

29 oktober 2014

”Dilemmaer og overvejelser i bæredygtigt byggeri”

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AGENDA

INNOBYG...

HENNING **LARSEN** ARCHITECTS

DILEMMAER fra 3 vinkler...

-  Projekter og bygherre...
-  Visioner og byggeprogrammer...
-  Komponenter og materialer...



HENNING **LARSEN** ARCHITECTS

Henning Larsen,
Grundlagde tegnestuen i 1959

- Henning Larsen Architects har 180 ansatte fra 20 forskellige lande.
- 65 % omsætningen stammer fra internationale projekter.
- Kontorer i Danmark, Tyskland, Norge, Tyrkiet og Saudi Arabien.

“the master of light...”





HLA Bæredygtighed

12 personer ansat i bæredygtighedsafdelingen

Sidste år tegnede vi 500.000 m² lavenergibyggeri uden brug af vedvarende energikilder.

FORSKNING

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The urban canyon and building energy use: Urban density versus daylight and passive solar gains

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Daylight
Solar radiation
Energy and buildings

1. Introduction

One of the most basic and fundamental questions in urban master planning and building regulations is how to secure common access to sun, light and fresh air, not for the owners of individual properties, but for a question of getting the most of what is available. There is potential for experientially increasing comfort between public and private to benefit. Solar access and the right to light means outdoor health to an open society. Vital urban space to health, comfort and pleasure.

Traditional urban planning has sought to control the proportion of the street, because the basic geometry of building heights and distances between buildings regulates access to light and solar heat. Living laws and building regulations usually establish height-to-distance ratios that limit the over-shading that buildings may cause for public spaces and other buildings. A similar geometric abstraction of urban space – the urban canyon [1] – has been used in urban climatology to describe the way that urban spaces create special microclimatic conditions. It is a spatial metaphor that allows us to integrate knowledge from several different specialized fields of research.

In generic terms, the urban canyon is described as the height/width ratio of the space between adjacent buildings. Over decades, over time, and the progress of urban development, having lasting impacts on the future energy consumption for the heating, cooling and lighting of the buildings that define them and the environmental qualities of the streets, squares, courtyards or gardens that constitute them. Urban development is a future slow process to meet technological evolution, but the impact of the conditions on building energy use multiply over the years – more than other processes that affect building performance in the short run.

So, considering that one of the main challenges to architects and engineers is the best decision will be how to improve the energy performance of our buildings and cities, we need to improve our knowledge of both urban and building design through research on the dynamic interplay between climate, urban and building energy use. The passive properties of buildings are likely to play a much more important role in the total energy consumption, as winter heat losses are reduced with better insulation, glazing and air tightness.

Urban densification is an attempt for sustainable development, focusing on energy savings through efficient transport systems, shared infrastructures and minimizing heat gain and losses that dominate energy budgets. It has been established that densification in a building can be done, but the opportunities are on the site level, and ensuring solar access for low-energy buildings and urban

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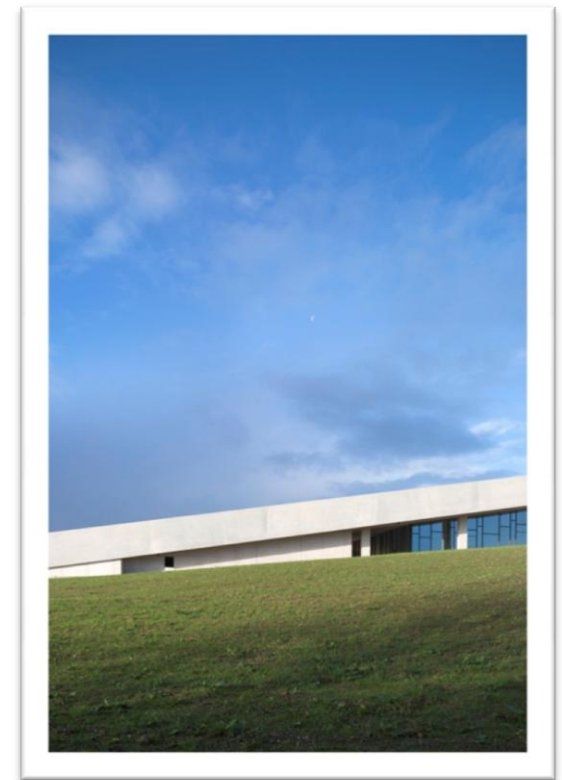
145 | DESIGN WITH KNOWLEDGE | RESEARCH ARTICLES

R&D

DESIGN WITH KNOWLEDGE

New research in sustainable building
Published by Henning Larsen Architects

PROJEKTER



DILEMMAER

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Visioner og byggeprogrammer

1.3.1.1 Generelt

Det nye [REDACTED] skal certificeres efter den nye danske certificeringsordning for bæredygtigt byggeri – DGNB. En certificering sikrer, at [REDACTED] får en garanti for, at det nye [REDACTED] bliver bygget efter bæredygtige principper.

