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# DAYLIGHT SOLUTIONS FOR SUSTAINABLE BUILDINGS

When great design also creates an ideal indoor  
climate in commercial buildings

**VELUX®**

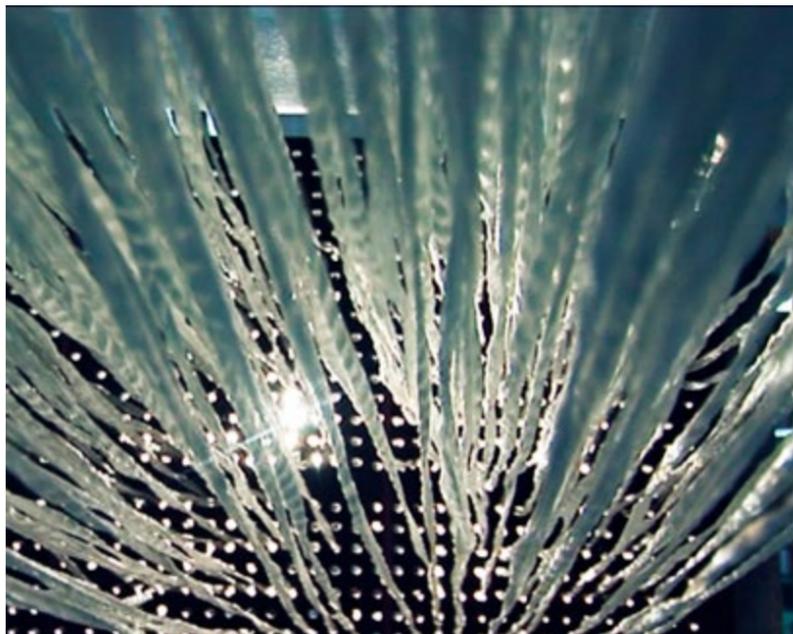
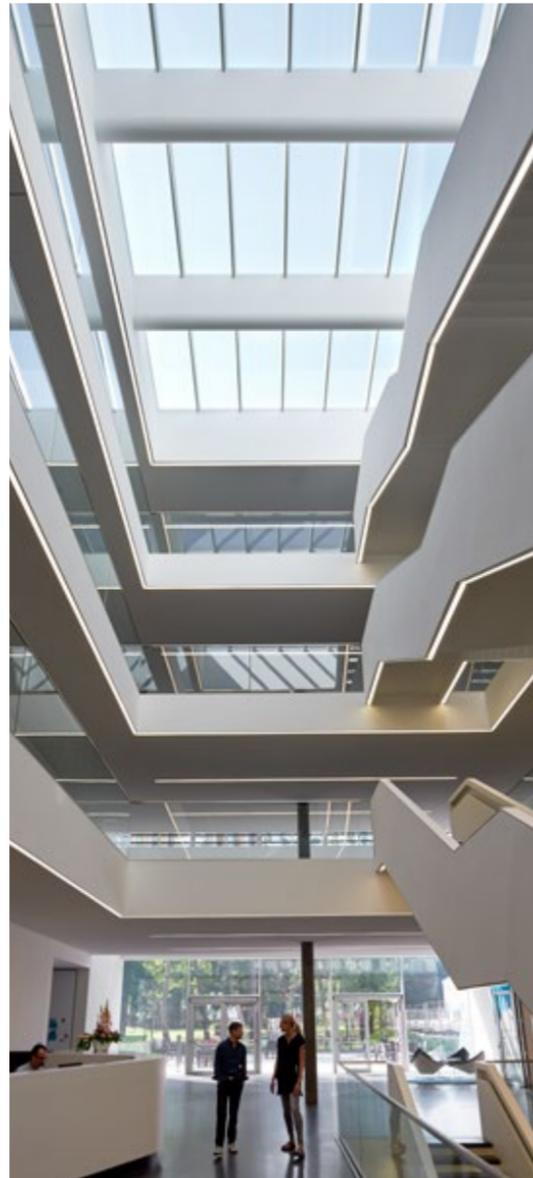
Commercial

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## VELUX MODULAR SKYLIGHTS

Improving people's quality of life  
with daylight and fresh air through  
the roof.





**Skylights: the sustainable choice**  
More and more architects and the customers they design for are looking for sustainability in their building design.

Skylights naturally let in daylight and provide a comfortable indoor climate for those working or learning in a building, therefore they are ideal for sustainable design projects.

VELUX Modular Skylights, fuelled by a passion for natural daylight and fresh air for the past 75 years, puts sustainability at the forefront of design.

With integrated, automatic blinds for daylight control and special venting modules, complete with a built-in motor for easy control of temperature and air quality, our prefabricated modular skylights are a great choice for sustainable design.

Above this, though, the skylights come with a number of unique design features that take sustainability to the next level.

**Energy efficient**  
Very low thermal conductivity of the profiles and a range of low-energy glazing options make the modular solution highly energy efficient.

