A comparison of GHG emissions of fire suppression systems

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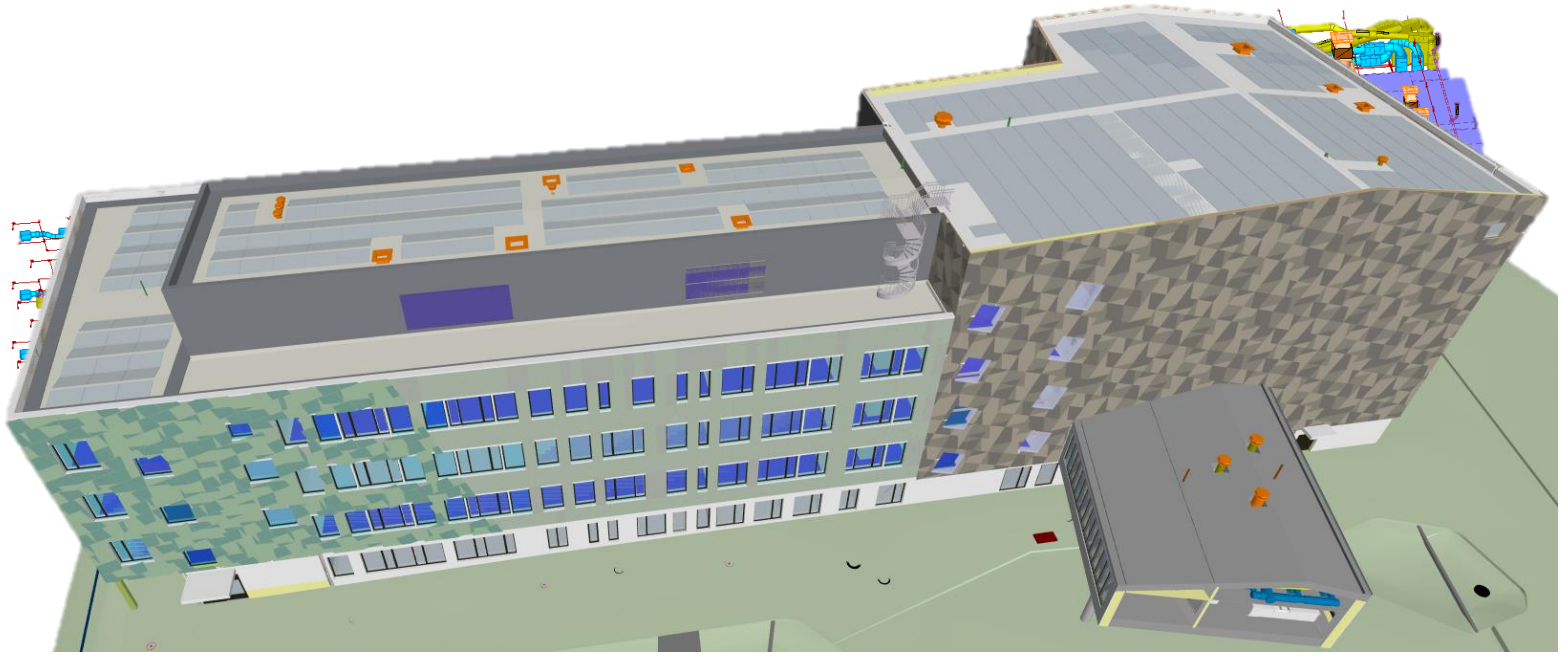

Voldsløkka skole

- key to building performance
- involve significant costs
- extensive material use

not included in the building's climate footprint

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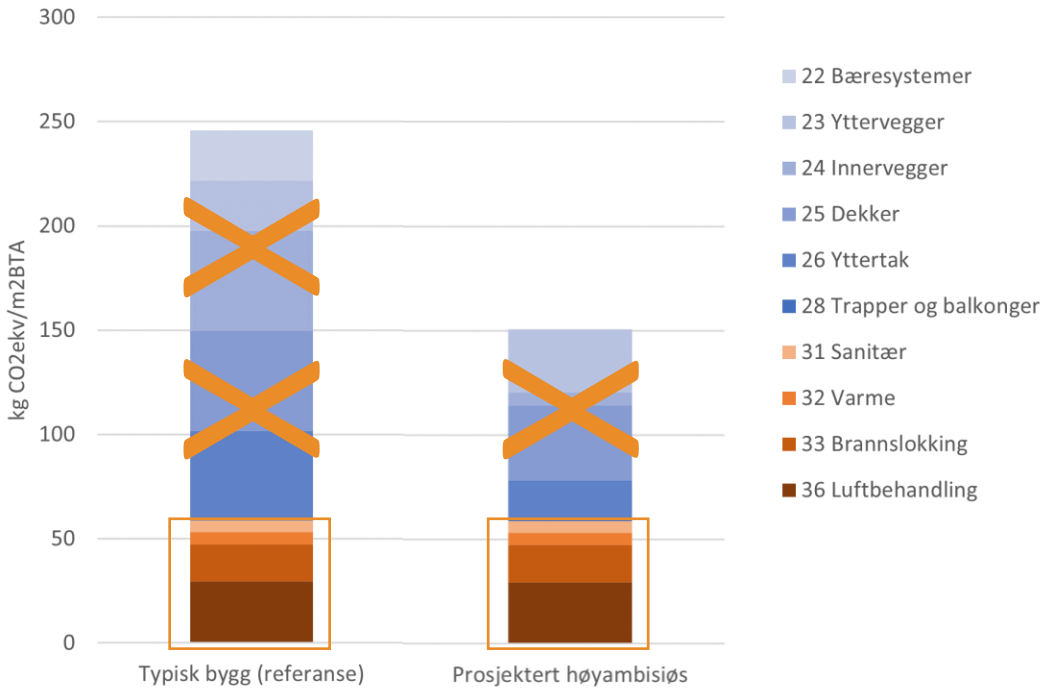
Estimated GHG emissions from HVAC systems



