

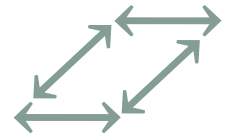
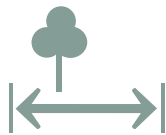
The juwi logo is located in the top right corner of the image. It consists of the word "juwi" in a lowercase, sans-serif font. The letters "j" and "i" are blue, while "u" and "w" are dark blue. The logo is set against a white, rounded square background.

The World's Most Energy Efficient Office Building

juwi Group Headquarters in Wörrstadt

Hub for Visitors – Miracle in Efficiency

With the construction of its headquarters in 2008 through 2010 juwi has set new standards. A sustainable timber construction and the consistent usage of renewable energy elements represent an impressive vision of a complete renewable energy supply. That vision can be put into place in many locations and is already reality – we have shown that in Wörrstadt.



Facts & Figures

Land area

approx. 26,500 sqm

Office space

approx. 17,000 sqm

Dimensions

width: 100 m
depth: 20–30 m
height: 12 m

Number of work places

> 700

Construction

timber frame construction
by Griffner

Statics

timber framework,
reinforced concrete
staircases



The building's architecture and equipment were designed with the goal of using energy as efficiently as possible. Solar electricity produced on a surface of more than 3,000 square meters and economical machines and devices ensure that the building produces more energy than is used. The premises offer a mix of functionality and places for leisure and relaxation.

juwi opened the northern part in July 2008; the southern part opened in July 2010. A wind and solar park built on the compound display the efficiency of the energy production systems. These parks, along with juwi headquarters are main attractions for visitors who quickly realize: Energy is here.



*Construction material
interior
spruce wood*

*Energy concept
self supply:
heating, AC
and electricity*

*Launch
July 2008 through 2010*

Awards

- Clean Tech Media Award 2009
- Environmental Award Rhineland-Palatinate 2009
- German Climate Protection Award 2008

*Construction material
exterior
larch wood*

*Energy demand
about 35 kWh
per sqm*



Relocation to Wörrstadt

The development of solar parks, bio gas plants and wind turbines require committed employees. juwi has become a job motor within the region. With our start in Mainz and Bolanden juwi soon decided to move their headquarters to Wörrstadt. The Austrian company Griffner was responsible for its construction; they have years of experience in creating timber and glass buildings for modern living and office spaces. After a construction period of only six months the first juwi employees moved in. The first section of the building consists of a total of three parts and seven staggered stories offering work places to more than 300 people. The German environmental organization “Deutsche Umwelthilfe” has awarded juwi with the annual German Climate Protection Award in 2008.



Extension 2009

Our innovative building quickly became a magnet for visitors. At the same time the number of employees grew so fast that after only one year we burst at the seams. The middle section of the southern extension—technically and architecturally identical with the first building—has been opened in August 2009. The opening day—after a construction period of only five months—turned into a fair of renewable energies.



No Half Measures

Having created 350 new jobs in 2009, juwi will soon exceed the limit of 1,000 employees. With more than 700 people in Wörrstadt the company is one of the largest employers in the region. Due to that extensive growth the headquarters were expanded again 2010. The southern part of the building was extended to the left and right; constructed by the Austrian company Griffner using an ecological timber method.

- 1) Solar front—south side
- 2) Entrance / reception area
- 3) Bistro for employees
- 4) Soccer field
- 5) Cafeteria with solar front
- 6) Staircase in timber construction
- 7) Bar for visitors
- 8) Fitness room
- 9) Cafeteria overview