Solar panel modules are also available for even greater energy efficiency.

**Resource efficient**  
VELUX modular skylights are durable, with an estimated lifespan of 40 years on profiles and 20 years on panes.

The prefabricated skylights are designed, manufactured and delivered to minimise the resource footprint, from production to delivery on-site.

**Ready for certification**  
The skylights come with the required environmental assessments and declarations for building certification according to all common certification schemes.

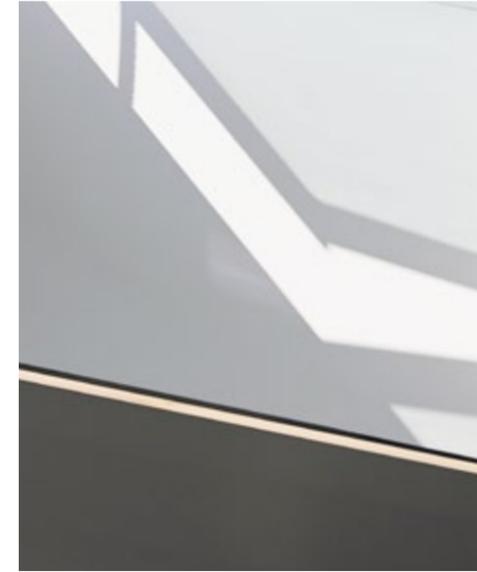
**Responsible production**  
All skylights are produced at our specialised skylight factory, which is committed to quality, environment and safety.

## INDEX

Indoor comfort	5
Great daylight design	8
Superior performance	12
Certified buildings	15
Sustainable sourcing	20
Responsible production	22



INDOOR  
COMFORT



GREAT DAYLIGHT  
DESIGN



SUPERIOR  
PERFORMANCE



CERTIFIED  
BUILDINGS



SUSTAINABLE  
SOURCING



RESPONSIBLE  
PRODUCTION

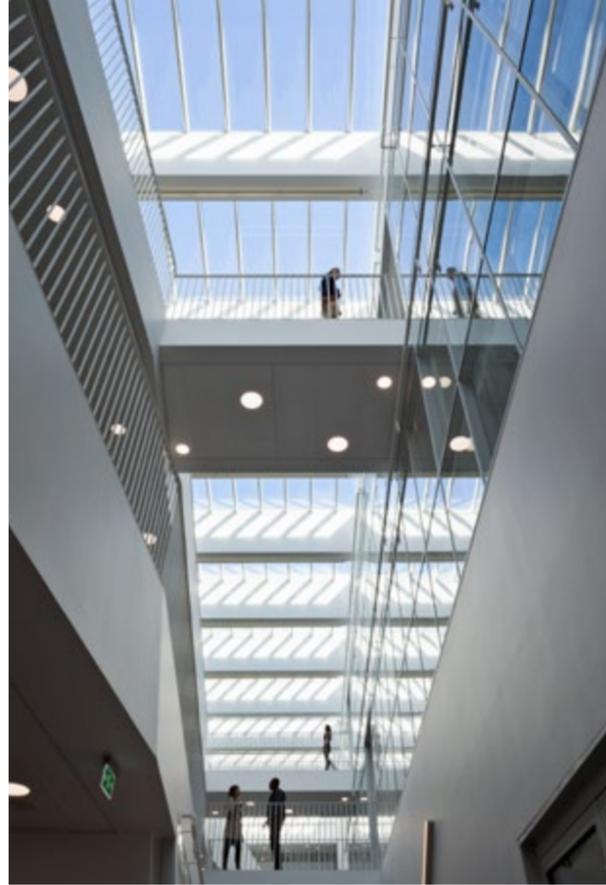
## INDOOR COMFORT

Boost comfort and productivity with daylight and fresh air through the roof.



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CREATING HEALTHY AND COMFORTABLE SPACES



**Healthy indoor climate**

Understanding how the indoor climate impacts health and comfort is vital in new building design as well as building renovation projects.

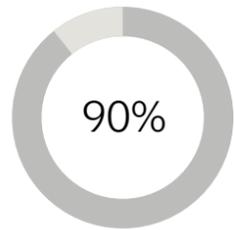
VELUX modular skylights enable design that prioritises these parameters. Our skylights take full advantage of daylight and fresh air through the roof, leading to improved occupant well-being, reduced risk of allergies, improved learning outcomes and better performance within buildings.



# FACTS ABOUT INDOOR CLIMATE

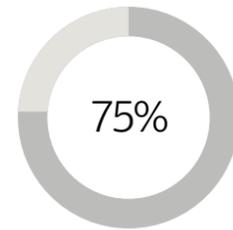
- People spend about 90% of the time indoors.

(Healthy Home Barometer 2016)



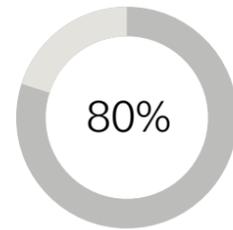
- 75% of all buildings are too hot in summer, too cold in winter.

