PLUS ENERGY BUSINESS BUILDING KOBRA

Protim Ržišnik Perc
ARCHITECTS AND ENGINEERS

KOBRA

Efficient use of energy and renewable sources of energy in buildings

AWARD WINNER 2013

Finance
energy efficiency award organizer

Building ID and project team

PLUS ENERGY BUSINESS BUILDING KOBRA

KOBRA

ground plan dimensions: **33,0 x 31,7 m**
height: **8,8 m**
GBA: **1.300 m²**
year of construction: **2011**
investor: **Kobra Team d.o.o.**
location: **Šentjernej, Slovenia**

PROTIM RŽIŠNIK PERC ARCHITECTS AND ENGINEERS - PROJECT TEAM:

author of architecture: **Andrej Ržišnik, BS Arch**
responsible designer: **Petra Spaić, BS Arch**
architect/associate: **Aleš Hajnrihar, BS Arch**
interior design: **Andrej Ržišnik, BS Arch**
building physics: **Aleš Hajnrihar, BS Arch**
sound isolation: **Aleš Hajnrihar, BS Arch**
structure design: **Robert Premrov, BSCE**
HVAC: **Bojan Mehle, BSME, Andrej Pureber, BSME**
electrical installations: **mag. Gregor Bavdaž, MSEE**

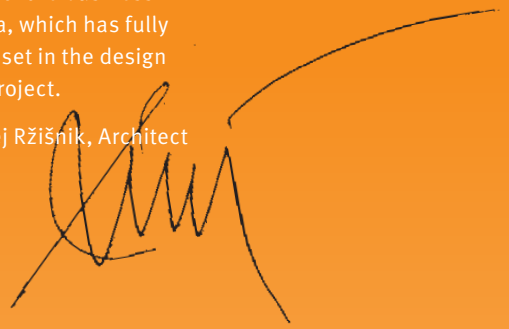
EXTERNAL EXPERTS:

fire safety: **mag. Aleš Drnovšek, BSEE**
environmental impact assessment: **Alenka Markun, BS Chem**
photovoltaic power plant: **David Furlan, Electrician**

introductory words

On this occasion I would most of all like to point out that we were given an extraordinary opportunity to cooperate with an investor, which has deliberately opted for sustainable development with emphasis on energy efficiency and a good measure of green building principles. Mr Kovačič has allowed us free hands with the architectural design while clearly setting the investment frame and economical criteria for used technical solutions. From the very start it has been a challenge to follow his ambitions and upgrade them. Through cooperation this ambitions have become mutual. To this day we are regularly exchanging experiences and findings on the operation of the business building Kobra, which has fully met the goals set in the design stage of the project.

Andrej Ržišnik, Architect

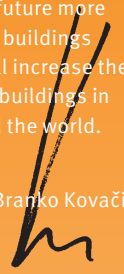


word of the investor

After 31 years of Kobra's activity on the market we have attained a modern industrial zone in Šentjernej. It has inspired us to undertake a construction of a contemporary business building, which is to pride to us, the municipality and to many of the contractors. With the help of the architects, our own interest and knowledge of the up-to-date technology as well as a good team of contactors, we have managed to build a contemporary plus energy business building, which is exploiting almost all natural energy sources. Apart from low heating, cooling and maintenance costs the building is enabling conditions for quality of living, better feeling and productivity of employees, furthermore the architecture and implemented technology will serve as examples to other potential investors. Unfortunately only a few such buildings exit, mainly due to the fact that there are no set norms for used complex solutions as well as no set government subsidies for such construction. To my opinion we have clearly proved that all the up-to-date technology can be used in one place, with the results showing in the near future. A supervisory control system will enable us to publish the results and according to need change the parameters to achieve higher energy efficiency. For such an approach the investor needs knowledge, courage and joy towards technology and not just a brief return on investment calculation.

We hope that in the future more of similar and better buildings will follow, which will increase the energy efficiency of buildings in Slovenia and around the world.

Branko Kovačič




KUBRA

use of renewable energy

About HVAC

We live in the times of great climate changes, which affect our environment in a negative way.

It is a fact that we need to adapt to this changes, reduce them and prevent them if possible.

Based on this findings the investor made a choice to undertake the construction of business building in the Šentjernej industrial zone. He combined the data, design and knowledge of newest technologies with great emphasis on ecology.

The investor's basic principle was to use as many renewable energy sources as possible. Of those the solutions on the building use mainly the advantages of geothermal and solar energy. All renewable energy sources are hydraulically interlinked through a reversible heat pump, which in addition to heating the building and its sanitary water also enables passive and active cooling of the building.

