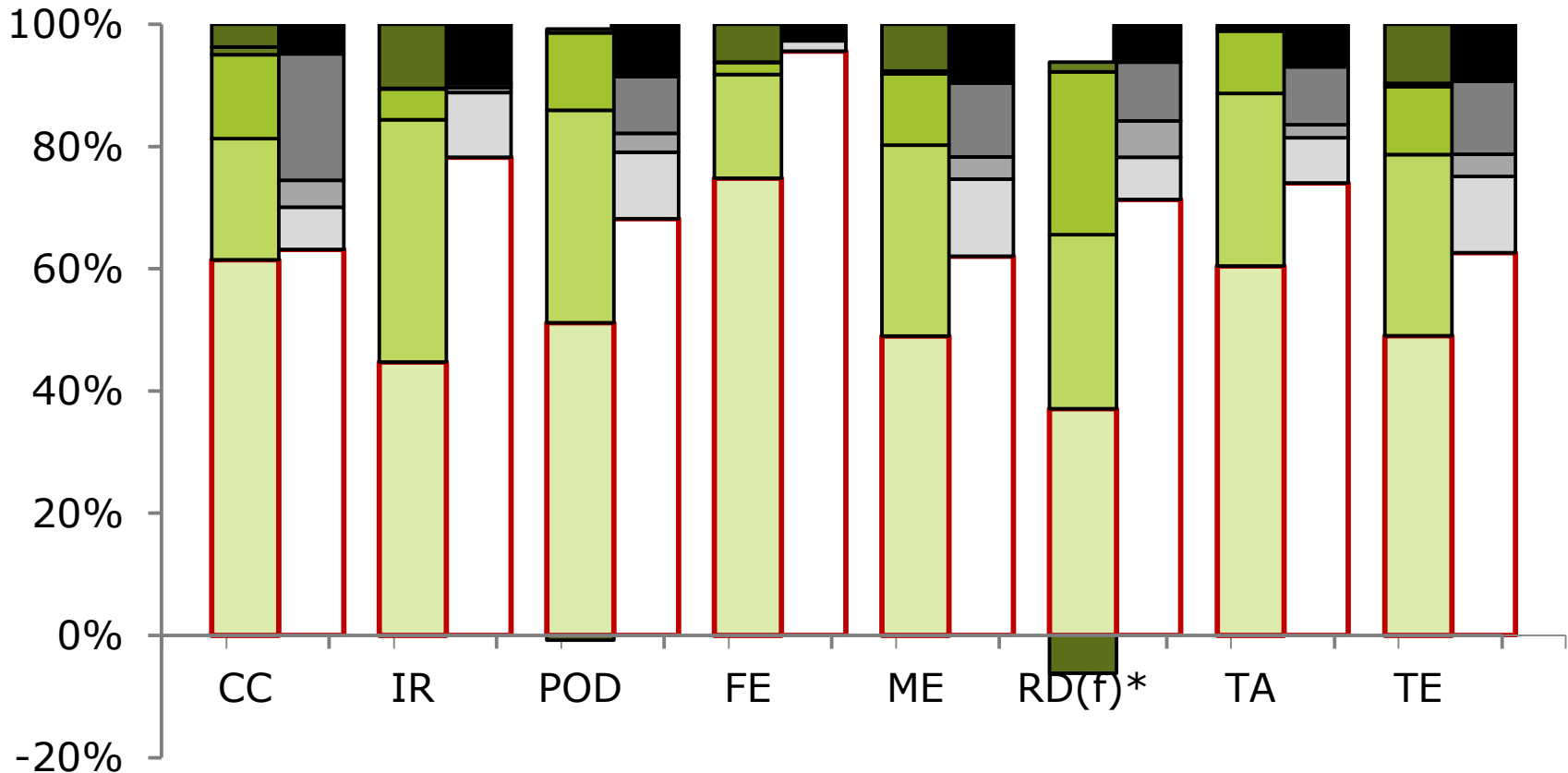
Environmental impacts: sensitivity analysis



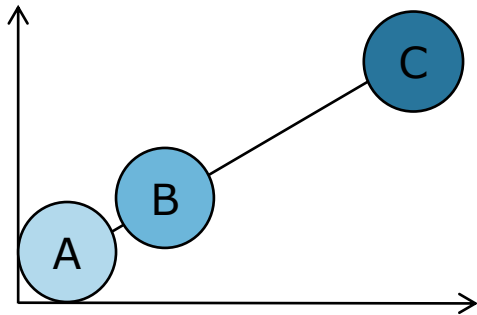
CMP: baseline
 CMP: pipe construction
 CMP: paved areas
 SSA: baseline
 SSA: pipe construction
 SSA: road materials