(Healthy Home Barometer 2017)



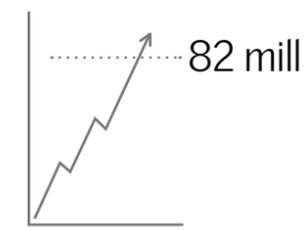
- 80 mill. Europeans live in unhealthy buildings.

(Healthy Home Barometer 2017)



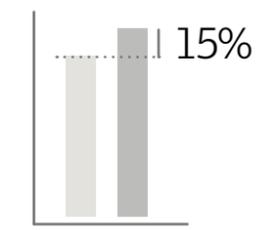
- In Europe alone, 82 mill euros go to treatment of asthma every year.

(Healthy Home Barometer 2017)



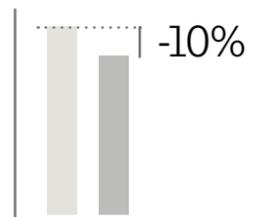
- A good indoor climate can improve office productivity by 15%.

(Healthy Home Barometer 2017)



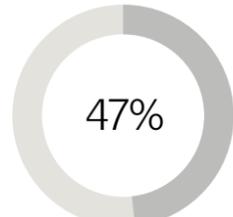
- Temperatures that are too low or too high can decrease employee performance by up to 10%.

(Healthy Home Barometer 2018)



- 47% of office workers have no natural light in their working environment.

(Healthy Home Barometer 2018)



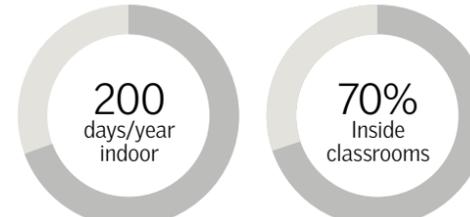
- When working in offices with windows, people get 46 minutes more sleep per night on average.

(Healthy Home Barometer 2018)



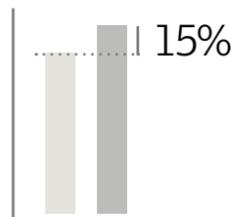
- Every year, students spend 200 days at school - 70% of the time indoors.

(SINPHONIE final report)



- Learning abilities of children increase by up to 15% in good indoor climates.

(Fraunhofer – Schools in Europe 2015)



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GREAT  
DAYLIGHT DESIGN

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Bring architectural ideas to life and  
design with maximum daylight.

### The essence of comfort

When people tend to spend 90% of their time indoors, designing with daylight becomes an obligation. Great daylight design brings the qualities of the outdoors into the building. Daylight brightens the mind and invigorates the body. It carries warmth, provides clarity, and creates spaces for meeting, talking, relaxing and playing.

Pleasant temperatures combined with fresh air and daylight is the essence of comfort and well-being.

### Built-in comfort

VELUX modular skylights offer several unique features for great daylight design. The integrated blinds and awnings ensure pleasant temperatures and prevent glare.

The venting modules enable easy control of the indoor climate by opening and closing the windows, providing fresh air and pleasant temperatures at any given time.



1



2



3



4, 5 and 6

### 5 TIPS FOR DESIGNING BUILDINGS WITH DAYLIGHT AND FRESH AIR

1. Ensure optimum daylight by:
  - Maximising glazing in the roof light.
  - Taking into account the size and shape of the roof light.
  - Considering the angle of the roof and the orientation of the building.
2. Install venting modules to create comfort ventilation.
3. Create an invisible solution by means of a slim and discreet profile.
4. Use sun screening – blinds and/or awnings – to prevent glare and block heat from the sun.
5. Choose fritted or opal glazing to divert the sunrays, block the heat and let in lots of daylight.

**THIS IS HOW DAYLIGHT DESIGN WORKS IN PRACTICE**

Light distribution, colour reproduction, heat transmittance and heat control



**GLAZING WITH ADVANCED SUN PROTECTION COATING**  
Coating efficiently blocks the sun and prevents overheating.

Note: The human eye can easily compensate for the darker luminance, but colour reproduction will desaturate significantly.



Glazing with low emissivity coating (LowE)



Glazing with light sun protection coating (Sun1)



Glazing with advanced sun protection coating (Sun2)

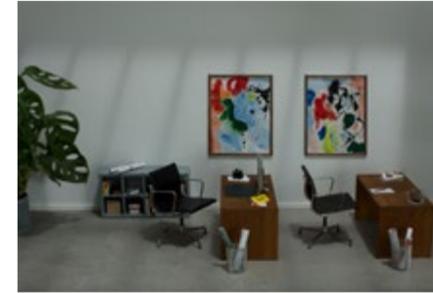


**GLAZING WITH LOW EMISSIVITY COATING AND ROLLER BLIND**  
Efficiently blocks light and heat and is easy to regulate.

Note: A white roller blind creates diffuse light with low contrast and high luminance, which is great for studying, computer work and typical office tasks.