DGNB-ordningen er karakteriseret ved, at systemet ser på alle forhold, som har betydning for en bæredygtig løsning. Bæredygtighed omfatter seks kategorier:

1. Miljø
2. Økonomi
3. Sociale forhold
4. Teknisk kvalitet
5. Procesmæssig
6. Beliggenhed

For at kunne opnå eksempelvis resultatet sølv skal byggeriets opnå en hvis kvalitet indenfor alle kategorier, dog medregnes beliggenheden ikke i sammentællingen.

“*Man får som man spørger*”

...og hvorfor?



Driftsomkostninger...



Indeklima og arbejdsmiljø...



Markedsbehov og efterspørgsel...



CSR og marketing...



Platten i receptionen ...



Metodik og systematik...

“ *Skab et hierarki der kan
understøtte projektets vision* ”

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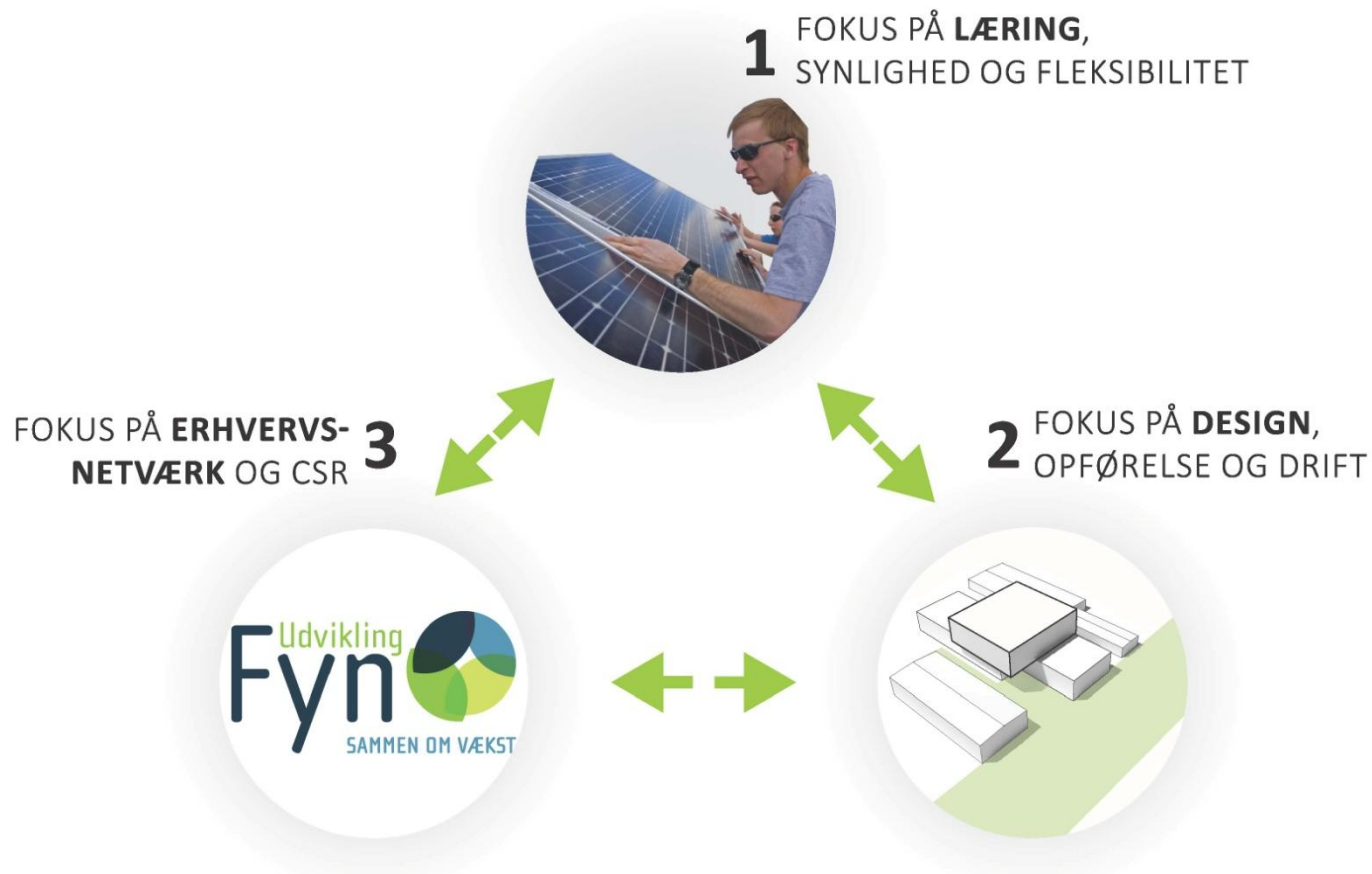