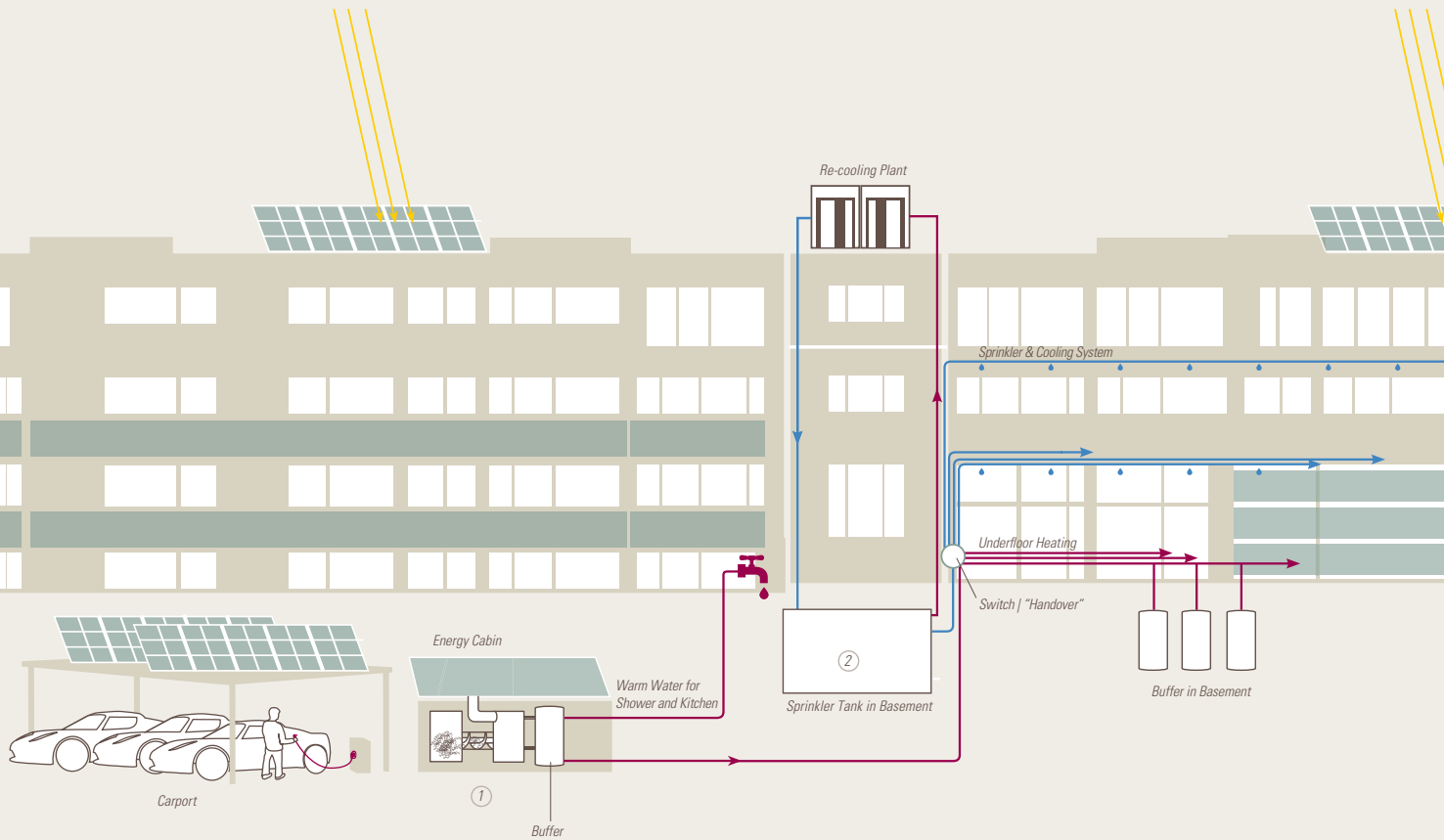
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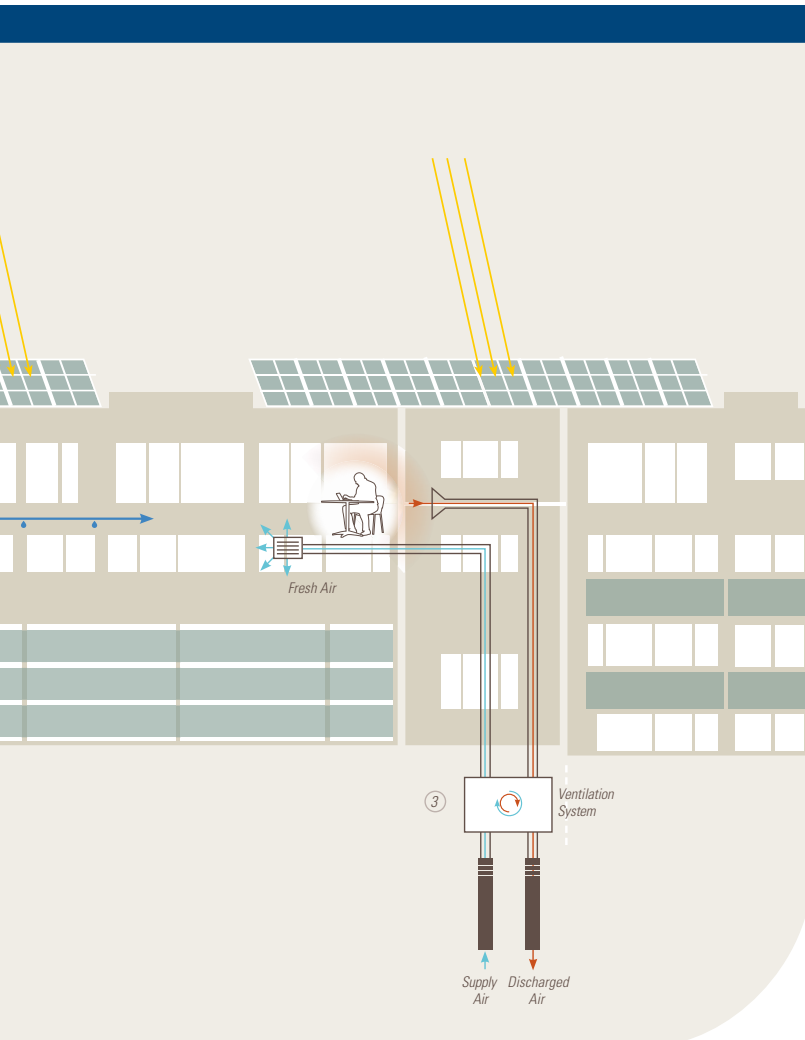
Impressions