Glazing with low emissivity coating (LowE) – No suncreening



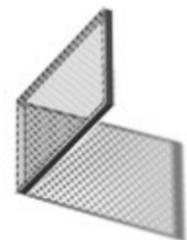
Glazing with low emissivity coating and Roller Blind RMM 8806, White



Glazing with low emissivity coating and Roller Blind RMM 8805, Grey

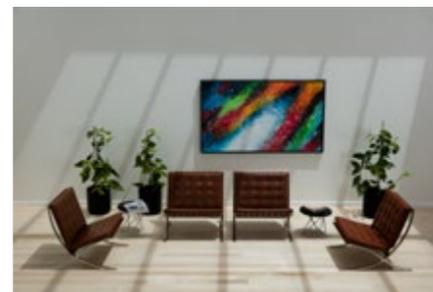


Glazing with low emissivity coating and Roller Blind RMM 8807, Black

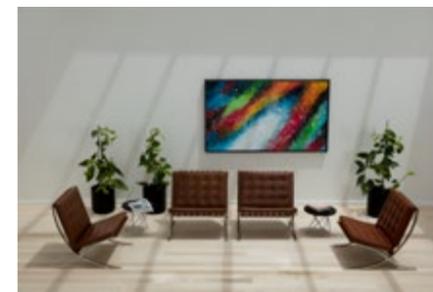


**FRITTED OR OPAL GLAZING**  
Lowers the contrast for a pleasant work environment, reduces the heat intake and preserves the luminance.

Note: Opal glazing preserves colour and luminance, while removing contrasts, which creates a perfect lighting for schools and offices.



Glazing with low emissivity coating (LowE)



Fritted glazing



Opal glazing

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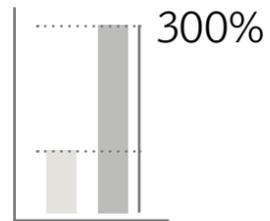
## FACTS ABOUT DAYLIGHT

- Panes used in VELUX modular skylights provide light transmission up to 79% depending on coating and variant.

(Source: EN 14351-1)

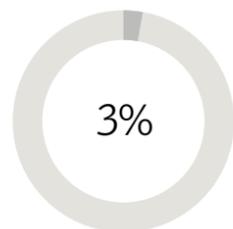
- Skylights provide up to three times more daylight than facade windows depending on building orientation and roof pitch.

(Source: CIE Standard General Sky)



- Illuminance requirements for an office building is 300 lux. This is only 3% of the illuminance provided by daylight. A skylight provides up to 10,000 lux – corresponding to the levels of daylight when outside.

(Source: CIE Standard General Sky)



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## SUPERIOR PERFORMANCE

Verified documentation of the skylight's performance – from energy efficiency to water tightness.





VELUX MODULAR SKYLIGHTS FULFIL ALL REQUIREMENTS OF THE EU AND NATIONAL BUILDING STANDARDS AND NORMS

**Energy efficiency**

The modules are highly energy efficient and fit perfectly together to provide a watertight roof glazing solution with good energy performance. The modules can be delivered with integrated blinds, awnings and vented modules that ensure thermal stability no matter the weather conditions.

**Insulating profiles**

The composite material used for the profiles combines great strength and high insulating performance.

**Favourable U-value**

The panes are supplied with low-energy double or triple glazing to achieve a favourable U-value. The integrated flashings ensure water tightness between module and roof.

**Integrated solar panels**

The modules are available with integrated solar panels, allowing for self-sufficient energy production.

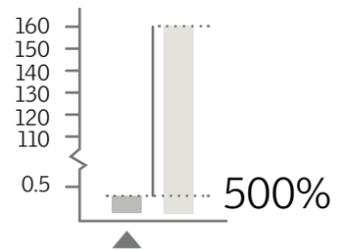
**Environmental Product Declaration**

VELUX modular skylights come with Environmental Product Declarations (EPD) for several markets.

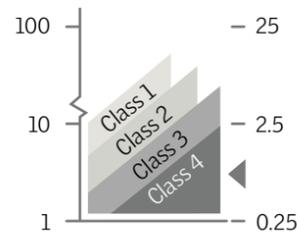


# FACTS ABOUT PERFORMANCE

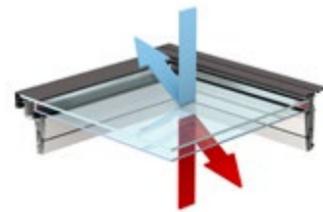
- The profiles are made of a composite material (80% glass fiber and 20% PUR) with very low thermal conductivity. This gives a 500% lower (better) insulation rate than aluminium.