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VI SØGER DEN BÆREDYGTIGE SYNERGI...



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FAST INSPICERING AF
BYGGEPLADS



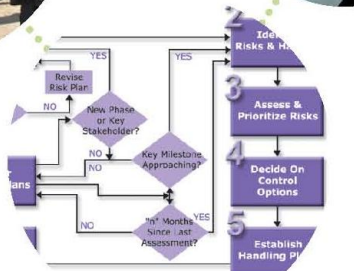
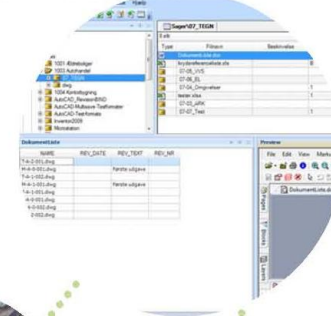
FØLGE ET
PROJEKTERINGSMØDE HVER
MÅNED



DELTAGELSE I
TOTALENTREPRENØRENS
LØBENDE HOVEDTIDSPLAN



BEGRÆNSET ADGANG
FOR STUDERENDE PÅ WEB
PORTALEN



STRUKTURERING AF
BRUGERPROCESSE



KOMMUNIKATION AF
BYGGEPROCESSEN TIL
OFFENTLIGHEDEN








INDSIGT I LØBENDE
BYGGEREGNSKAB



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| |  | ANBEFALING  |  |  | ANBEFALING  |
|---|---|--|--|---|--|
| | ROCKPANEL METALLIS Mineraluldsbeklædning med en metallisk lamnering. | MURSTEN Betonbagnur med skålmur i mursten. | FORSEGLET ZINK | KOBBER | ALUMINIUM |
| Arkitektur ▷ Læring Læring forventes adresseret i det kommende DGNB Schools System. | Moderne materiale. "Demonstrationspanel" kan udvæjnes: Med en boremaskine demonteres panelet, så eleverne kan se opbygningen. +++++ | Levende og traditionelt materiale. Forbåndet kan varieres i forskellige felter, så eleverne får en fornemmelse af forskellige traditioner. +++++ | Møkt udtryk. Gode muligheder for at studere pladesamlinger og konstruktionsopbygning. +++++ | Mere sødelt metal. Imageproblemer ift. bæredygtighed pga. kendte miljøproblemer. Gode muligheder for at studere pladesamlinger og konstruktionsopbygning. +++++ | Let materiale. Kan behandles med alternativ farve. Gode muligheder for at studere pladesamlinger og konstruktionsopbygning. +++++ |
| Miljø ▷ Energi DGNB-kriterier 1-6, 10, 11, 35 | Består af 25% genanvendt materiale, som ofte er lokalt energitung i produktion. Selvrensende coating skal undersøges for miljøpåvirkning. +++++ | Tegl er energitung i produktion. Mørtel bør være kalkbaseret, så murstenen kan renses og genanvendes (øger LCA-værdi). +++++ | Rå zink er problematisk ift. nedvaskning – der kan vælges et produkt med lak, som reducerer med 93%. Antigræftit skal granskes og jævnligt genopfriskes. +++++ | Tungmetal i vandførende flader (særligt horizontale) påvirker lokalmiljøet negativt. Antigræftit skal granskes og jævnligt genopfriskes. +++++ | Let metal; partikler nedvaskes pga. metallets densitet ikke ved regn. Antigræftit skal granskes og jævnligt genopfriskes. +++++ |
| Økonomi ▷ LCC DGNB-kriterier 16, 17 | Fornuftig anlægskøkonomi. Mellemlang levetid (20-30 år). +++++ | Dyr i anlæg, men der er mulighed for salg af mursten til genbrug som bortsol af associationer. Lang levetid (50/100 år). +++++ | Levetid: ca. 50 år Mediumdyr i anlæg +++++ | Levetid: ca. 80 år Dyr i anlæg +++++ | Levetid: ca. 50 år Fornuftig anlægskøkonomi +++++ |
