



Design for health and care in hospital construction: the case of biophilic design

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The concept of **biophilic** design

« an innovative approach that emphasizes the necessity of maintaining, enhancing, and restoring the beneficial experience of nature in the built environment» (Kellert & Heerwagen, 2008, Preface, vii)

But how can a biophilic hospital design be accomplished for a large regional hospital construction?



” A pavillon in the woods”/”The Healing hospital”: Nyt Hospital Nordsjælland(NHN). Copyright: Herzog & de Meuron and Vilhelm Lauritzen architects. Source: <https://www.regionh.dk/nythospitalnordsjaelland/derfor-bygger-vi/FAQ/Sider/Hvor-bliver-hospitalet-placeret.aspx>

BIM and immersive technologies: what matters of concern can the technologies help to address?

- Manage the design- and design validation process (e.g. crash tests)
- Manage the value management process (e.g. the construction/cost budget)
- Manage the interface between design and construction site work (e.g. Davies & Harty, 2013).
- Manage the interface between the construction project and operations/FM (e.g. Whyte, Jennifer; Lindkvist, Carmel Margaret; Jaradat, Suha, 2016)
- Manage the interface between the construction project and the many different end-users, actors/stakeholders, such as early users involvement in biophilic design?

When building SIZE matters and stakeholder management goes wrong...

- In Trondheim city planning, when a building is **too big**



..... OR in the new Østfold Hospital, when a building is **too small**....

BIM& 3D/VR appears to facilitate the transition into operation...of a too small hospital...:

<https://fagbladet.no/nyheter/direktoren-gikk-for-enda-flere-pasienter-kom-6.91.541947.0886473400>

So, what **MORE** matters, in building design – and stakeholder management?



When *SUSTAINABLE CONSTRUCTION INNOVATION* matters

A related matter and challenge: managing the whole value chain- including a circular economic perspective from plant to recycled product

Massive wood construction, Campus Evenstad.
BIM & immersive visualisation: **Copyright: Ola Roald architects** <http://www.statsbygg.no/Prosjekter-og-eiendommer/Byggeprosjekter/HiHm-Evenstad-Nybygg/>

Case researched by:

Hugosson, M., Stevik, K., Sjøberg, P. & Tryggestad, K. Forthcoming 2018/2019.



An emerging project-stakeholder network

Suppliers

FEM Interreg & Innovasjon Norge
(Seed money feasibility study)

Ola Roald
(architect)

Massiv Lust (massive wood supplier & sub-contractor to ØM Fjeld)

SINTEF/The research centre Zero Emission Buildings - ZEB
(research lab)

Construction company

ØM Fjeld AS
(«Target» contract with Statsbygg)



Customer and client org.