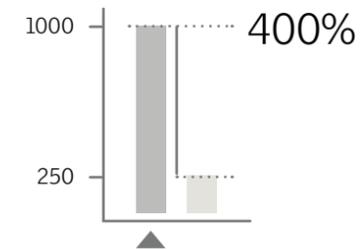
- The modules have obtained the air permeability classification, Class 4, lowest heat loss.



- Thermal transmittance per sqm module:  
 Modules with double-glazing:  
 $U_w = 1.3-1.5 \text{ W/(m}^2\text{K)}$   
 Modules with triple glazing:  
 down to  
 $U_w = 0.86-1.1 \text{ W/(m}^2\text{K)}$



- The composite material has high flexural strength and is four times stronger than aluminium. The profiles are slim and allow more daylight into the building.



- The prefabricated modules are tested through-and-through before leaving the factory. This means that all EN and DIN classifications are in place for easy specification.



- Low-energy glazing in combination with low-conductive profiles create an effective shield against all kinds of cold weather.



- Per August 2018, Environmental Product Declarations (EPD) are available for the following markets:
  - UK (and DK) is ready.
  - EPDs for France and Netherlands are on the way.



- The EPDs offer full declaration of factors like Global Warming Potential (GWP), Ozone Depletion Potential (ODP), acidification and eutrophication.



CERTIFIED  
BUILDINGS

Meet the need to build sustainably  
with VELUX Modular Skylight.



### Holistic approach to sustainability

The Environmental Protection Declaration that VELUX modular skylights hold makes it easier to achieve compliance with environmental building rating schemes, such as BREEAM, LEED, DGNB, Active House, AktivPlus, Living Building Challenge and Well Building Standard.

The different rating schemes vary widely in terms of overall scope, performance metrics and priorities during the building's life cycle, yet they all share the ambition to create healthy and sustainable buildings.

VELUX Modular Skylights pursue the same holistic strategy, seeking to optimize energy efficiency, minimize environmental impact and ensure a healthy indoor climate.

We follow the development and content of the rating schemes closely and provide guidance as well as all relevant information that can help you achieve certification.