| Drift ▷ Vedligehold DGNB-kriterier 40, 35 | Panellerne er behandlet med en coating, så de er selvrensende. Rockvool anbefales regelmæssig rengøring med vand. +++++ | Meget robust materiale, der kræver et minimum af vedligehold. Fugemørtel skal vedligeholdes. +++++ | Metallader påvirker levetidsomkostningerne til renhold +++++ | Metallader påvirker levetidsomkostningerne til renhold +++++ | Metallader påvirker levetidsomkostningerne til renhold +++++ |
| Demontérbarhed ▷ Genanvendelse DGNB-kriterie 42 | Kan fastgøres mekanisk og dermed nemt demonteres ift. både hel og delvis udskiftning. Rockvool tager paneller tilbage ved bortsol af fælde. +++++ | Hvis der anvendes kalkbaseret frem for cementbaseret mørtel kan stenene renses og genbruges med store miljømæssige fordele ved bortsol af fælde. +++++ | Hvis mekanisk monteret (ingen lim/lavet som integreret sandwichelement) kan zink genbruges med god værdi i videre salg. +++++ | Hvis mekanisk monteret (ingen lim/lavet som integreret sandwichelement) kan kobber genbruges med høj værdi i videre salg. +++++ | Hvis mekanisk monteret (ingen lim/lavet som integreret sandwichelement) kan alu genbruges med høj værdi i videre salg. +++++ |
| | | Det anbefales at bruge en murstenbeklædning på byggeriets base. Vurderingen baserer sig især på udtrykket, læringspotentialet og robusthed/LCC. | | | Det anbefales at bruge en aluminiumsbeklædning til den øvre del af byggeriet. Vurderingen baserer sig især på udtryk, miljøpåvirkning og anlægskøkonomi. |

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DAGSLYS SOM DESIGN-DRIVER



DGNB: VISUEL KOMFORT

Kriterie 22 i DGNB's certificering for kontorbyggeri handler om den visuelle komfort. Der er syv underkriterier, som tilsammen evaluerer både den kvalitative og den kvantitative

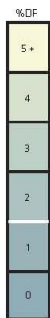
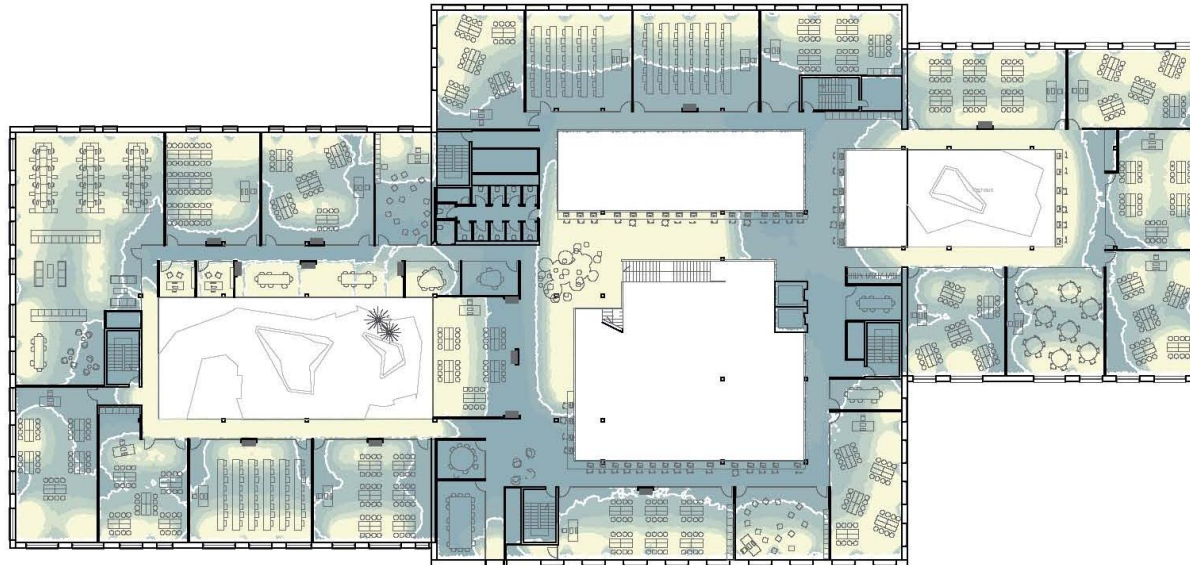
| Underkriterium | Håndtering på EAL | Point |
|--------------------------------|---|-------|
| 22.1 Dagslys i bygningen | Halvdelen af brugsarealet har en dagslysfaktor på >2 pct. | 12 |
| 22.2 Dagslys på arbejdspladser | Dagslysfaktor på arbejdspladser er 2pct.< DF<2,5pct. | 7 |
| 22.3 Udsyn | Der er udsyn fra alle undervisnings- og arbejdsområder | 14 |
| 22.4 Blænding fra dagslys | Indbyggede persienner | 10 |
| 22.5 Blænding fra kunstlys | Brug af LED-lyskilder | 14 |
| 22.6 Kunstlysstyring | Der er individuel styring af dagslys ved faste arbejdspladser | 7 |
| 22.7 Farvegengivelse | Alle lyskilder har farvetemperaturer på 80-90 Ra | 14 |
| I alt | | 78 |

