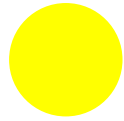
A photograph of two children, seen from behind, walking hand-in-hand on a sandy path that leads to a beach. The children are wearing blue t-shirts and shorts. The path is flanked by tall, golden-brown dune grasses. In the background, the blue ocean meets a clear sky at the horizon. The overall scene is peaceful and natural.

Man and Nature  
Partners Today and Tomorrow

Stranddorf Augustenhof  
Augustenhof Beach Village



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Investitionsbank Schleswig-Holstein.





Tourism and conservation are not natural partners - that at least, is what many conservationist think. Even businessmen in the tourist industry see people involved in conservation more as an obstruction than an opportunity to further their business aims.

### Our target group

*People who enjoy holidaying in nature.*

*People  
who value a pollutant-free environment.*

*People who enjoy  
eating wholesome, organic food.*

*People who want to know more  
about sustainable technology for the future.*

*People who are keen  
to meet like minded people.*

We think differently; our project ,Augustenhof Beach Village, challenges this view and aims to prove that the tourist industry and conversation can get along. Our goal was to build a holiday vil-lage in harmony with nature rather than in conflict with it.

Moreover, we also wanted to be at the cutting edge of innovative ecological technology where-  
ver possible.

Our third aim was to create houses and use the surrounding areas in an aesthetically pleasing way as possible.

These were our ideals. It was, however, impor-  
tant not to lose sight of the cost effectiveness of our goals. No business will survive if the num-  
bers do not add up! On 3 July 2004, after a 4-  
month construction period, 15 holiday homes  
were opened to the public. We have had such  
positive feedback that we know that we are defi-  
nitely on the right track. Winter 2004/05 saw the  
opening of the community building, which offers a  
variety of additional facilities. We can now  
accommodate larger groups in the holiday village  
for work, parties - or both.



## the project

*a holiday village setting standards*

The priority of any holiday village is, of course, to make sure the guests have a wonderful stay. We also hope that our guests take some ideas and new interests away with them.



# Holiday Homes

*experience innovative building*

A quick glance into a building's rooms will not necessarily highlight its special qualities. It is not until you stay a while that you begin to realise the effect the materials used might be having on you. It is for this reason that holiday homes make very useful "guinea pigs"! Visitors have the opportunity to live and experience a building made along new lines or with new materials.

When you hear the words 'holiday home' you expect bright sunshine, sunny rooms and warm evenings. Those homes are usually only inhabited in the summer and thus built with light materials, especially on the coast. The houses at Augustenhof, however, are designed to keep our guests safe and snug even during our strong autumn winds and cold winter days. They have been built to be hardy.

*a holiday home with a woolly hat on !*

In every house the fireplace is not just a source of warmth but also a symbol



The standard of heat insulation here is the same as might be found in any normal family home. Our houses are wind-proof, perfectly insulated and have triple-glazed windows.

A house as weatherproof as this has to have special ventilation devices, so all our rooms contain regulated openings to the outside, protected by pollen-filters. There is a variable vent in the bathroom.





We avoided using PVC-based materials during construction of the holiday homes, especially as we were aware that there were PVC free alternatives readily available for almost all building materials, including underground sewage pipes and green-roof foil, both of which are usually made from PVC. In the bedrooms the floors are covered with traditional linoleum.

### About PVC-free building materials

Pipes made from PP (Poly Propylene) can easily be used for underground sewage pipes, normally made from PVC.

It is not expensive to make these pipes, they are, however, slightly harder to obtain.

Every hardware store has PVC pipes but pipes made from PP have to be especially ordered resulting in a 30-50% price increase for small orders.

If the use of the environmentally damaging PVC was made illegal,

PP pipes would be less expensive - market forces would adjust.

We have gone out of our way to make sure that all other materials have the lowest possible pollutant content. We did not want the therapeutic effect of staying by the sea ruined by our guests breathing in all kinds of solvents and other chemical additives from the building materials.

Clay, a 'modern' building material.