1

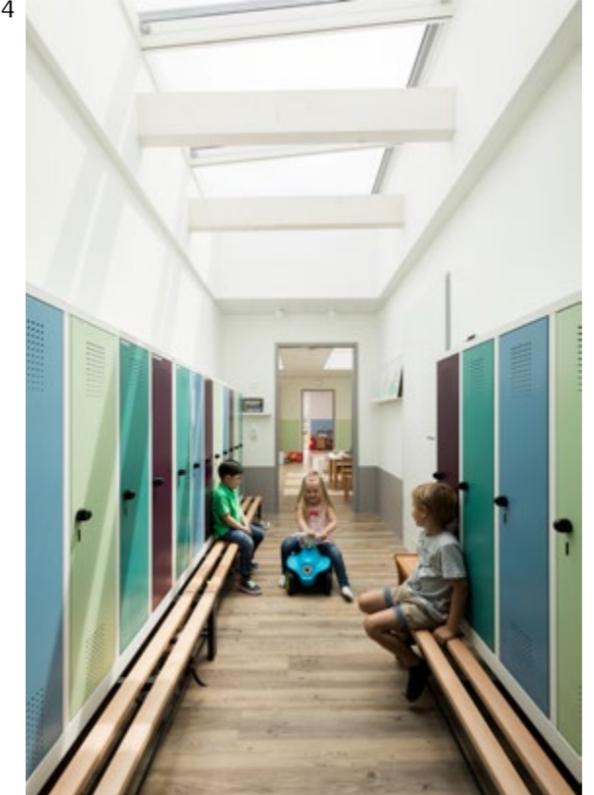


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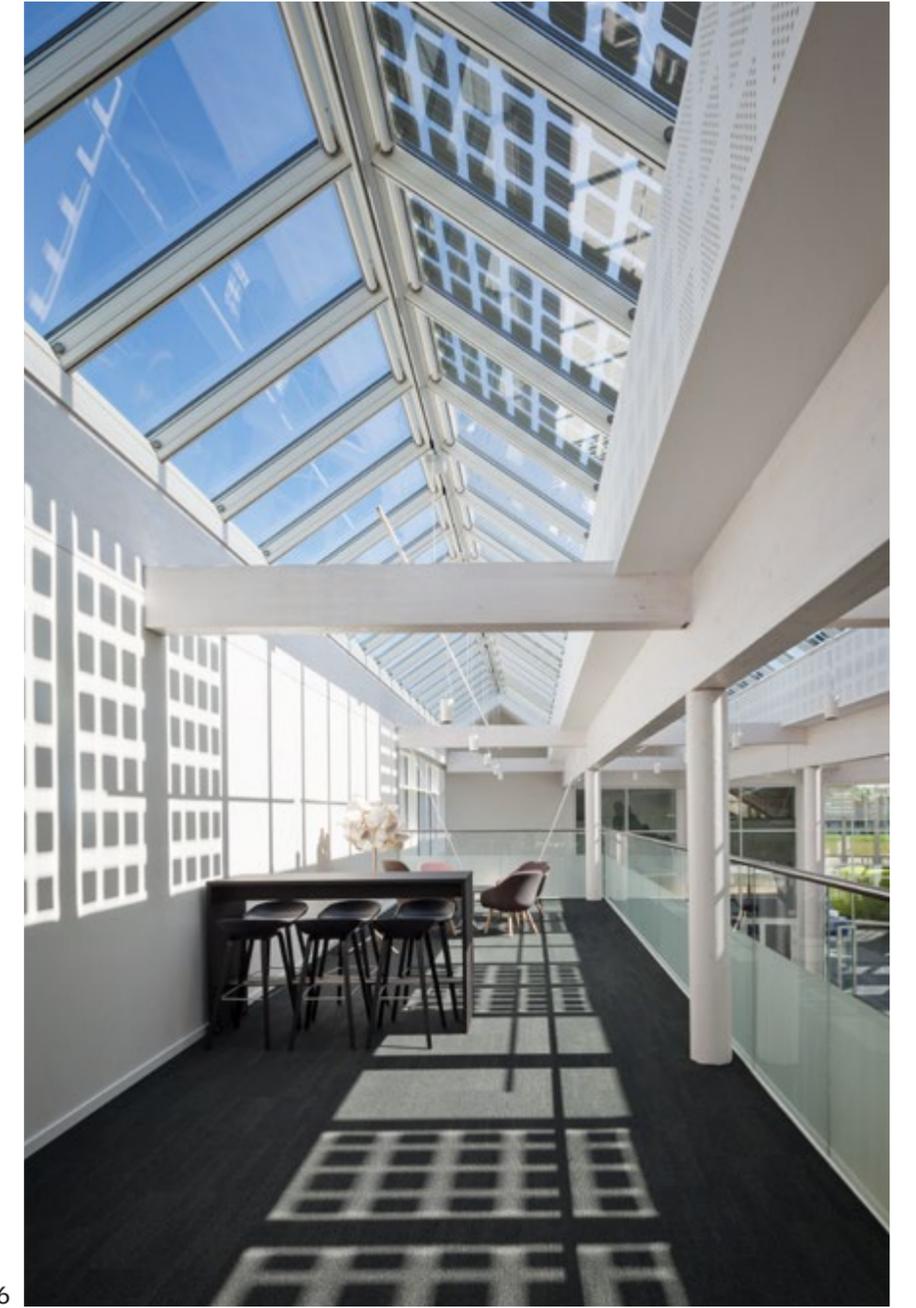


### Examples of buildings with VELUX Modular Skylights

1. German Center for Neurodegenerative Diseases, DZNE, Germany
2. Siemens Head Office, Denmark
3. Hafner, Office Building, Germany
4. KITA, Kindergarten, Germany



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5. Hal 3, Multihal, Sports Facility, Denmark  
6. Green Solution House, Hotel, Denmark  
(Modules with Photovoltaic glazing)



7 8

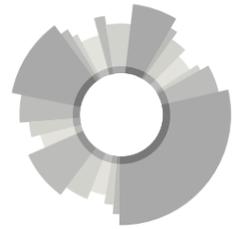


7. Experimentarium, Science Center, Denmark  
8. The Houtloods, Auditorium, Bar and Restaurant, Netherlands

# FACTS ABOUT CERTIFICATION

- Worldwide, more than 600 sustainability certification schemes for building components and building design are being used. A new guide "Guide to sustainable building certifications 2018" provides an in-depth investigation of the ten most widely used standards.

(Guide to Sustainable Building Certifications 2018)



- With regard to chemical emissions, VELUX modular skylights have been tested and classified as A+ in VOC (Volatile Organic Compounds), according to the French regulation on VOC emissions from construction products.