78 checklist points viser erfaringsmæssigt en meget fin performance for visuel komfort og et godt stykke over de i byggeprogrammet påkrævede 67 checklistepoint. På denne side samt de følgende sider er vurderingen dokumenteret med dagslysanalyser af alle planer.

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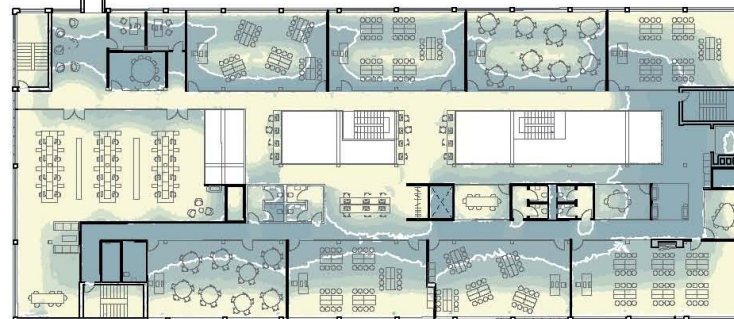


S01.5 VISUEL KOMFORT
Dagslysanalyserne er udført som
dagslysfaktoranalyser med følgende
forudsætninger:

- Reflektanser
- Loft 0,7
 - Væg 0,5
 - Gulv 0,3

- Lystransmittans
- Glas 0,7

Analysegrid er placeret 850 mm over
gulv



Etage 02

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INSPIRATION TIL FREMTIDEN

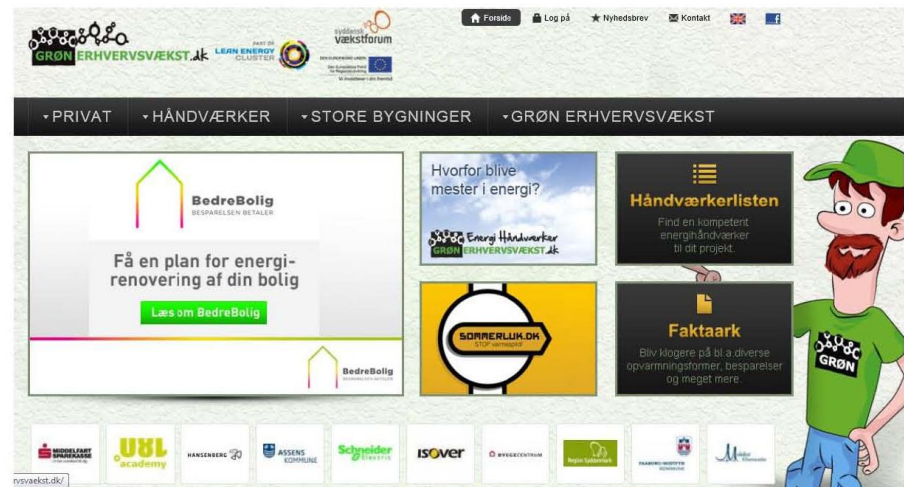
ERHVERVSRETTET SAMARBEJDE

MILJØ FORUM FYN



The screenshot shows the homepage of MiljøForum Fyn. The header includes the logo and navigation links like 'Kontakt', 'Sitemap', and 'Søg'. A main menu lists categories such as 'Nyheder', 'Om os', 'Effektiv Energi', 'Værktøjer', 'Medlemmer', 'Bliv medlem', 'Log in', and 'Arrangementer'. The main content area features a 'Nyheder' section with an article titled 'EFFEKTIV ENERGI finder store besparelser i mindre virksomheder' and a photo of two men. Below it is a 'Tilmeld nyhedsbrev' form with fields for 'Navn' and 'E-mail'. To the right, there is an 'Arrangementer' section listing events like '04.06.2014: Vejen til den første miljøredegørelse' and '18.06.2014: GRØNT FOKUS giver glade kunder og positivt budline'.

GRØN ERHVERVSVÆKST



The screenshot shows the homepage of GRØN ERHVERVSVÆKST. The header includes the logo and navigation links like 'Forside', 'Log på', 'Nyhedsbrev', 'Kontakt', and social media icons. A main menu lists categories such as 'PRIVAT', 'HÅNDVÆRKER', 'STORE BYGNINGER', and 'GRØN ERHVERVSVÆKST'. The main content area features a 'BedreBolig' section with a headline 'Få en plan for energi-renovering af din bolig' and a 'Læs om BedreBolig' button. To the right, there are sections for 'Håndværkerlisten' and 'Faktaark'. The footer includes logos for various partners like 'UBL academy', 'HANDELSBANK', 'ASSENS KOMMUNE', 'Schneider Electric', 'ISOVER', 'BYGGEKONFID', 'GRØN ERHVERVSVÆKST', and 'LILLEBÆLT ERHVERVSKOLEN'.