- Model building : ~ 20 %
- Advanced performance building : ~ 40 %
- Retrofit: ??

Outlook:
- Fewer new builds, more retrofits
- Focus on the structural shell

will become more critical in future building design

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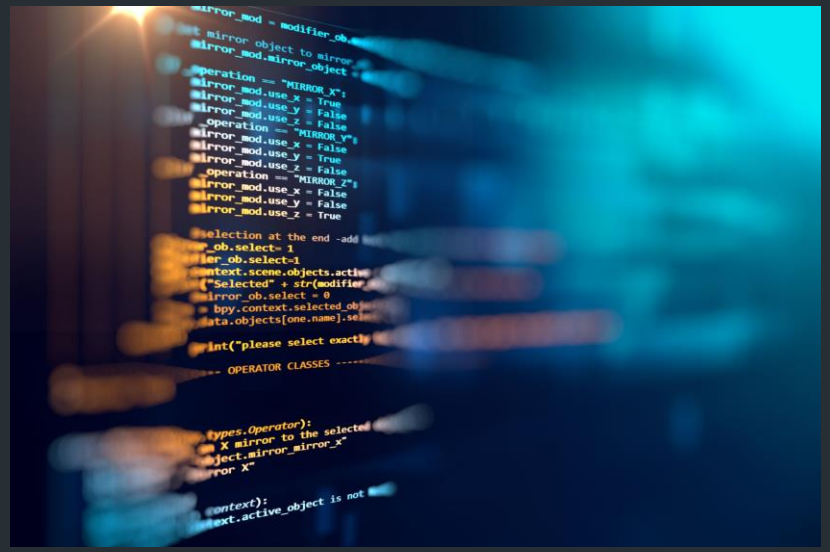
Grønn VVS

Støttet av
Forskningsrådet



Green HVAC - greenhouse gas calculator

- No adequate tools available
- Necessary for executing Green HVAC projects
- Simplifies greenhouse gas calculations
- Improved visual presentation

The tool is not the product – the service is!