Another unique aspect was our use of very traditional materials: some of the houses have two layers of clay plastering on the inside. The clay plastering is about 2cm deep and regulates the air in the rooms, i.e. it absorbs excessive moisture and releases it when the air becomes too dry, e.g. when the radiators have been turned on. Clay plastering also helps to keep a constant temperature - when the fire is roaring it absorbs some of the heat to release back into the room later at night when all the logs have burnt down.

## Holiday homes

As only some of the houses are built in this unique way, comparisons can be made with the more usual interior wall surface covering Fermacell.



## Community Building

the heart of the village

Just like any other village, a holiday village needs a central focal point. Our community building is at the entrance to Augustenhof in front of all the other houses. This is where the guests are greeted and made to feel at home. The community building contains all that a holiday village needs, i.e. an office, a café, a small health-food shop, places for playing games and reading and also washing machines and tumble dryers.



The health-food shop is a fundamental part of our eco-friendly programme. The majority of our guests prefer buying organic produce and are able to do so in our shop. Other guests can try these products for the first time, even if it is only because it means that they don't have to travel to the nearest supermarket. The fact that even young children can shop here alone has been welcomed as an added child-friendly service.

The community building is one of the first commercially used "passive houses" in this area.

A 'passive' house is a building that is so efficiently insulated that it needs no active heating or cooling system i.e. passive heat sources such as the sun, body warmth, electrical appliances, are sufficient to heat the building.

Our holiday homes are too small to be recognised as "passive" buildings as houses with a base area of 60 square metres fall outside the legislation. Furthermore the sophisticated ventilation system would be too expensive for such a small area. It made sense, however, for the community building (which is as large as your average family home) to attempt to keep within the energy saving laws (less than 15 KWh/sq m yearly energy input).



## Thermal Transmittance Values

The Thermal Transmittance Values (W) of every building component shows how much energy is needed per square metre to maintain a temperature variant of 1 Kelvin. (The lower the value the better the insulation).

holiday houses    community building

### Outer wall

0.185 W/(m<sup>2</sup> × K)    0.123 W/(m<sup>2</sup> × K)

### Roof

0.15 W/(m<sup>2</sup> × K)    0.89 W/(m<sup>2</sup> × K)

### Windows

1.1 W/(m<sup>2</sup> × K)    0.8 W/(m<sup>2</sup> × K)

### Floor

0.30 W/(m<sup>2</sup> × K)    0.126 W/(m<sup>2</sup> × K)



### THZ 303 SOL

The community building energy centre

#### Functions:

- Ventilation of all rooms
- Heating (if necessary)
- Hot water preparation (200 litre storage tank)

#### Production of energy

1. via a cross current flow heat exchanger up to 90% of the warmth from the outgoing air is conferred to the added air.
2. via a heat pump

#### Manufacturer

Tecalor GmbH Holzminden

It was quite difficult to apply the energy consumption formula to a commercially used "passive" house. The number of people occupying the building varies considerably, and even if this has a relatively small impact on daily energy requirements it will take us a year to see how much added energy the house actually needs and whether we have managed to stay within the allotted standard. Yet another area in which the Augustenhof Beach Village is at the cutting edge.

All rooms in the community building except for the kitchen and bathrooms have the same clay plastering as some of the other houses. The two bathrooms are fitted with urine separation toilets (see below).

The main purpose of the community building is for the enjoyment of our guests. However, we also expect to welcome visitors who are "only" interested in the unique features of our village. We are happy to show them around and explain the technical side of it all. This brochure and other more detailed leaflets will provide additional information to complete a visit. These will not be limited to information about new technology but will encompass cultural activities such as films, art and music..

## Community building

### Notes:

The photograph below is of the construction phase:

The clay plaster is held in place by reed mats which have been stapled onto the walls made from slabs of OSB and Fermacell. The red material in the door way is being used to test the wind proofing of the building.



# Local Energy Plant

*a model for small residential estates*

Many people head off on holiday at just that time of year when the sun is at its most intense. Any solar collectors on their roofs will collect a lot of energy in vain. Solar power makes most economic sense at tourist destinations where it is the busiest time of the year.

It was clear right from the planning stage of our holiday village that we would use solar power to heat our water. We would only top up from the grid if and when there was insufficient sunlight or when too many people taking showers emptied the tanks. Using electricity to heat water is admittedly not the best environmentally friendly solution, but the partial use was a big step in the right direction particularly when we compared this to other holiday homes where it would be the only means of heating water.