1



Building of the Future – Illustration of Energy Cycle



Energy Concept Headquarters

juwi designed an efficient supply system to provide ventilation, heating and cooling – all based on renewable energy sources.

The **energy cabin** (1) supplies the building complex with eco-friendly heat energy. It is produced using CO₂-neutral wood; stored in tanks located in the basement of the northern building part and delivered to the consumers using a system of pipes integrated into the floor.

A **sprinkler tank** (2) which holds 114,000 litres fulfils two functions – it is a substantial component in the systems for fire protection and the cooling of the building. When high outside temperatures occur the water is cooled over night in a re-cooling plant installed on the roof of the building and stored in the tank. During the day a system of pipes integrated in the floor delivers the coolness of the night to the offices. In case of fire the water can also be used by a sprinkler system.

Several **ventilation systems** (3) provide the necessary ventilation of offices and conference rooms. Recycled, warm air flows back and emits the warmth to fresh, incoming air through a **heat exchanger**.



Facts & Figures

(North- and South-Building)

Plant	Manufacturer/Technology	Surface (m ²)	Output (kWp)
Main roof (N)	First solar/Thin-film	635	66
Main front (N)	Sulfurcell/Thin-film	146	10
Cafeteria roof (N)	REC/Crystalline	168	21
Cafeteria front (N)	Solarnova/Crystalline	48	5
Roofing (N)	Solarnova/Crystalline	158	16
Carports	First Solar/Thin-film	922	96
Roof day-care centre	REC/Crystalline	64	9
Front day-care centre	Sulfurcell/Thin-film	15	1
Main roof (S)	First Solar/Thin-film	681	72
Front (S)	Sulfurcell/Thin-film	199	13
Roofing (S)	Ertext-Solar/Thin-film	65	7
Roofing (S)	Solarnova/Crystalline	40	4
Sum		3,141	320

juwi's Headquarters as a Photovoltaic Power Plant

When planning its headquarters juwi placed great importance on a holistic energy system. Solar power plays a central role: Modern photovoltaic modules on a total area of 3,150 square meters transform sunlight into clean energy. Numerous modules and cell technologies can be seen on the roofs, south facades and within the car park. They fit harmoniously into the architecture and the overall concept of the building. Photovoltaic plants installed at the company headquarters cover its complete electrical power requirements. In summer the surplus is fed into the grid, which balances the gaps of coverage in winter. In addition solar electricity can be stored in an innovative backup battery system. There will be more information about this system on the following pages.

The building's roofs are equipped with thin-film modules produced by First Solar; a 138 kilowatt (kWp) plant installed on the roofs with an inclination of five degrees. Thin-film modules produced by Sulfurcell with a total output of 23 kWp are integrated into the south facades of the building. The roof of

the cafeteria carries crystalline solar modules produced by REC, fixed with an inclination of ten degrees and with an output of 21 kWp.

Crystalline solar cells integrated in the three-pane insulation glass of the cafeteria's south front (5 kWp) provide shade and create an unmistakable atmosphere. The special inert gas filling in the insulating glass layer obtains a K-value (heat transition coefficient) of 0.7 – the best isolating solar module glasses at present. All terrace roofs in the upper floors, aligned to the south, are completely covered with glass solar modules (27 kWp). With their integrated crystalline solar cells they guarantee protection against sun and rain and offer shade.

Solar carports, constructed in front of the headquarter building in December 2009, reveal how gas stations of the future may look. On 920 m² they produce 97,000 kilowatt-hours annually. At the same time they protect parking cars against rain and strong sun exposure.



PV modules in south facade



"Sunny Backup System"

Batteries: Just in Case

A "Sunny Backup System" located in the basement of the northern building is connected to the photovoltaic system. If a power failure occurs the battery-supported system developed by SMA Technology AG takes over the energy supply for important consumers such as the emergency lighting, the controlling of the fire sprinkler and the complete computing systems – including the telephone system. In this case the backup system separates the load circuit from the public grid and develops its own isolated network with the help of batteries. Photovoltaic modules feed their energy into the isolated network and supply the in-house consumers; or they charge the battery, whose storage capacity is 4,800 ampere-hours – which is equal to the capacity of 530 car batteries.