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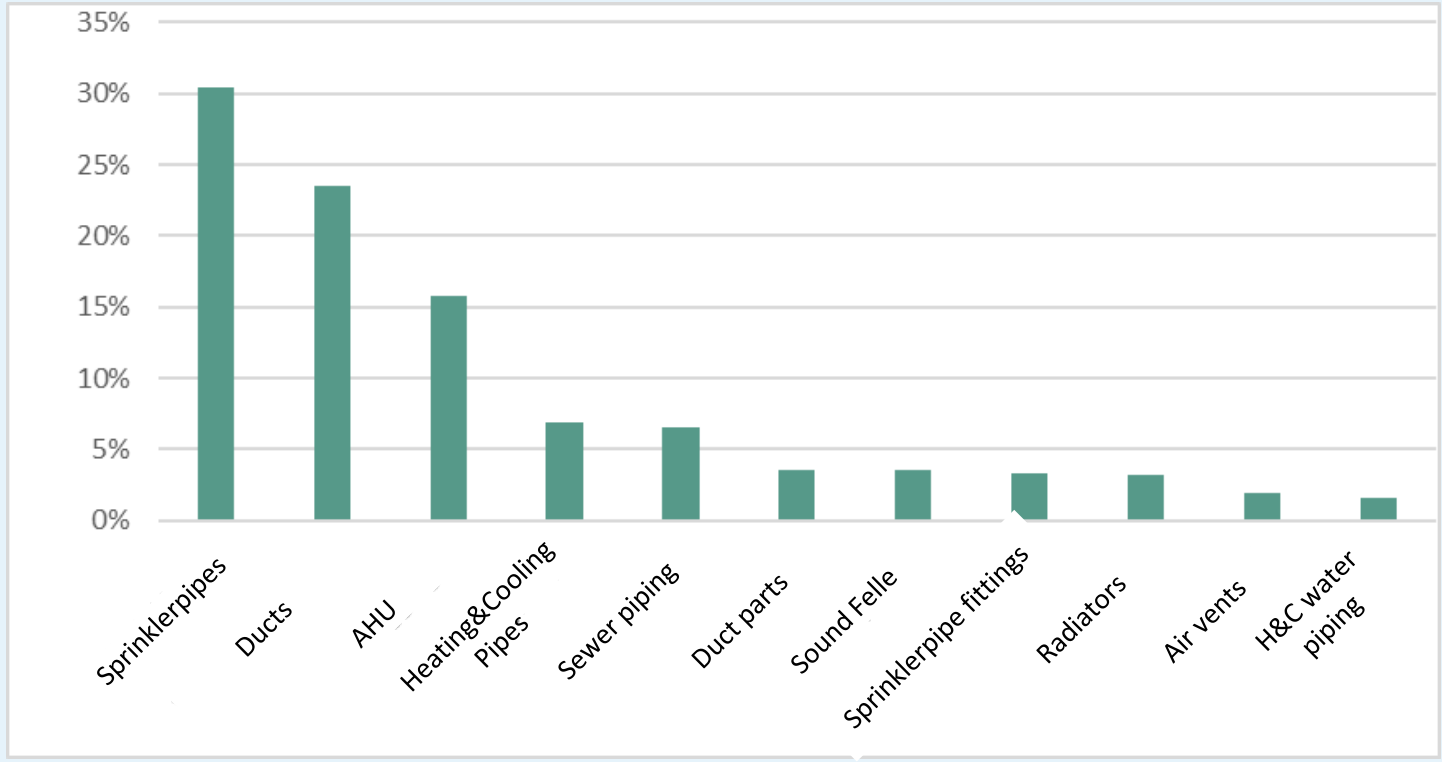
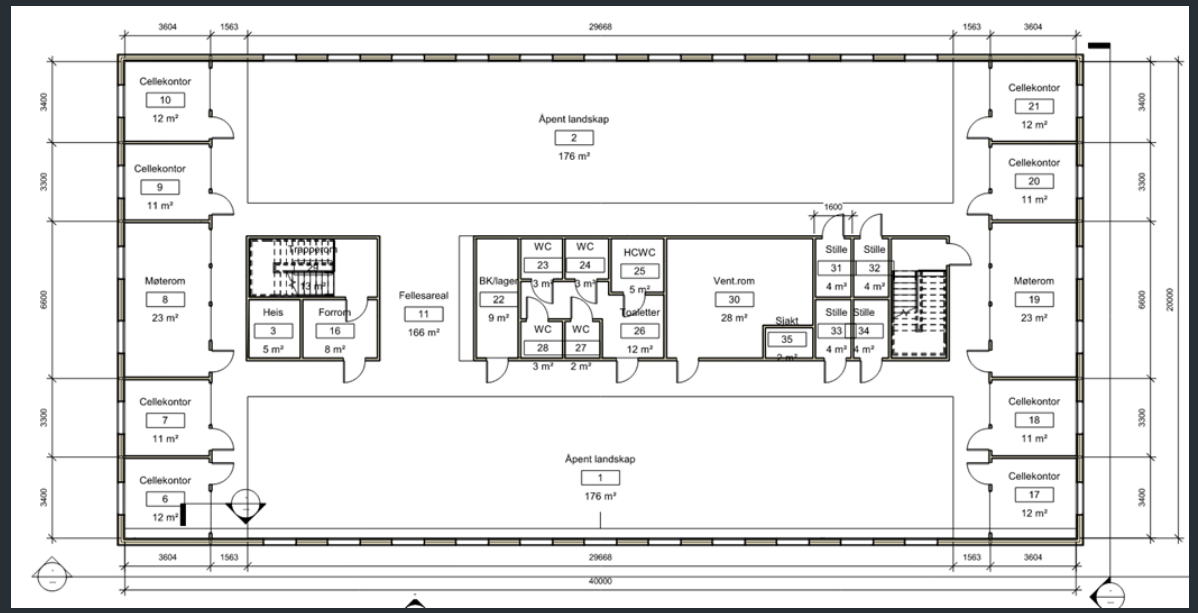
Allocation of emissions to specific components



A sandbox for exploration

- **Typical Office Building**
- Developed by: Grønn VVS & Hybridene
- Inspired by actual new builds in Eastern Norway
- Goal: Study solutions with transferable value
- Typical office floor: ~850 m^2
- Four floors + technical rooms



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Background

- Several studies from GVVS identified that pipes from fire suppression systems are among the largest emission sources in HVAC installations
- We had to get to the bottom of this!
- The study for GVVS is supplier-independent
- Focus on how greenhouse gas emissions can be reduced

4 System typologies

- **Conventional sprinkler system (CS) –** Calculations are based on estimated dimensions derived from pre-calculation tables. Conservative coverage using standard sprinkler heads and fixed piping down to the ceiling level
- **Optimized sprinkler system (OS) –** Fully hydraulically calculated with optimized sizing, utilizing available technologies such as extended coverage sprinkler heads and flexible sprinkler hoses down to ceiling level.
- **Low-pressure water mist (LWM) –** Optimized based on product-specific requirements
- **High-pressure water mist (HPWM)** – Optimized based on product-specific requirements