During a meeting with the Energy Foundation of Schleswig-Holstein, it was suggested that we build one central energy plant for all the 15 buildings which would include a pellet burner next to the planned solar collectors.

## Technical Specifications of the Local Energy Plant:

Surface of solar collectors:  
47.5 sq m

4 storage containers  
with 700-litre capacity each

**Manufacturer:**  
*Tecalor GmbH*

Pellet Stove:  
32 KW

Storage Silo:  
6.2 tonnes

**Manufacturer:**  
*Paradigma  
Energie & Umwelttechnik GmbH & Co KG*



This idea has numerous advantages: the pellet burning stove would use a further source of renewable energy, which meant we could manage without any electricity from the grid. Most holiday villages are not fully booked in spring. This means that, just as the sun is starting to shine more intensely, the central energy plant can send its solar energy directly to where it is needed thus making more effective use of the solar panels.

### Comparative Costings (2001)

#### Alternative 1

Electric Convector

+ Flow heater

Investment 25,000

Running cost 6,000/yr

#### Alternative 2

Solar collectors on every house

+ electric use as needed

Investment 60,000

Running cost 3,000/yr

#### Alternative 3

Energy plant with pellet stove

Investment 110,000

Running cost 2,000/yr

The only problem was that the numbers didn't add up! It turned out that this energy plant was going to be more expensive than our previous plan.

It was suggested that the extra cost, minus energy cost savings for the next 10 years, could be paid for by the Energy Foundation. Such a small system of solar collectors and pellet stoves could be useful in delivering energy not just in holiday villages but also in small residential developments. Nothing like it had ever been built before and thus it lay in the public interest to gain experience of such a system. We were happy to accept the offer.

There are 19 solar collectors on the roofs of the energy plant and the building next to it. The solar power collected is stored in three water cisterns. Once the temperature in the storage tanks is high enough, the water is pumped through a pipe into all 15 holiday homes, where it goes into either another hot water tank or directly into the heating system as needed.

## Local energy plant



If the energy in the three buffer storage tanks is not enough, a fourth one comes on line, heated by the pellet stove.



## Local energy plant

In order to optimise use of any existing solar energy, the warm water from the pellet stove only flows into the top third of the tank. The rest of the water is pre-heated by the water from the three solar tanks via heat exchange. This way we can be sure that the energy from pellet burning is really only used when necessary.



The delivery of pellets into the stove is done by a screw conveyor, which takes the pellets from the bag-silo in the plant to the stove. The silo is refilled by a silo vehicle, making the use of the pellet stove just as easy as any oil heating system.

1 tonne wooden pellets  
are equivalent to 500 litres fuel oil.

They deliver 5,000 kWh  
and cost between 150 and 200.

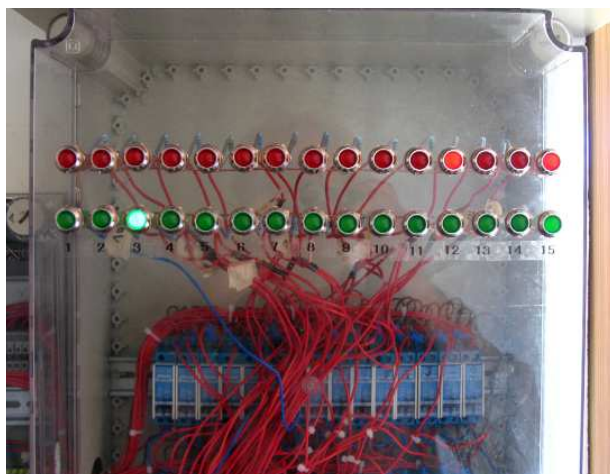
Soon after starting up it became clear that the combination of solar energy and the pellet stove was not working perfectly, but this was no great surprise. Nothing like this had ever been built before. After careful observation of the plant and detailed consultation with the engineers the controls as well as the hydraulics of the system were adjusted.

In the first six months  
we produced 24.6 MWh of energy.  
Of this 18.2 MWh was created through pellets  
and 6.4 MWh by solar energy.