In case of a power failure the batteries secure the electrical supply in connection with twelve stand-alone inverters (5 kWp each). The backup system ensures that the battery is constantly optimally loaded and that a minimum charge necessary for the sprinkler system is always available.



Facade modules day-care centre

Depending on sun exposure and consumption the capacity lasts from five hours up to several days. This concept is unique in Germany and was specially certified by the German Technical Inspection Agency (TÜV).

The batteries consisting of lead gel are maintenance-free, have a life span of approximately twelve years and are completely recyclable. In this process lead and sulphur are separated and both elements are reused in new accumulators.

Energy Cabin

Apart from the power supply the headquarters' complete energy needs for heating, cooling and warm water are covered in a 100 per cent regenerative way. Pivot for the heating supply is the energy cabin with a wood pellets heating plant and a solar thermal power plant of 25 square meters. It supplies the entire building complex with climate friendly heat energy. Central elements of the energy cabin are a boiler, in which the natural energy source wood is burned in a CO₂ neutral manner, and a fuel camp with a spiral conveyer where pellets are transported into the basement. Produced heat is stored in the basement of the building's northern part and from there transferred to all consumers.

Heat Insulation

Excellent heat insulation is an important part in the headquarters' energy concept. Windows and walls are insulated so that the building has annual

heating requirements of approximately 10 kWh/m². This corresponds to standards of a passive house; objectives of the current German regulation for energy saving in buildings and building systems (EnEV) are undercut by more than two thirds. This becomes possible by employing ecological building and insulation such as wood, cork and cellulose.

Efficient Ventilation Systems

Besides heat insulation, efficient ventilation systems are of great importance for the headquarters' low energy demand. Equipped with heat exchangers and fine dust filters they provide permanent ventilation. They obtain a heat recovery degree of up to 92 per cent as well as a moisture recovery degree of 65 per cent. There is an additional energy savings effect: the heat exchangers are adjusted to seasonal conditions and replaced by window ventilation as needed. Therefore the electrical power requirement of the plant equates to only 2.5 kWh/m².

- 1) Energy cabin with wood pellets heating plant and solar power plant
2) Inside energy cabin 3) Production of building parts 4) Ventilation system



- 1) Staircase with natural light
- 2) Measuring point for daylight, temperature etc.
- 3) Sprinkler tank 4) Re-cooling

Energy-Efficient Construction

Using Natural Light

Using natural daylight in a building reduces the overall power consumption. In juwi's headquarters there is a mix of large roof-lights, glass doors and wide office windows. As important is an optimal interaction of natural and artificial light. The starting point is a daylight measuring head on the roof of the northern building tract. Using photovoltaic cells it captures the sun's direction. A central building control system seizes data and guarantees for an optimal and glare-free light quality. This ensures that daylight is used in the best possible way and if necessary is supplemented by artificial light. Additionally to the central control each employee is able to adapt the light situation according to individual needs. Automatic on-off switches result in energy savings of more than 70 per cent in comparison to conventional lighting systems.

Intelligent Control Technique

The "brain" of the company headquarters is a complex central building control system. Computers permanently observe and steer the output and consumption of devices and machines. Information is supplied by more than 20,000 sensors (data points), which are placed everywhere in the buildings. The technology adjusts automatical ventilation systems, warm water circulation, swaying of the shutters, heating and cooling system and the lighting control. juwi's headquarters are an example for energy efficiency in daily office life.

Fire Protection and Room Air

Working should also be a pleasure in high-summer temperatures for juwi employees. Instead of air conditioning water is circulating between a steel tank (placed in the basement of the northern building and accommodating 114,000 litres), a re-cooling plant on the building roof and an integrated piping system in the floor. Cold temperatures are absorbed during the night by the re-cooling plant and stored in the tank. During the day cooling is pumped into the offices. This reduces the temperatures by approximately five degrees. With only one kilowatt-hour per square meter the energy requirement is very small. In addition shutters on the south sided windows shadow the building in such a way that the heat entry in the summer and thus the cooling requirement remains at its minimum. The water can also be used by a sprinkler system, in case of fire. Equipped with 2,500 sprinkler heads this system is able to reach every corner of the two buildings. There is only one store for pressure, which is not used for the floor cooling.





Energy-efficient offices



Energy-efficient kitchen equipment

Energy-Efficient Equipment

By using extremely efficient equipment juwi has been able to reduce the consumption of heat and electricity to a minimum.