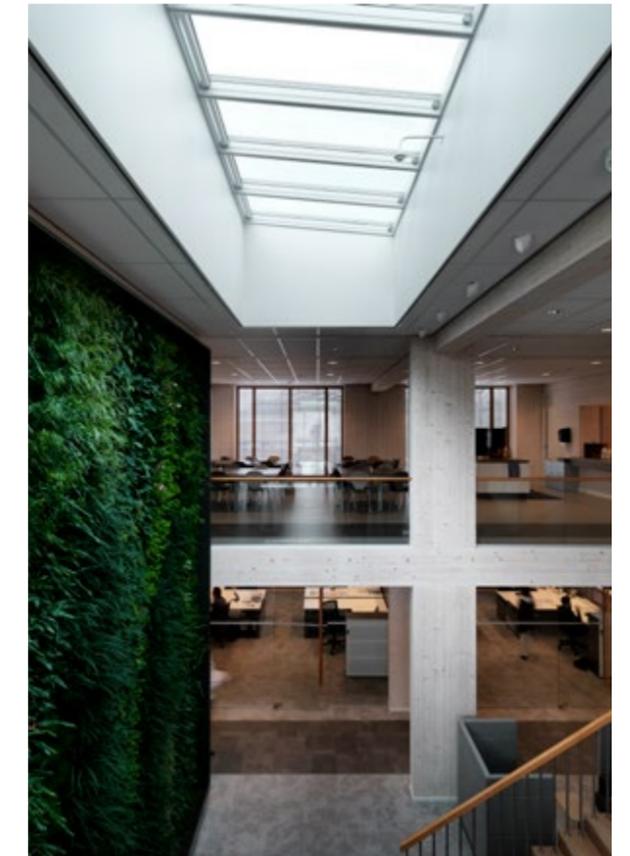
Siemens Head Office, Denmark, LEED Gold



Green Solution House, Denmark, DGNB and Active House



Trumpington College, United Kingdom, BREEAM Excellent



Geelen Counterflow, Netherlands, BREEAM Outstanding

SUSTAINABLE  
SOURCING

Maximise the use of sustainable materials throughout the entire life cycle of the building.





## FACTS ABOUT MATERIALS

- The service life of the profiles is estimated to be 40 years; for panes 20 years.
- The composite holds the European Composite Recycling Technology (ECRT) certificate, certifying that composite waste is treated and recovered into new raw material for insertion in and production of composite products.



- Buildings account for one third of humanity's resource consumption.
- 3 billion tons of raw materials go into the building sector every year.
- 40% of solid waste comes from the construction or demolition of buildings.

### Sustainable resource use

The main materials used in VELUX modular skylights with double-glazing are glass (57%), composite (19%), wood (7%, used for packaging), aluminium (7%) and other minor material fractions.

### Profiles

The structural profiles of VELUX modular skylights are made of low-conductive, pultruded composite, containing approximately 80% fiberglass and 20% polyurethane resin. The composite material provides high flexural strength, good insulation performance and long service life.

As primary producer of Composite, the VELUX Group carries out

research and development in recycling of the composite material. Currently, we're experimenting with recycling the material for use in different window components, noise screens, glass wool insulation and other products.

### Glass

The VELUX modular skylight panes are made from virgin glass sourced from leading European glass manufacturers.