All holiday homes contain individual meters to measure the amount of heat used. We are thus able to account for individual use and look at how much was used in each season and for each building.





## SOLLET Test Sites

### Germany:

Augustenhof Beach Village  
Detached family home in Dormagen  
Detached family home in Köln

### Luxembourg

Church, school and vicarage in Nagem

### Austria

School and dormitory in Tulln

### Sweden

Hotel on Gotland  
Retirement home on Gotland

### Greece

Laboratory and office

[www.sollet.info](http://www.sollet.info)

In November 2004 this careful monitoring was given official scientific support when the local energy plant at the Augustenhof beach village became a demonstration plant for SOLLET ("European network strategy for combined solar and wood pellet heating systems for decentralised applications"), a EU-project. Monitors were placed at every relevant point and connected to a data collector. The data can now be accessed regularly by telephone.

During the first phase of construction in spring 2004 we built 15 holiday homes all of which are connected to the energy plant. A further 15 homes were planned for the village, three of which were built in the winter of 2004/2005. As the capacity of the solar collector/pellet stove system is fully utilized by the 15 original houses, the new buildings have a different heating system:

## Local energy plant

each house has solar collectors (3.5 sq m) and a gas burning system for further heating needs. In order to maximise the use of solar energy, the new houses all have under floor heating, which can use water temperatures as low as 30°. Add this to the energy system in the community building, which receives its warmth from the expelled air, we have three very different heating systems in our village. All systems are measured independently, giving us the opportunity to compare their efficiency. A photovoltaic system in the roof of the community building completes our solar energy programme.



# Urine separation

## a field trial of nitrate circulation



Human urine accounts for 80% of nitrates in domestic sewage. To prevent eutrophication of lakes and rivers it must be treated i.e. to remove nitrates.

### Additional expenses

Construction of a urine separation plant

Installing the urine separation toilets  
1,400 each

#### Manufacturer:

Roediger Vakuum + Haustechnik, Hanau

Two sets of sewage pipes

Building a pumping station  
Ca. 5,000

Building an underground tank with liquid  
level indicator  
Ca. 7,000.

Urine separated out and collected in containers can be used as agricultural fertilizer. In other words, money can be saved during sewage treatment and the energy and money required for the production of agricultural nitrate-based fertilizers are also reduced, thus killing two birds with one stone.

*"Using urine separation we can turn a waste product into an economic asset".*

Prof Ralf Otterpohl,  
TU Hamburg-Harburg

Urine separation makes sense ecologically and economically.

It is only possible in new cities and those countries, where there is no modern system of treatment plants exists and where it could be considered an economic alternative.

To us, the idea seemed very promising for the future and so we investigated the possibility of running at least a field test at the beach village. As it happens, at this very time there was an EU-project just getting under way with an engineering company from Uelzen, working with colleagues in Austria, Italy and the Baltic States. Their plan was to try out innovative sewage systems at tourism facilities and assess their impact scientifically. The idea of urine-separation fitted perfectly into this plan. When the Ministry of the Environment of Schleswig-Holstein announced their interest in paying for part of the experiment, a decision was made:





The Augustenhof beach village became co-opted partner of the SWAMP project (Sustainable Water Management and Wastewater Purification in Tourism Facilities).

We have put separation toilets into five of our holiday homes and our community building. Despite the fact that the toilet seat might move a little bit and the toilet bowl is split into two sections, our guests hardly notice the difference.



## Urine separation

In order to build a urine separation plant a second sewage plant has been installed and a second sewage pump pumps the undiluted urine into two collection tanks, which are filled alternately. It remains to be seen whether this invention will be practical in the long run. For the time being, the urine separation plant at the beach village allows scientists to gather scientifically valid data. For safety we have installed a gate valve on the urine pipe, which we can open if we need to send its contents into the normal sewage system. We might have to do this if the urine tanks are full but have not been collected yet or if the experiment has to be suspended for other reasons.