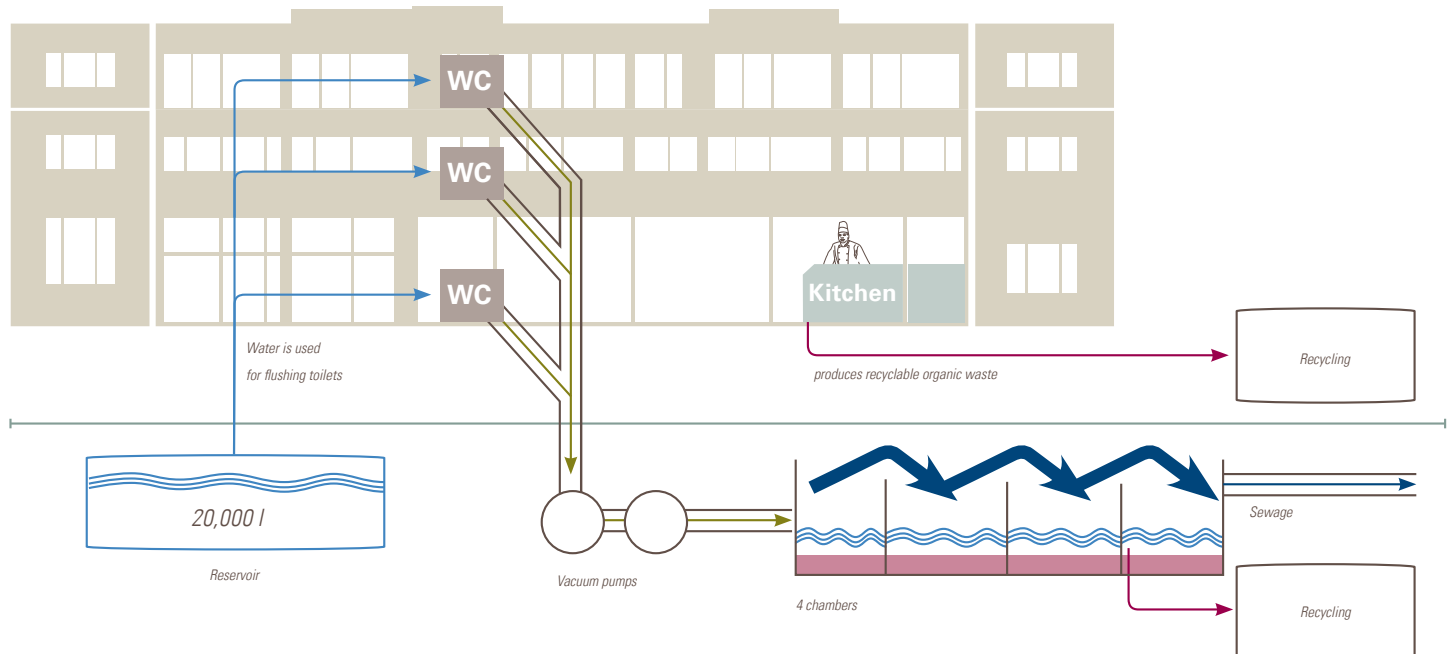
- Energy optimized computing equipment (laptops and flat screens instead of PCs)
- Lighting with a power requirement of less than eight W per m²
- Optimized use of kitchen utilities—50 times less electricity usage
- Only one lift per building
- Exhaust hood with heat recovery
- Cookers equipped with so called blue burners, which are able to work with bio fuel
- Fitness equipment without utilization of power
- No fridges, no dishwashers on every floor



Sustainable Water Cycle

Energy-efficient water usage and recycling systems are also part of juwi's concept. Rain is collected in a cistern to be used for toilets. Our modern vacuum toilets need only one litre per flushing compared to the usual eight litres used by conventional ones.

Four vacuum pumps are drawing the sewage to a complex with four chambers where the water is separated before it flows into the canalisation. Together with organic kitchen waste, faecal matter is put to further use.



Motivation and Regeneration

It is juwi's philosophy that all employees enjoy working and have the opportunity to relax at any time. The headquarters offers not only a perfect atmosphere for concentrated working, creativity, communication and teamwork, but also numerous possibilities and free spaces for relaxation.



The cafeteria is the centre of this philosophy. Built completely from natural material, the 464 square meters large hall is cafeteria and room for events at the same time. Meetings and larger customer events take place here as well as lectures and introduction days.

The generous exterior installations with terrace, sidewalks, benches, barbecue area and pond, as well as the football and the beach volleyball field immediately catch your eye. All this is very popular with the employees – just

like the different health courses and the fitness studio accommodated in the basement of the northern building. Another large value in the concept of Work-Life-Balance is an in-house day-care centre called “juwelchen”.