Requirements

- Sprinklersystem: *NS-EN 12845:2015+A1:2019 Fixed firefighting systems — Automatic sprinkler systems — Design, installation and maintenance, FG-930 (Norwegian Guidelines for NS-EN 12845)*
- WaterMist: *NS-EN 14972-1:2020 Fixed firefighting systems - Water mist systems - Part 1: Design, installation, inspection and maintenance*
  NS-EN 14972-3:2021 Fixed firefighting systems - Water mist systems - Part 3: Test protocol for office, school classrooms and hotel for automatic nozzle systems
- Water supply / Backflow prevention Cf. NS-EN1717
- Water supply curve
- Pipeseries

Tabell 1 - Forutsatt tilgjengelig vannmengde og trykk.

Q [l/min]	P [bar]
0	4,3
750	4,0
900	3,7
1 100	2,9
1 400	1,5

Tabell 2 - Rørtyper for de forskjellige systemene.

System	Materiale	Dimensjon	Sammen - føyning	C-faktor
KS	Sorte stålrør - *Mellomserie	DN 25-100	Rille/gjenge	120
OS	Sorte stålrør - *Mellomserie	DN 25-100	Rille/gjenge	120
LV	Syrefast	DN 15-50	Pressfitting	150
HV	Syrefast	DN 10 – 50	Klemring	150

*Referanser "Mellomserie" angir godstykkelse iht. NS-ISO 4200 område D (se Tabell 3)

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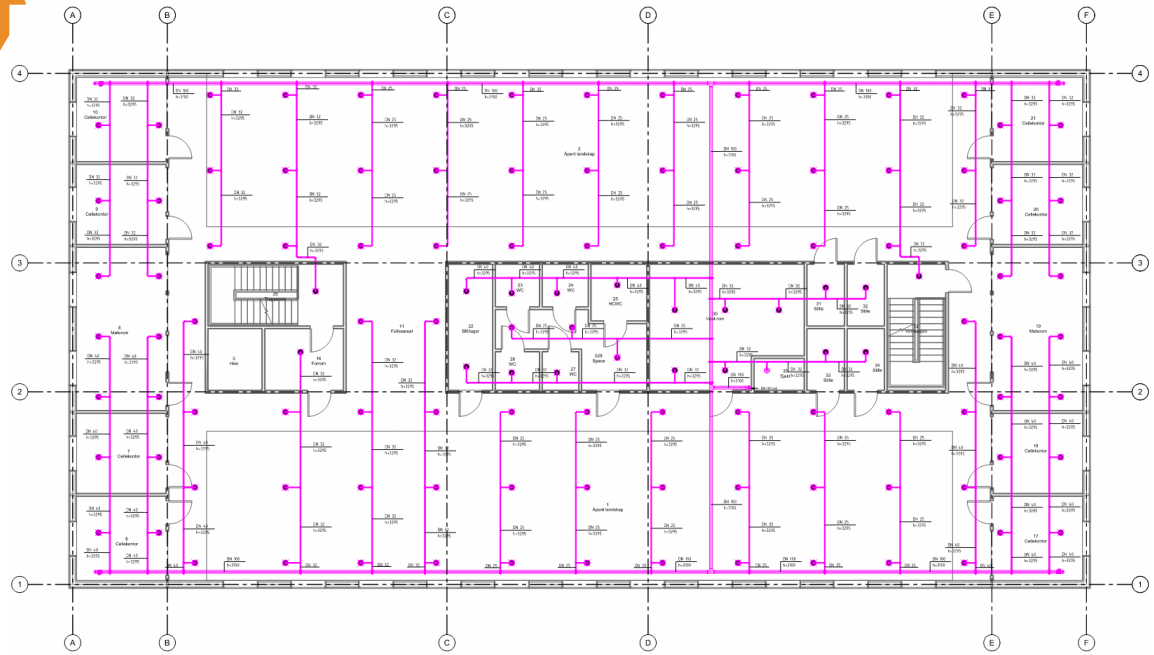
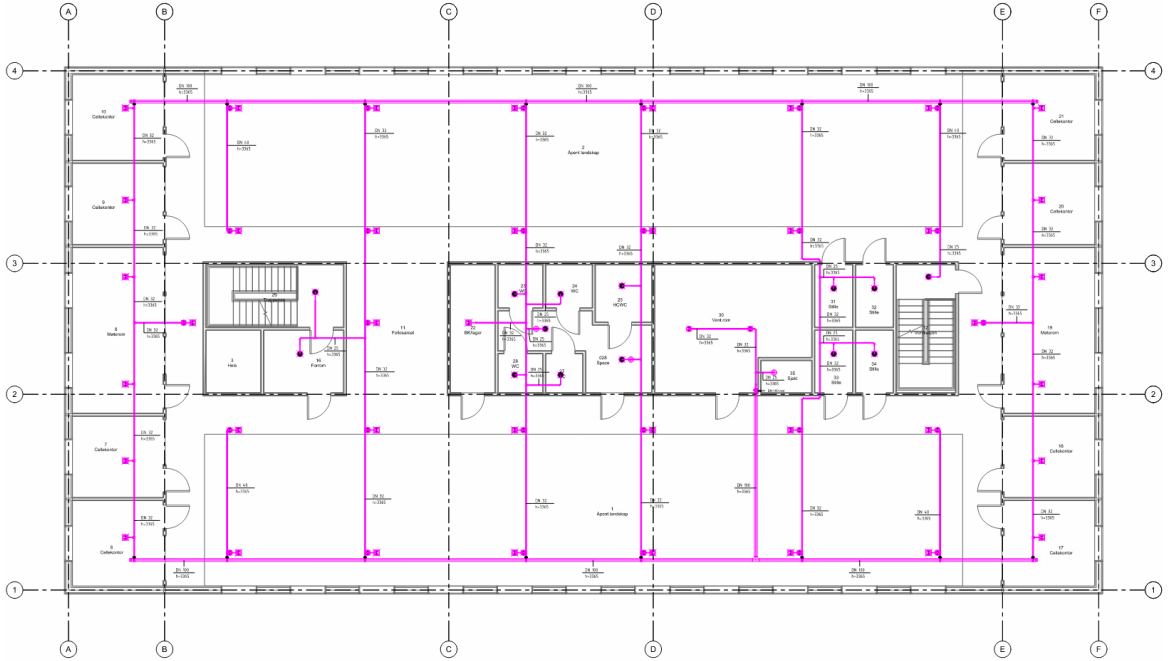
Interfaces