“ *Gør bæredygtigheden til et drivende dialogværktøj* ”

DILEMMAER

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Komponenter og materialer

Green building

Graphic by JAMES OWENS; Text by JOHN C. KUHNER | THE PLAIN DEALER

The Cleveland Environmental Center is one of the first buildings in the nation that combines historic preservation techniques and new green building practices. The \$3.8 million project will cut energy use, provide a healthy workplace and do less damage to the environment than a conventional office building. It features non-toxic and recycled building materials, a geothermal heating and cooling system and a grass roof. The five-story building, formerly a Cleveland Trust bank branch, will become of the hub of Cleveland's environmental movement. Tenants start moving in April 1.

Interior spaces

One of the main features will be windows and natural light. At night, light-motion sensors will activate lighting only when needed. Sensors also will turn on systems to deliver fresh air to rooms when needed.

Bathrooms

The four men's bathrooms have waterless urinals, which push liquid waste down the drain with a non-toxic material. They will save an estimated 140,000 gallons of water yearly. All bathrooms are equipped with low-flow water fixtures and toilets.

Green building materials

1 Bamboo flooring

Bamboo, a grass, is preferred because it grows faster than traditional hardwood trees and its root system stays alive after it is cut, protecting hillsides and river banks from erosion.

2 Windows

On upper floors, double-paneled, argon-filled windows reflect heat in or out, depending on the season.

3 Carpet

Made from recycled, low-toxic materials, it can be recycled into new carpet when replaced. Low-toxic glues were used to put it down. The wood under the carpet is made from pressed agricultural waste.



Who's moving in
EcoCity Cleveland; Green Building Coalition; Clean Air Conservancy; Green Energy Ohio; Environmental Health Watch; League of Conservation Voters Education Fund; Enterprise Foundation; Periwinkle; the Nature Conservancy; Fifth-Third Bank and another tenant to be announced.