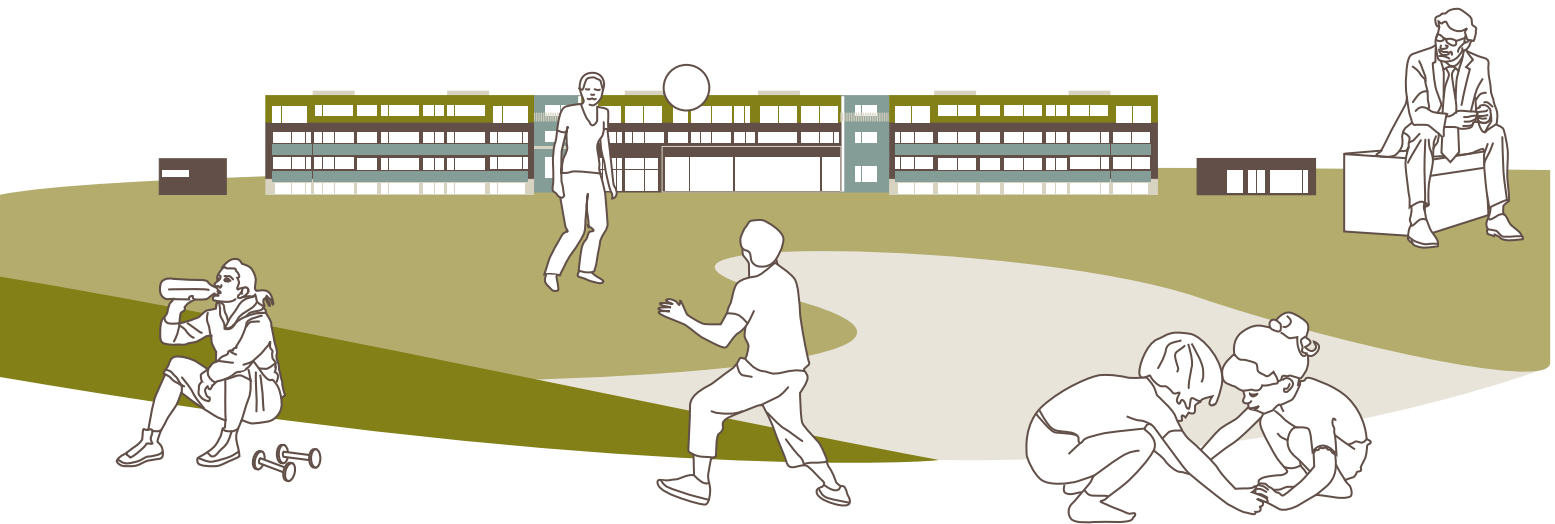
Here the youngest juwis are setting the tone. There is place for 25 children in the two-story, barrier free building, who discover the world while mum and dad are working in a building next door.



Day-care centre "juwelchen"



Chapel "Oasis"



The day-care centre is based on an open pedagogical concept and offers day-care for children from zero to six. The generous hours of operation (7.45 am to 6 pm) help to create family-friendly structures and allow parents an easy re-entry into working life. Due to high registration numbers, juwi plans an extension of the centre only one year after the initial opening.

A chapel, the "Oasis", is based between the northern building and the car park. All employees have the possibility to relax and to gather strength for

coming tasks. The "Oasis" – equipped with a colormagnificent sacral glass structure designed by Eberhard Münch – offers also a location for the regular meetings of the juwi choir. Musical talents are welcome to participate here as well as in the juwi band.

Besides using renewable energies for the generation of power and heat, a CO₂ neutral mobility concept is as important in achieving a complete regenerative energy supply. The juwi group supports this goal already with innovative concepts, outlined in Wörrstadt.





Mobility Concept

A shuttle bus system and an on-line tool for car sharing are first components of a mobility concept for juwi. Driving together in one car instead of travelling alone, many employees reduce their amount of CO₂ emission – and costs.

Currently juwi is carrying out a field test with electric cars, scooters and bicycles (Pedelecs) in a project subsidized by the Federal Ministry of Transport. The intention is to examine the user acceptance of these means of transport and to increase the number of electric vehicles in the company-owned car pool.



Solar Carport

For the transition to the electric mobility of the future an infrastructure is needed that allows a reliable supply with renewably produced energy. In a first step juwi offers a roofing of parking lots with solar carports, exemplified at juwi's headquarters in Wörrstadt. In a further step it is planned to develop and operate a pilot plant for the usage of solar powered parking lots with innovative charging stations.

Solar carports established in December 2008 demonstrate how the solar charging station of the future may appear. With 920 sqm the plant has an output of 97,000 kWh. At the same time it is protecting cars against sun and rain.