Norwegian Government,
Ministry of Agriculture and Food

Norwegian Government,
Ministry of Education

Board of HUAS

Central administration HUAS

Faculty at Campus Evenstad &
End-user involvement group

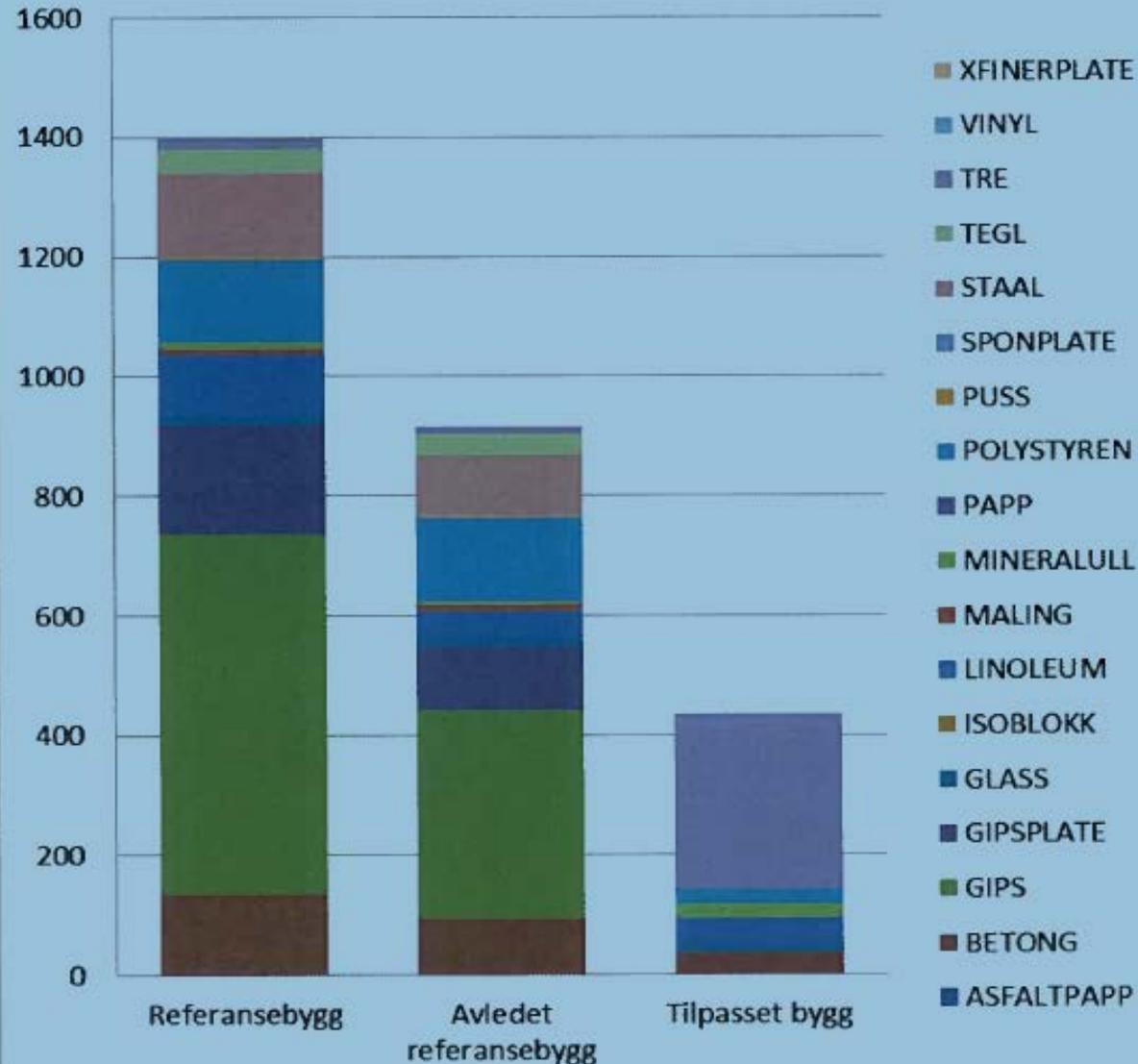
STATSBYGG: Project mgt.- and FM & Client

Tretorget & Tredriveren Hedmark (Wood consultants, facilitators, feasibility study)

Connecting organizations and regional projects

Project Ydalir- Wood & Zero Emission City, Elverum, Hedmark in planning phase

Klimagassutslipp fordelt på materiale, i tonn CO2-ekv



When the NATURAL environment matters: the important role of Environmental accounting

Image, source: Statsbygg (2012), p.4. Klimagassberegninger for nybygg ved HiH Evenstad, 20120719 (The greenhouse gas report from the feasibility study, 20120719)

Figur 2: HiH Evenstad, nybygg. Klimagassutslipp (tonn CO2-ekv) fra materialer. Beregningsverktøy: www.klimagassregnskap.no. Det er anvendt 2 graders målet = ZEB-funksjon som utslippsfaktorer for elektrisitet.

When USERS matters: Nyt Hospital Nordsjælland (NHN): Vision and concept of a "Healing hospital"

Case and research project with Peter Holm Jacobsen, CBS & Chris Harty, University of Reading

Tryggestad, K. , Jacobsen, P. H.,
Harty, C. Forthcoming
2018/2019.

How virtual reality technology
is mobilized in the user
involvement process:

<https://www.youtube.com/watch?v=H3qxm4WfHHU>



“The hospital’s great strength is its highly successful and fundamental fusion of form and function”

Hospital director, NHN

“The hospital **organically** reaches out into the wide landscape. Simultaneously its soft form binds the many components a hospital consists of together. It is a low building that fosters exchange between staff and patients. It has a human scale despite its very large size.”