- This study includes only fire suppression systems
- Installation components ***not*** included as: base structures, signal cabling, power connections, and instrumentation for pump systems.
- Labourcost for Cable installation, system integration, and programming are excluded from the scope
- These deliverables contribute to both the carbon footprint and the total cost of installation

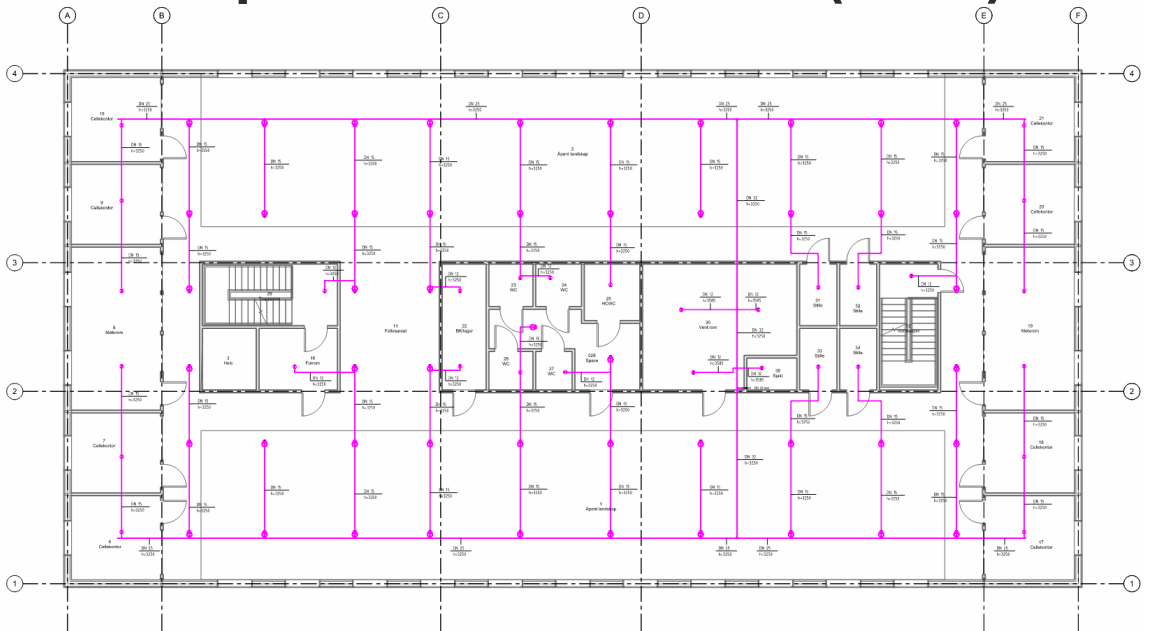
Conventional sprinkler system (CS)