### Partners in the SWAMP-Project:

- AEE intec,  
Gleisdorf/Austria
- Ökologisches Projekt GmbH,  
Graz/Austria
- Ambiente Italia srl,  
Mailand/Italy
- IRIDA srl,  
Florenz/Italy
- AWA-Ingenieure Dr. Bahlo & Ebeling,  
Uelzen/Germany
- target GmbH  
Hannover/Germany
- Carl Bro Latvia,  
Riga/Latvia
- Sia Aprite,  
Cesis/Latvia
- Water Management Institut,  
Kedainiai/Lithuania



# Pro nature

## *a conflict and possible solution*

A meadow near the coast - the earth is sandy, grey from use as pastureland. If you dig just 30cm down, the sand turns as white as the sand on the beach. This is where skylarks sing, partridges make their nests and lapwings watch hares playing hide and seek. Day and night buzzards and owls are able to find ample prey.



This meadow is where we built our holiday village. We know the issues surrounding this all too well. When diggers destroy the grass, car engines are louder than the chirping of the grasshoppers and children run across the meadow, timid birds will soon vanish and another part of their habitat will be lost.

Tourism is the enemy of nature.

However, without our "interference" this little paradise would have a limited life. EU-subsidies are enabling the meadow to be left in peace, to be enjoyed by an abundance of wildlife. This paradise would vanish as soon as industrial farming started again. Should we let nature choose between a rock and a hard place?

*Man and Nature  
Partners Today and Tomorrow*



The concept of our beach village is to offer a third way, one that can serve both masters, nature and tourism.



Our plan of action:

1.  
We build only as many houses as are absolutely necessary for economic viability to prevent the area from returning to agricultural use. The size of the whole meadow is 15 ha. There is room for several hundred holiday homes; we have decided to build no more than 30 .
2.  
The houses must be in harmony with nature, so we have used untreated and unpainted wood on the exterior. These exterior surfaces will, with time, bleach and become silver grey. All the houses have green roofs and are thus adapted to the surrounding landscape as much as possible.
3.  
There are neither tarmac streets nor brick foot-paths running through the village. What traffic there is, keeps to gravel-grass or sandy paths. Obviously we can't claim that such surfaces are completely natural but at least they haven't destroyed all that was there before. We hope they remain in harmony with the existing paradise.
4.  
Yes, paradise does still exist - on four fifths of the area. This was key to our vision. The 12 ha space that had only survived by the skin of its teeth has now been preserved for the long term.

And there is more:

This area used to be governed by temporary fallowing methods of farming; now it can and will be governed and maintained by conservation principles. The most effective use of the final fifth of the site i.e. the building of the 30 holiday homes ensured the long-term protection of the area. The added value achieved by changing the use of the land offers immediate rewards to environment protection - another part of the beach village concept.

*Tenants at the beach village*  
Marsh warblers, partridge, pheasant, lapwing, skylark, meadow pipit, whinchat, whitethroat, sand martin, buzzard.

The tourists benefit greatly from this "gift" to nature of 120,000 square metres of land as it adds a special attraction to the Augustenhof beach village. There were no losers in the giving of this gift - it was rather a win/win situation.



*We're all in the same boat*

*lets consider the social implications*

The bird-nest swing in the Augustenhof beach village is both a symbol and a toy. The children do not swing on it alone but in a group. They make friends very quickly as do their parents.



The small size of our village is a great advantage to children, as they don't feel lost in the throng and find it easy to get their bearings. There are no dangers lurking in our large car-free area and so parents don't have to worry if their kids get up early to meet their newfound friends, fly their kites in the meadow or play hide and seek in the bushes. When seven-year-old children can go shopping for the very first time on their own they are very proud and their parents are delighted.

Almost all holiday homes have child friendly furniture and there is no extra charge if you request any. For us child-friendly means just that and people with children should not have to pay extra for the privilege.



Another subject close to our hearts is making our village as allergy friendly as possible. Just breathing the fresh sea air alleviates the problems of many allergy sufferers but more can be done. We ensured that our houses were built using as few known allergenic materials as possible. The clay plastering in some houses described above is especially beneficial to people with allergies. The air in those houses is dryer in summer and moister in winter, as the clay plaster always balances the moisture content of the surrounding air. It takes in moisture if there is too much and releases it when the air is too dry. This is an added advantage not just for allergy sufferers.