In addition to thermal comfort an adequate temperature of floors, ceiling, walls, sufficient air flow and relative humidity must be assured for in business premises. With that goal all rooms are equipped with a floor heating system. In the summer time cooled water is circling the system, which contributes significantly to more comfortable living conditions.

Fresh air is entering through a common ventilator and travels through a heat exchanger with parallel pipelines. On the way to the building and its central ventilation device the air is partially heated during the winter and partially cooled during the summer. It is then additionally filtered and thermally processed in the ventilation device with a highly efficient recovery, heating and cooling unit.

Near the building a underground rain water reservoir is in place, which is substituting the flush water in toilettes.

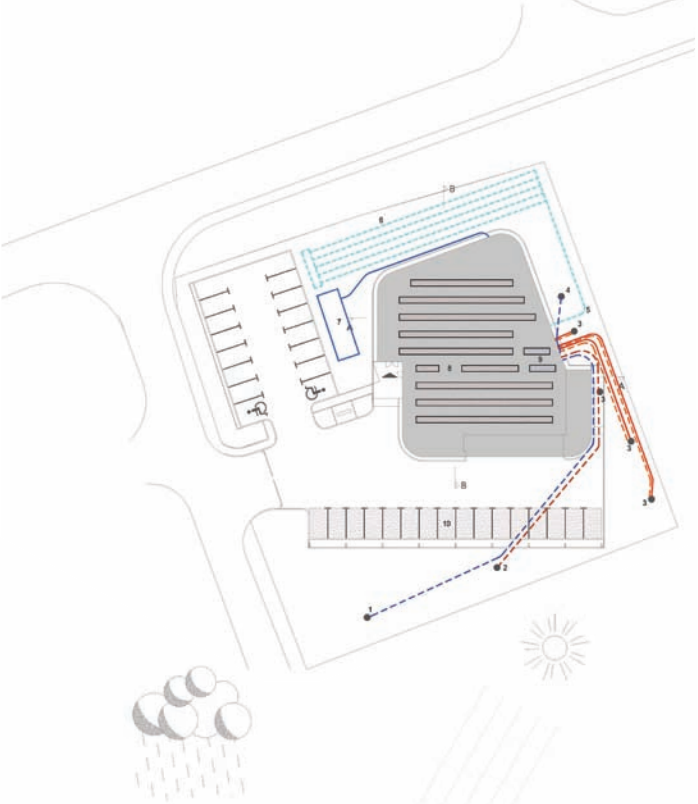
All named interlinked technical parameters are combined in a complete system solution for heating, cooling and ventilation of the business building with a goal of minimizing the consumption of energy.

Alongside Protim Ržišnik Perc d.o.o the HVAC design and solutions were upgraded by Revis d.o.o., contractor on the project. The basic goal for the building was met: **to ensure efficient use of energy with inclusion of as many renewable energy sources as possible.**