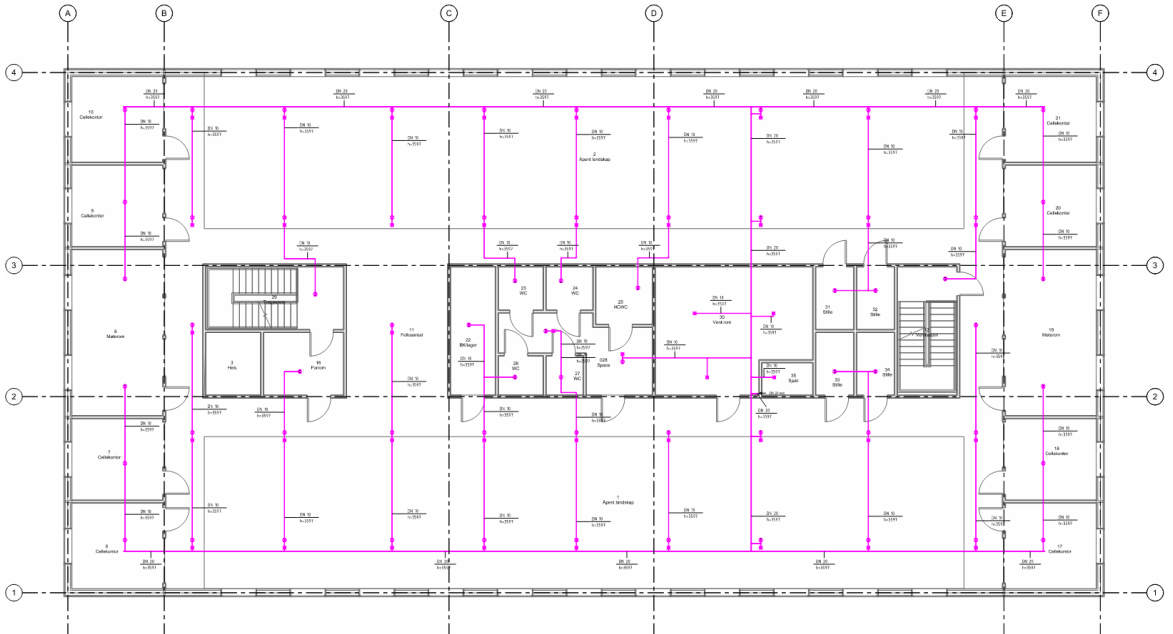
Optimized sprinkler system (OS)



Low-pressure water mist (LWM)



High-pressure water mist (HPWM)



Results

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Weight

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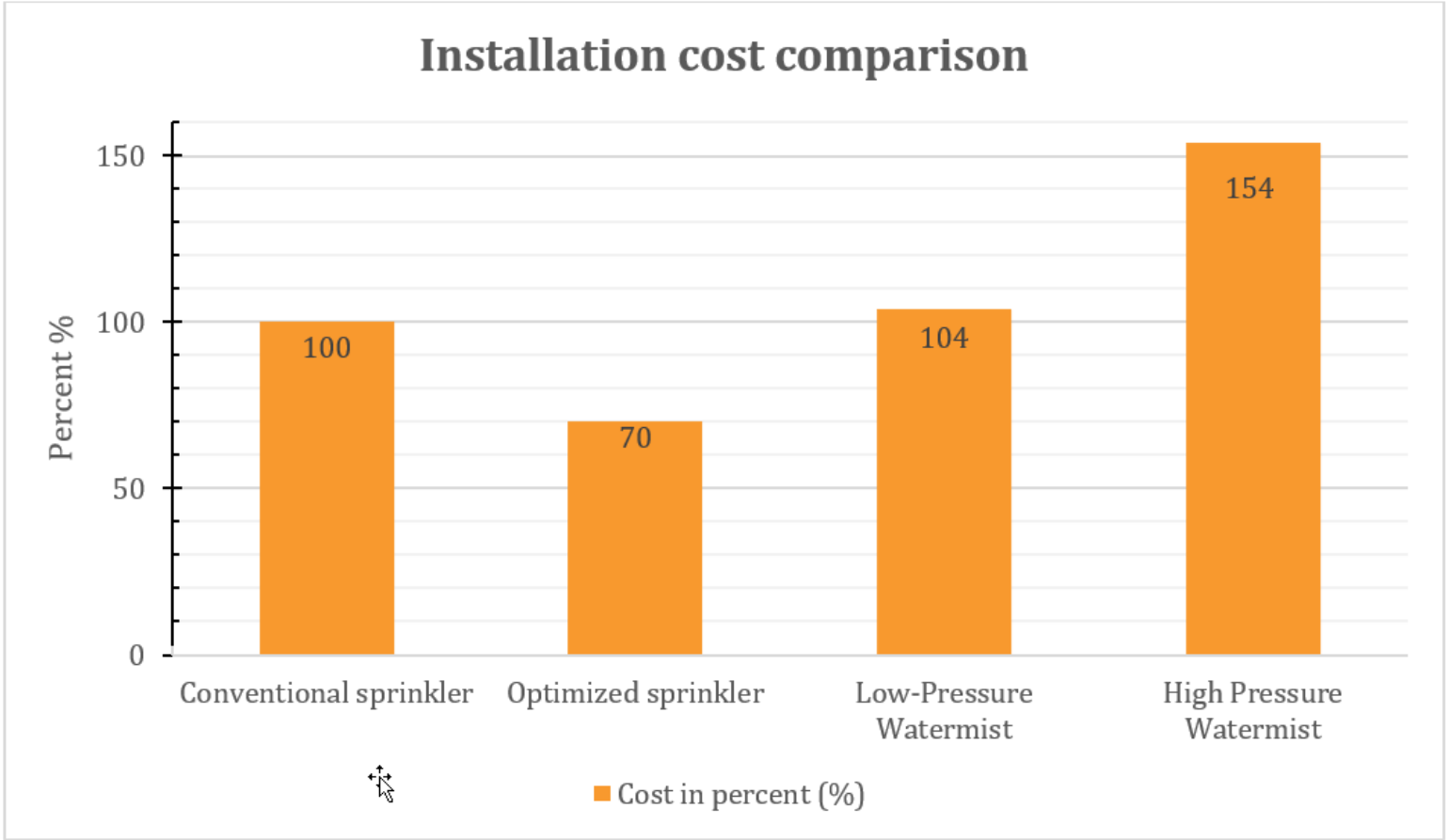
Economy