## We're all in the same boat

Allergy sufferers are very often sensitive to animal hair. Some visitors, on the other hand, may not want to part with their four-legged friends even on holiday. We wanted to be animal friendly and sensitive to the needs of allergy sufferers. The only way to do this was to have some houses dedicated to people holidaying with their pets. Smokers are asked to smoke outside of the buildings, a rule that has worked well up to now.



When the idea of the holiday village was conceived, it was important that we could welcome people with disabilities. Thus one of the houses has wheelchair access. The front door and another door in one of the bedrooms can be used as emergency exits and are fitted with ramps. All doors in the house are extra wide and there is enough space in all rooms (especially the bedroom) to manoeuvre a wheelchair easily. There is a specially adapted bathroom too, making the house named "Singschwan" unique in the village.

Our decision to build a wheelchair friendly house was not without problems. Promoting this one house has proved to be as challenging as promoting the other 14. Disabled people tend to look for holiday destinations in specialist publications. Although advertising in these has been more expensive than we expected, we feel it was a necessary expense. People with special needs are an important part of our community and all our disabled guests to date have only endorsed this view. It goes without saying that the community building is also wheelchair friendly and has a second emergency exit.

*The type C house  
(wheelchair friendly)  
is the largest house in the village  
(60 sq m in accordance with DIN).*

*It has two ramps - one to the front door and  
one to an emergency exit in the bedroom.*

*Room to manoeuvre round all beds 1.20 m,  
around one bed 1.50 m.*

*All doors are wider than 90 cm.  
The bathroom is wheelchair friendly in accordance  
with DIN 18024/25.*



## Planning

### concept

Regina + Adolf Bollmann  
Rellin Hs 15  
D 23777 HERINGSDORF Germany  
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### B-Plan

Konstanze Guhr - Stadtplanung  
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### Nature Preservation Plan

TGP - Maria Julius  
Untertrave 14  
D 23552 LÜBECK Germany  
Tel: + 49 (0) 451 - 79882 - 0

### Building Design

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### Technical Realisation

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### Design of the Surrounding Spaces

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## Construction:

### General contractor

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### Civil Engineering & Roadworks

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### Green Roof

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### Electrical Engineering

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### Clay Plastering

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### Photovoltaics

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## Funding:

Ministry for Agriculture, Environment  
and Rural Areas of Schleswig-Holstein  
Mercatorstr. 3,  
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Funding Programme:  
Eco-Technology/Eco-Economy

Innovationsstiftung Schleswig-Holstein  
(previously Energiestiftung Schleswig-Holstein)  
Lorentzendamm 24  
D 24100 KIEL Germany

European Union  
Dept. Energy, Environment  
and Sustainable Development

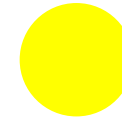
## Scientific Monitoring

### Project SWAMP

AWA Ingenieure Dr. Bahlo & Ebeling  
Gartenstraße 36  
D 29525 UELZEN Germany  
Tel: + 49 (0) 581 30733

### Project SOLLET

Institute for Innovative Energy Systems  
Ulrich Bemmann  
Altenkesslerstr. 17  
D 66115 SaarbrückenGermany  
Tel: + 49 (0) 681 9762 840



# Stranddorf Augustenhof

## Facts & Figures:

### Base area

15 ha = 150,000 sq m

4/5 nature reserve  
= 120,000 sq m

1/5 Beach village  
= 30,000 sq m

### Housing Development

16 Type A holiday homes  
Living Area according to DIN: 43.25 sq m  
Base Area: 54.76 sq m

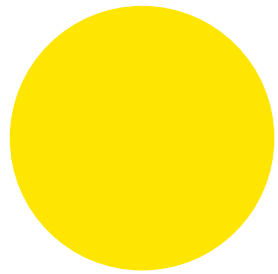
12 Type B holiday homes  
Living Area according to DIN: 52.36 sq m  
Base Area: 65.16 sq m

2 Type C holiday homes  
(wheelchair friendly)  
Living Area according to DIN: 59.15 sq m  
Base Area: 72.41 sq m

### Community Building

Living Area according to DIN: 155.92 sq m  
Base Area: 124.57 sq m





Stranddorf

Augustenhof



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