Clean Energy & Mobility Centre

With the opening of the Clean Energy & Mobility Centre adjacent to our company headquarters in Wörrstadt we give business partners, customers and visitors the opportunity to become familiar with technologies of electric mobility. We present different electric vehicles – from scooters to Tesla sports cars on 250 square meters.

Likewise we show components of a solar infrastructure such as charging stations and solar carports.

Renewable Energies at Your Fingertips

The vision of further development of renewable energies is a sizable reality in many regions today. You can see that in direct proximity to our company headquarters, juwi has found ideal locations for outstanding reference projects.

Reference Projects near juwi's Headquarters



Solar Park Wörrstadt

The solar park Wörrstadt in the south of the company headquarters has started with an output of 5.6 megawatts in 2008. With the support of the local municipality it was possible to get official approvals in record time. On an area of 15 hectares more than 75,000 photovoltaic modules produced by First Solar generate 5.5 million kWh per year—enough electricity for approximately 1,700 households.



Wind Farm Wörrstadt

Five wind turbines designed by Enercon are in place since December 2009 in juwi's wind park in Wörrstadt. The gearless 2 megawatt turbines produce annually approximately 30 million kilowatt-hours. That corresponds to a third of the yearly consumption of all private households and businesses in the municipality of Wörrstadt. Energy production in this dimension is made possible by majestic turbines with hub heights of 138 meters and rotor diameters of 82 meters.

100 Per Cent Renewable Energies in Wörrstadt

Wörrstadt has earned regional fame due to the location of juwi's headquarters and the energy projects. They are popular destinations for visitors; the media pay great attention to the construction and operation of the buildings. In a next step juwi plans a bioenergy facility in Wörrstadt. Wörrstadt plans to cover 100 per cent of its energy needs with regenerative power by 2017. The municipality is following the example of Morbach, where juwi has realized the "Energy Landscape Morbach" which is providing 100 per cent clean energy.



juwi at a Glance

Since 1996, we have been developing, planning, financing and operating plants and systems that use regenerative energies – wind, solar and bioenergy.

→ The juwi Value Creation Chain



juwi is your partner during every phase of project development.

Company History

- 1996** · juwi is founded by Fred Jung and Matthias Willenbacher
· Construction of the first wind turbine in Germany
- 1999** · Entry into the photovoltaic (PV) sector
- 2001** · Entry into the bio energy sector
- 2002** · Start of international activities in North and South America
- 2003** · Founding of pfalzwind GmbH together with Pfalzwerke AG
- 2004** · Commissioning of our first wind farm in France
· Commissioning of our first biogas power plant
- 2005** · Start of international activities in Spain and the Czech Republic
- 2006** · Start of business activities in Italy
- 2007** · Construction of wood pellet factory in Morbach (Hunsrück, Germany)
· Construction of the world's largest PV plant of its time in Brandis, Germany (40 MW)
- 2008** · Start of international activities in Greece
· Start of construction of 50 MW wind farm in Costa Rica
· Establishment of new company headquarters in Wörrstadt (Rhine-Hesse, Germany)
- 2009** · Agreements are signed for the construction of large wind farms and solar parks in the USA
· Founding of a company for producing a nutrient-rich humus substrate (Terra Preta)
· Construction of Germany's largest solar park (53 MW) near Cottbus (model project for the renaturation of military areas)
· Expansion of company headquarters in Wörrstadt
· Entry into geothermal and hydropower business areas
- 2010** · Start of construction of solar off-grid systems in Senegal
· Start of direct marketing of wind energy

Growth – employees:

2000: approx. 30
2005: approx. 100
2010: approx. 1,000

Growth – annual turnover:

2000: approx. EUR 40 million
2005: approx. EUR 90 million
2010: approx. EUR 900 million

Wind Energy

Selected reference projects

Wind farm Flat Water (Nebraska, USA)*	40 turbines	60 MW
Guanacaste wind farm (Costa Rica)	55 turbines	49.5 MW
Rhine-Hesse-Palatinate wind farm (Germany)	28 turbines	33 MW
Morbach Energy Landscape (Germany)	14 turbines	28 MW
Plouguin wind farm (France)	7 turbines	14 MW



Guanacaste | Costa Rica

- Number of wind turbines worldwide > 400
- Installed capacity > 500 MW
- Investment volume approx. EUR 1 billion

Solar Energy

Selected reference projects

Lieberose solar park (Germany)	53 MW	free-field
Waldpolenz solar park (Germany)	40 MW	free-field
Blue Wing San Antonio (Texas, USA)	16.6 MW	free-field
Rapale (Corsica, France)	7.7 MW	free-field
Muggensturm (Germany)	1.8 MW	rooftop
Pro-soccer Stadium Verona (Italy)	999 kW	rooftop