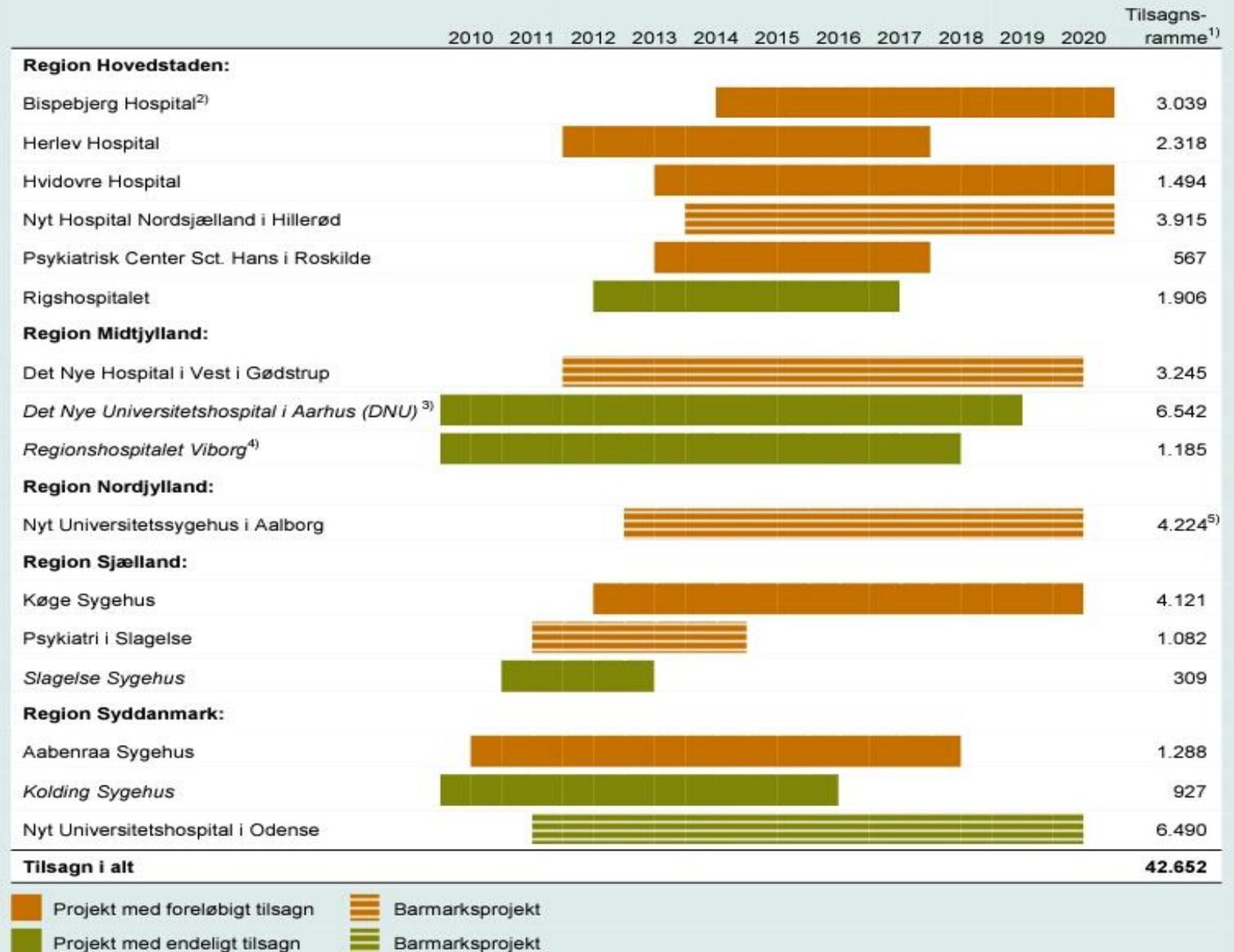
Architect, winning design team

“The physical design should support the organizational change for the hospital in operation”

Construction management, NHN

When regional and national ECONOMICS matters: The economic geography of public healthcare

Tabel 1. Oversigt over kvalitetsfondsprojekternes tilsagnsrammer og tidsmæssige udstrækning (2011-priser) (Mio. kr.)



When also users/patients' BODY size and ROOM size matters – Is the room and hospital too small? (Image, Source : Center for brugerfokuseret Innovation (2010), (Harty and Tryggestad, 2015))

The physical
mock up
and
simulation
of a heart
attack



Who and what matters - who are the stakeholders - now and in the future? Methods for user- and stakeholder involvement are crucial in addressing this question.

Some references

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Harty, C., & Tryggestad, K. 2015. The hospital building as project and matter of concern: the role of representations in negotiating patient room designs and bodies. *Engineering Project Organization Journal*, 5 (2-3), 95-105.

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Whyte, Jennifer; Lindkvist, Carmel Margaret; Jaradat, Suha. (2016) Passing the baton? Handing over digital data from the project to operations. *Engineering Project Organisation Journal*, 6(1), 2-14.