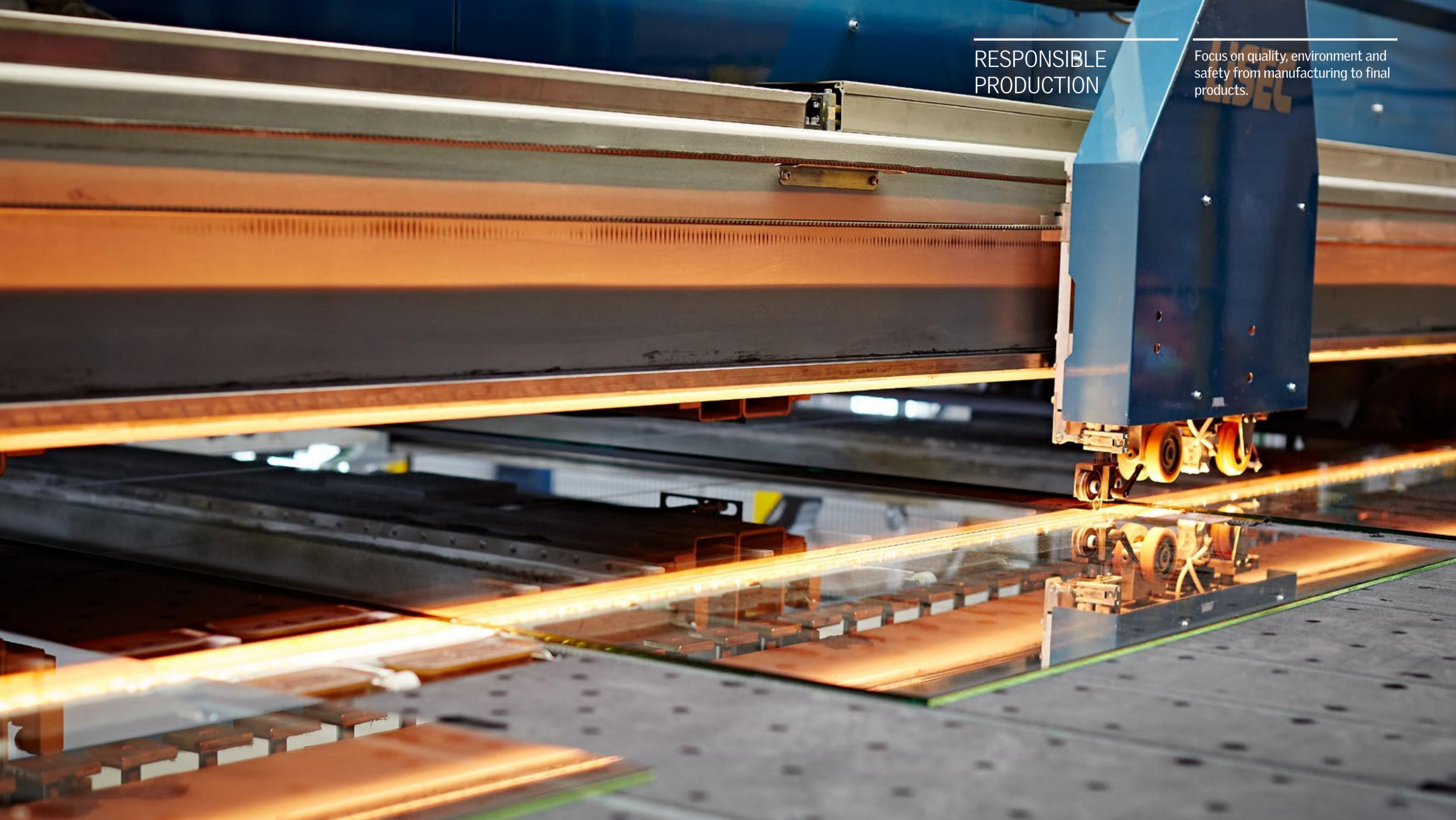
### Wood and aluminium

The wood used for packaging pallets for VELUX modular skylights is sourced from certified, sustainable forests. The aluminium used in the skylight modules contains 50% recycled aluminium.

### Re-use and replacement

Prefabrication enables re-use of modules in other buildings. The modular design of the skylights allows easy replacement of panes, motors and blinds.





RESPONSIBLE  
PRODUCTION

Focus on quality, environment and  
safety from manufacturing to final  
products.

### Peace of mind

VELUX Modular Skylights are produced at our specialised factory in Denmark. The factory is ISO 9001 certified and in the process of being certified according to ISO 14001 and OHSAS 18001 to ensure continuous focus on quality, environment and safety in operations and products.

### Minimise footprint

We seek to minimise our footprint in the way we source, manufacture and transport our products.

We strive towards zero-waste production and constantly seek to optimize our resource efficiency.

### Work safety

We pursue a safety vision of zero work-related injuries at our manufacturing sites. New factory equipment and new working procedures are always subjected to thorough safety assessments before purchase/implementation.

Our proactive approach to safety has brought down the work-related accident frequency to a level four times lower than the comparable industry benchmark.



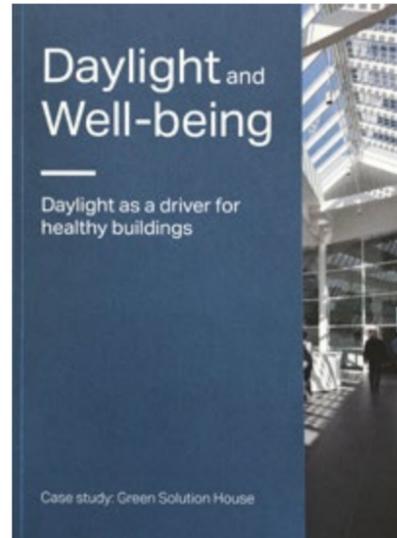
## FACTS ABOUT PRODUCTION

- The target for the carbon footprint of our manufacturing processes is a 50% reduction of CO<sub>2</sub> emissions compared to the 2007 baseline.
- The VELUX Modular Skylight factory is certified according to ISO 50001, Energy Management.
- We carry out research and experiments to investigate reuse of the composite material. More specifically, we have material specifications ready for innovative products, where new or recycled composite can be used. In the longer term, this insight will be used to fulfil EU regulation on end-of-life return of products.
- The work-related accident frequency at the VELUX factories is four times lower than the comparable industry benchmark.



## LEARN MORE

Find further information about sustainable and healthy buildings.



CASE STUDY:  
GREEN SOLUTION HOUSE  
[Download eBook](#)



SUSTAINABLE BUILDING CERTIFICATIONS  
[Read eBook](#)



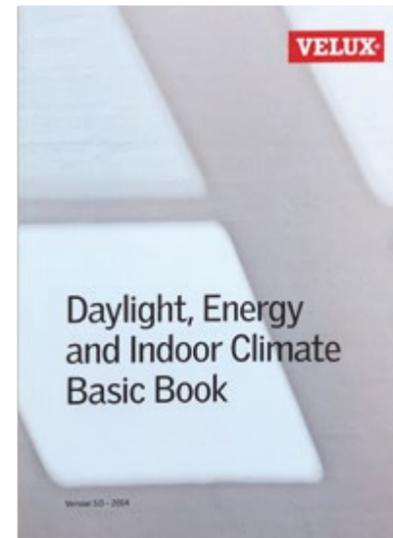
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VIDEO FEATURING SUSAN CARRUTH  
SPEAKING AT THE ACTIVE HOUSE  
SYMPOSIUM  
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