Lieberose solar park | Germany

- Number of systems worldwide > 1,300
- Installed capacity > 500 MW
- Investment volume approx. EUR 1.5 billion

Bio Energy

Selected reference projects

Lindenhof (Germany)	biogas plant	elec. capacity approx. 200 kW
Morbach	biogas plant	elec. capacity approx. 500 kW
Energy Landscape	wood pellet factory production / year approx. 20,000 t	heating plant (wood) therm. capacity 740 kWp
juwi headquarters	energy cabin	solar collectors approx. 25 m ² pellet heating 70–244 kW



Morbach Energy Landscape | Germany

- Number of systems: 4 biogas plants | 1 pellet production factory | 1 energy cabin
- Installed capacity 1,570 kW_{el.} | 1,973 kW_{th.}
- Investment volume approx. EUR 20 million

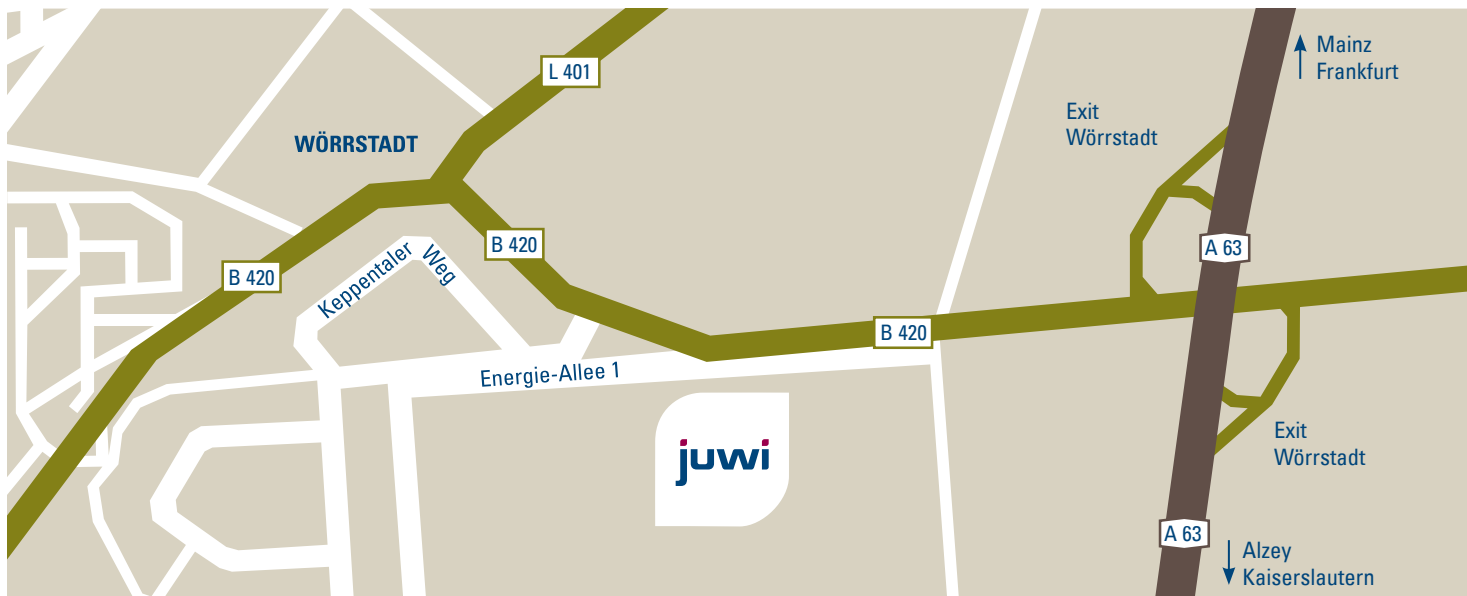
* under construction

juwi Welcomes You to the World's Most Energy-Efficient Office Building. Your Way to juwi:

Coming from Mainz / Frankfurt, take A63 towards Kaiserslautern at the motorway junction Mainz-Süd. At exit 6 "Wörrstadt / Oppenheim / Nierstein" leave the motorway, make it to the right and take B420 towards Wörrstadt.

Coming from Worms or Koblenz, take A63 towards Mainz / Frankfurt at the motorway junction Alzey. At exit 6 "Wörrstadt / Oppenheim / Nierstein" leave the motorway, make it to the left and take B420 towards Wörrstadt.

After leaving the motorway and entering B420 towards Wörrstadt, take the 1st left leading into the business park. Parking space is provided onsite, direct in front of the company's headquarter. In case that "Energie-Allee" is not known to your navigation system, please use "Schornsheimer Chaussee".



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