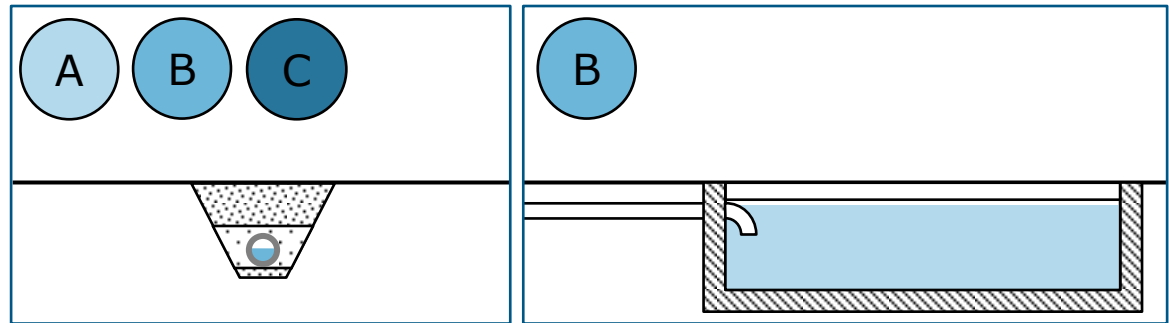
Allocation to life cycle stages



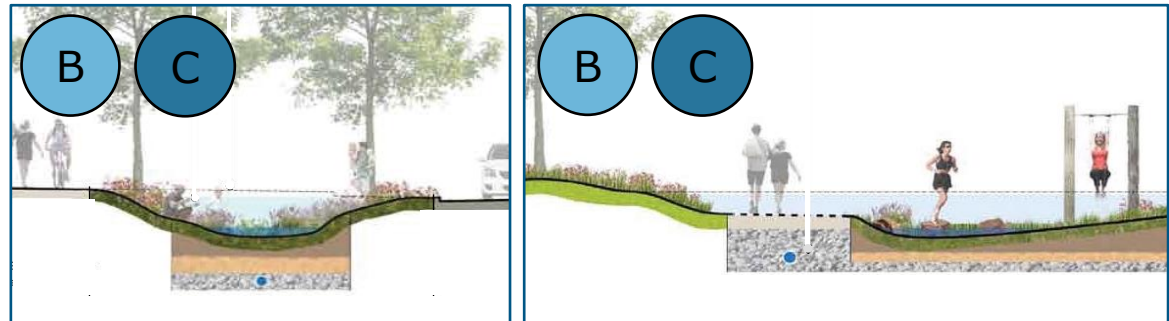
Elements and flood safety



Subsurface solution



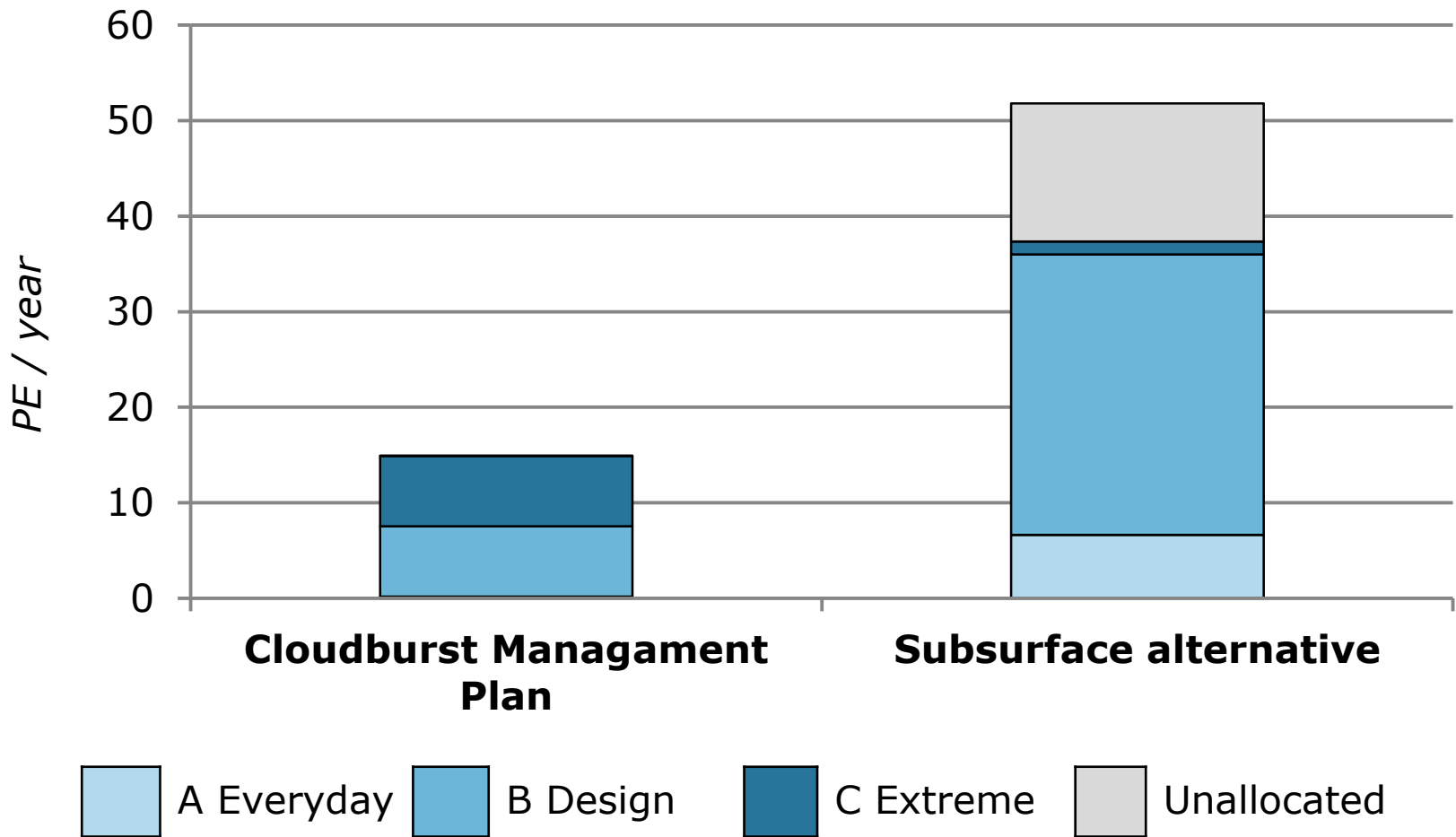
Cloudburst Management Plan



→ Different elements contribute to fulfilling different flood safety levels.

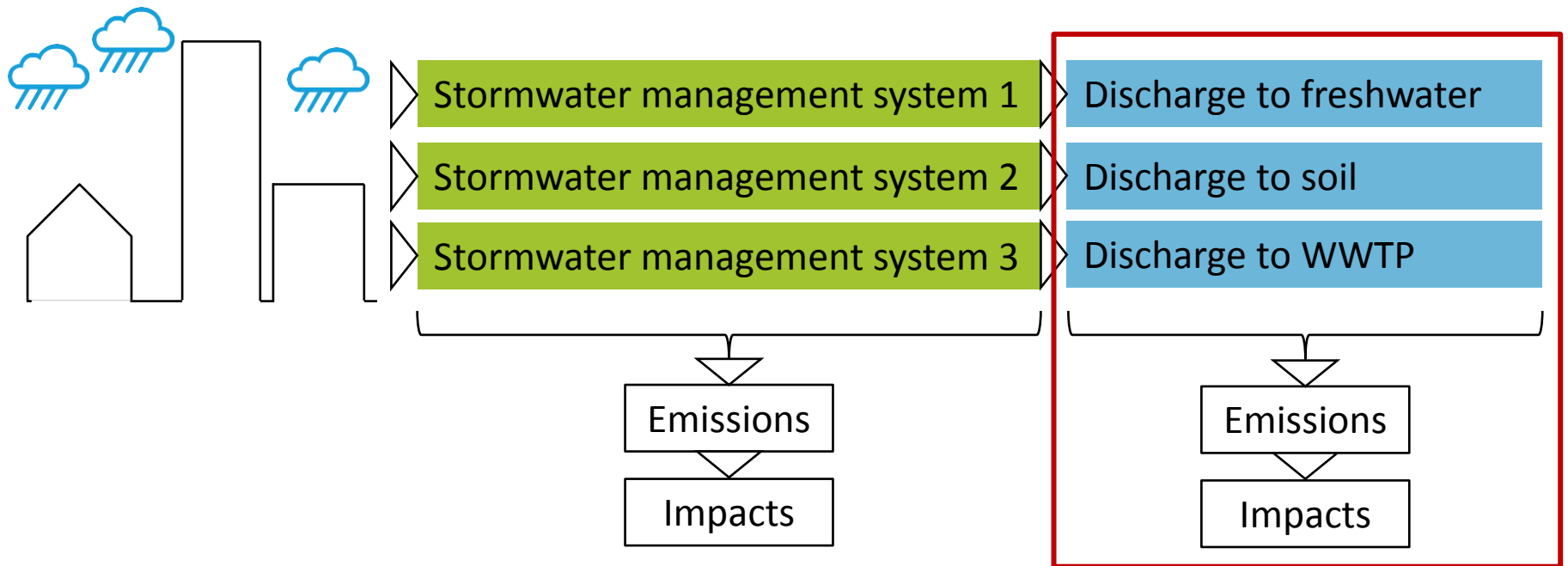
Allocation to flood safety levels

Climate change impacts



Ongoing work

Assessment of ecotoxicity impacts



Conclusion

- Stormwater management above the surface and using green elements (Cloudburst Management Plan) is more sustainable than a subsurface solution for the Nørrebro catchment.
- The targeted flood safety level influences the environmental impacts.
- Elements not contributing to flood safety cause relatively high impacts.

Preliminary results:

- The untreated discharge of runoff causes high ecotoxicity impacts.
- The use of filter soil reduces these impacts significantly.