Figur 8 - Relative material and installation costs (design and project management not included)

Effective project planning saves money!

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Lifecycle parameters

Produktstadiet			Gjennom-føringsstadiet		Bruksstadiet								Livsløpets sluttstadium				Konsekvenser utover systemgrensen
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7*	B8	C1	C2	C3	C4	D
Råvarer	Transport	Produksjon	Transport	Anlegg-, bygge- og monteringsarbeid	Bruk	Vedlikehold	Reparasjon	Utskiftning	Ombygging	Energibruk i drift	Vannforbruk i drift	Transport i drift	Riving	Transport	Avfallsbehandling	Avhending	Material- og energigjenvinning og ombruk av materialer og eksport av egenprodusert energi

Tabel 12 – Orange celles is included

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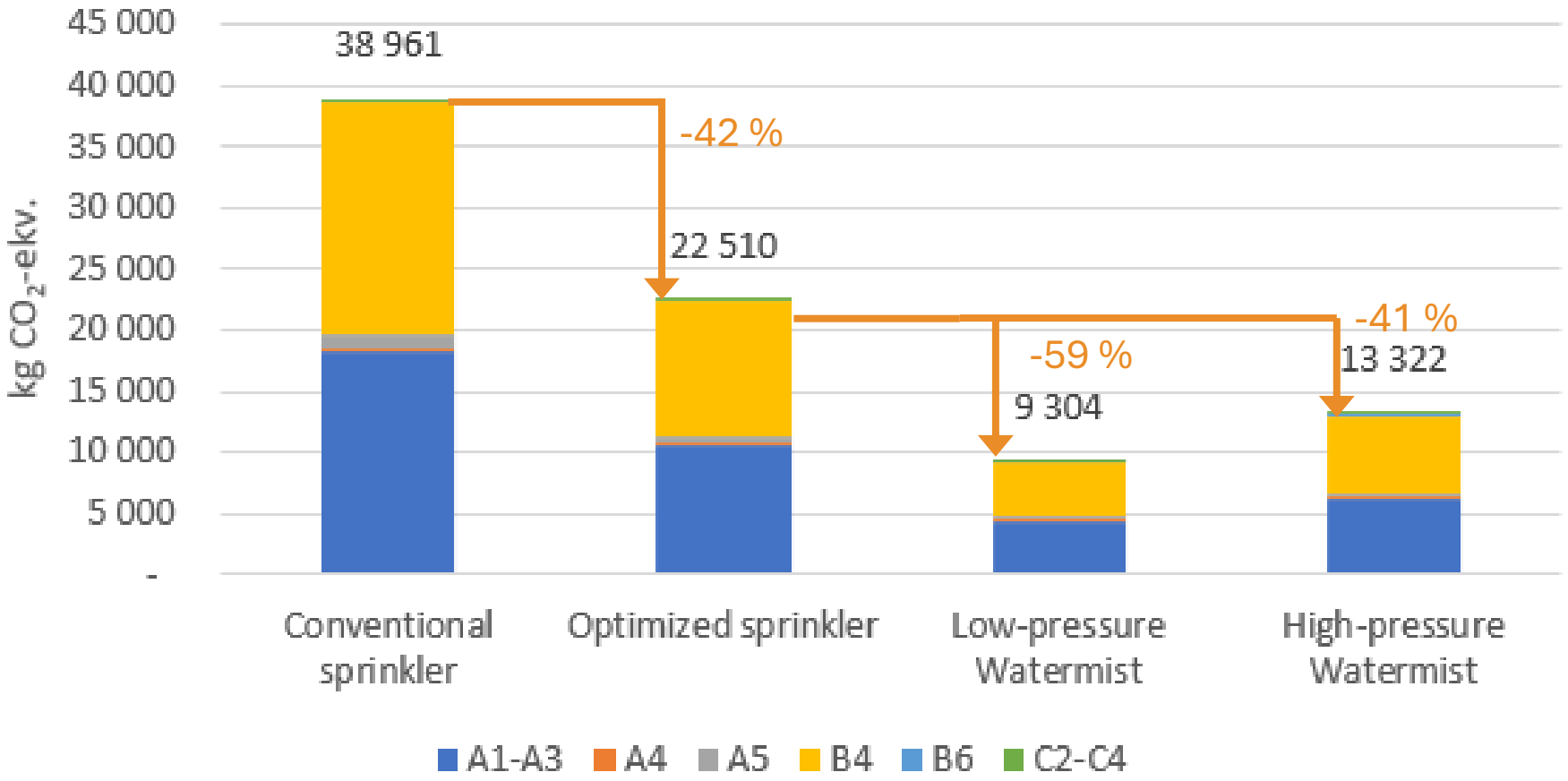
GHG emissions by suppression system and life cycle stage