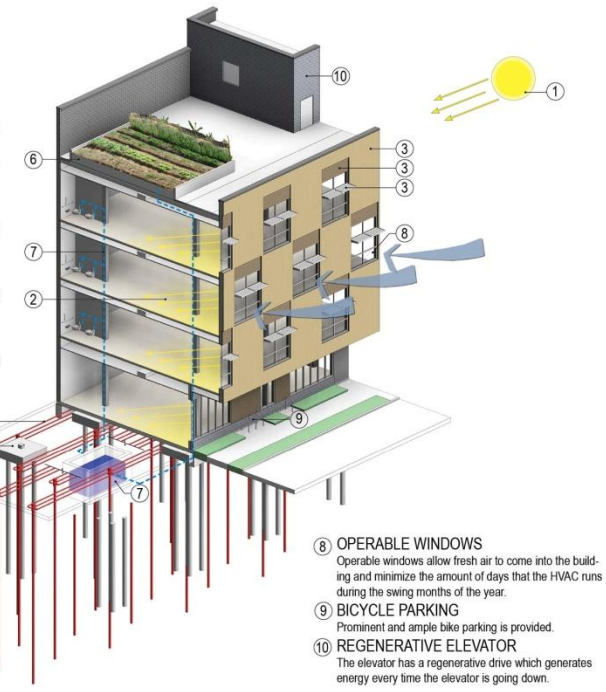
Environmental learning station
Visitors will find a touch-screen computer that will give a virtual tour of the building. It also will tell how much electricity the solar panels are producing at that moment, the building's energy consumption and roof temperature.

Pipes are a constant 55 degrees.
Electrically heated coils provide additional heating above the pipes' 55 degrees.

Special heating and cooling units
To cool a room, warmer air is blown past the pipes, which absorb the heat. The cooled air is blown back out.

Radiant heated floor
Pipes that are imbedded in the floor carry heated fluids from the thermal underground system that provide a consistent temperature in the working area. This saves energy because only the working area is heated rather than using a system that blows down heat from the 26-foot high ceiling.

- 1 **SOLAR ORIENTATION**
The building oriented to the south to take full advantage of the sun.
- 2 **DAYLIGHTING**
Salvaged wood sunscreens control the sun's heat gain and maximize the daylight that the building can harvest.
- 3 **SALVAGED MATERIALS**
A majority of the exterior envelope is made from salvaged materials which diverted approximately 160 tons of materials from going into a landfill.
- 4 **GEO THERMAL WELLS**
27 geo-thermal wells are drilled directly below the first floor slab. The geo-thermal wells are one of systems that allow the building to be 50% more efficient.
- 5 **DRILLED PILES**
The buildings required 53 piles to be drilled under the building to allow this parcel of land to be able to support a building of this size.
- 6 **ROOFTOP PRODUCTION GARDEN**
The roof has a roof top garden that is used for planting vegetables. This garden is maintained by the tenants and both minimizes stormwater runoff into the sewer system and promotes healthy living for the tenants.
- 7 **GREY WATER REUSE FOR TOILETS**
Any water that is collected on the rooftop and not stored in the green roof is collected by a cistern built under the building. This water is then pumped up to the toilets and used for flushing these toilets. This is one of the ways that the building conserves 60% water.



- 8 **OPERABLE WINDOWS**
Operable windows allow fresh air to come into the building and minimize the amount of days that the HVAC runs during the swing months of the year.
- 9 **BICYCLE PARKING**
Prominent and ample bike parking is provided.
- 10 **REGENERATIVE ELEVATOR**
The elevator has a regenerative drive which generates energy every time the elevator is going down.

THE CLOCK SHADOW BUILDING
Sustainability Diagram
CONTINUUM ARCHITECTS + PLANNERS, S.C.

“*Der er en tendens til at bæredygtige byggerier er lig med komplekse systemer*”

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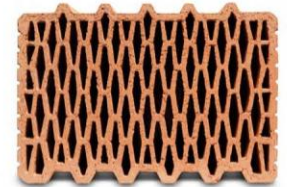
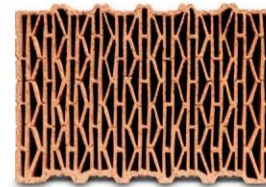
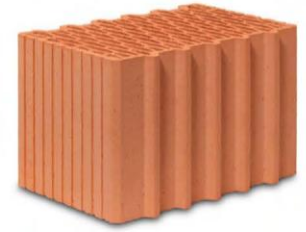
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POROTHERM 38 H.i N+F

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“Bæredygtighed er en mulighed for at skabe mere **meningsfuldhed** og **værdi** i vores liv og i samfundet”

SUSTAINABLE BY DESIGN

HENNING **LARSEN** ARCHITECTS

TAK...

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