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A Challenge to the Industry

- **Pipe Series**
- Exploring alternatives
- Challenge to suppliers: Regulations, testing, and approval
- **Prefabrication**
- Cutting waste and surplus
- Transport
- **Disposal and Re-use**
- Reuse potential
- Potential for material and energy recycling

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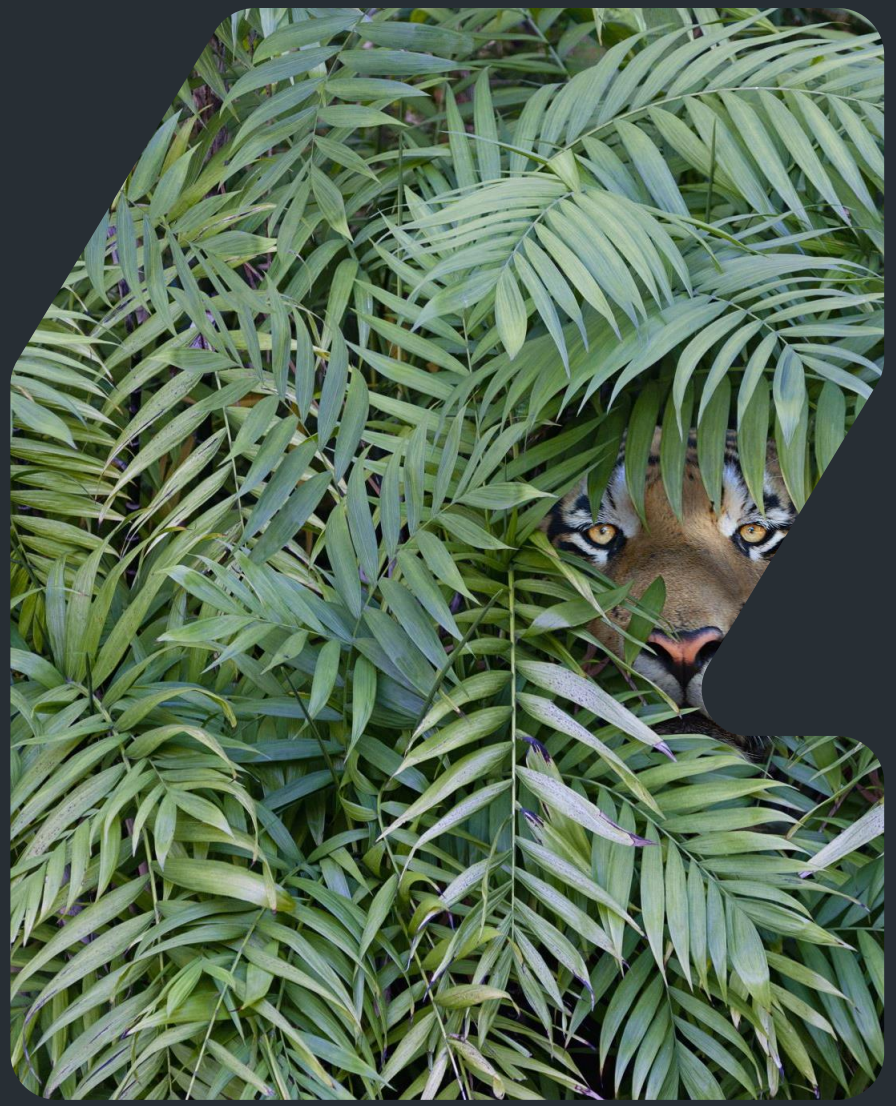
Risk & Safety

- Being slightly conservative is understandable
- Climate and environmental factors also represent risks – at a broader scale

- Safety considerations always comes first
- GHG emissions should be included in a holistic assessment
- Solutions should be reviewed by specialists on a project-by-project basis!



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You're welcome to read our complete report!

Available on our website :

https://www.multiconsult.no/gronn-vvs-skal-halvere-utslippene-fra-vvs-anlegg/


Thank you for your attention
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