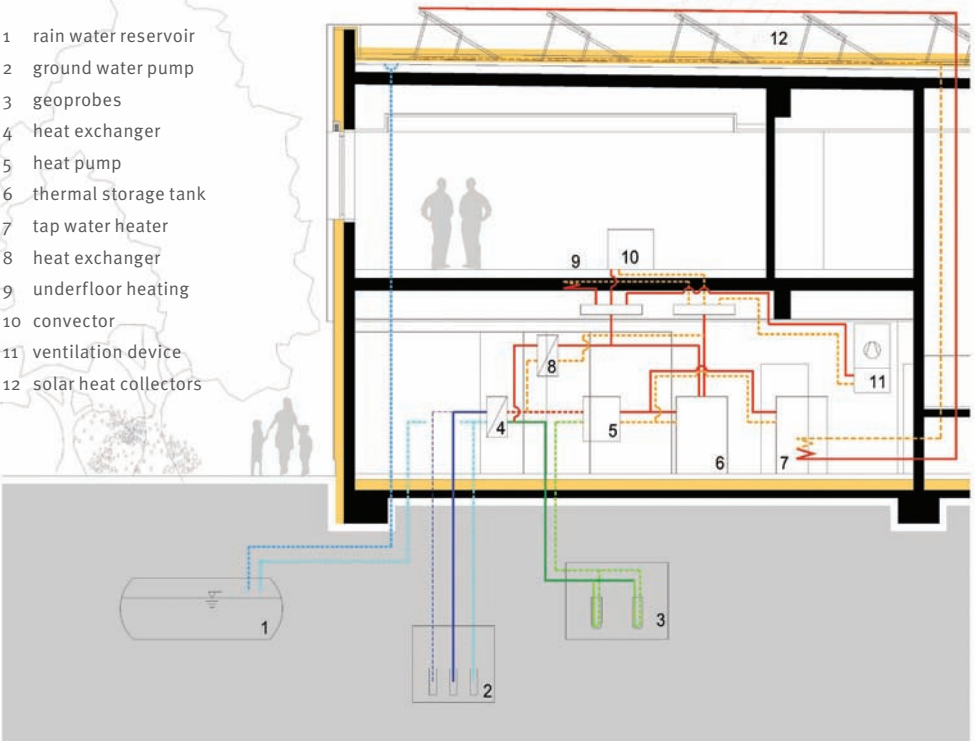
Bojan Mehle, BSME

sources

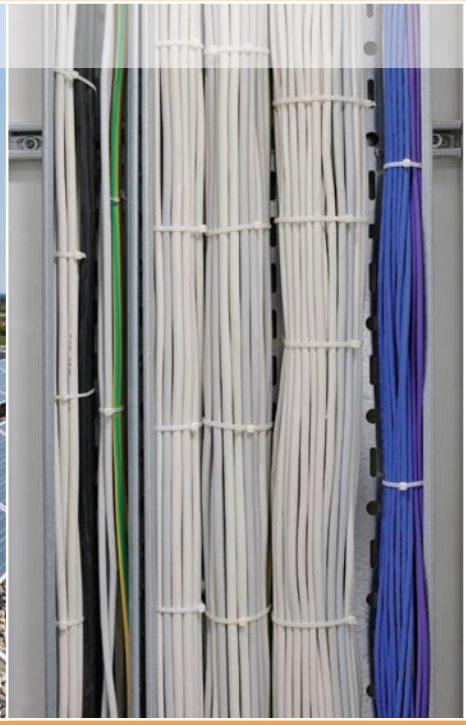
1 water bore - 2 m^3/h
2 back-up water bore - 0,5 m^3/h
3 geoprobe - 100 m
4 water sinking probe - 8 m
5 heat exchanger distributor DN500
6 heat exchanger DN315 (6 x)
7 entrenched rain water reservoir with a hydrophore station; vol. =40 m^3
8 photovoltaic modules - electricity
9 solar heat collectors - water
10 integrated photovoltaic modules - electricity



1 rain water reservoir
2 ground water pump
3 geoprobes
4 heat exchanger
5 heat pump
6 thermal storage tank
7 tap water heater
8 heat exchanger
9 underfloor heating
10 convector
11 ventilation device
12 solar heat collectors



About electrical installations



Up-to-date IT systems have become an indispensable part of our lives lately as we can no longer imagine operating without internet. They affect our daily routine and thus our living habits.

Contemporary buildings are getting more intelligent and safe, regularly including technical solutions with goals to:

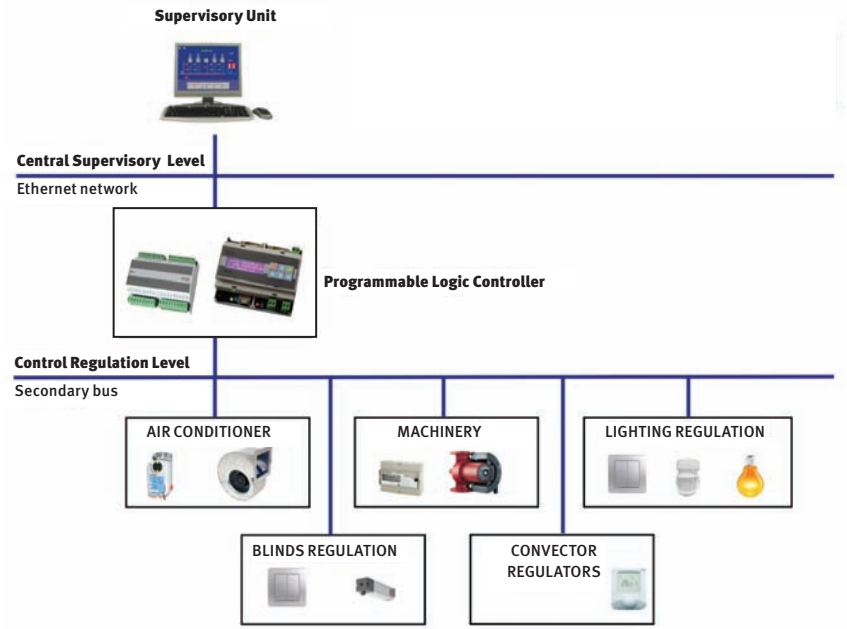
- save on energy, enhance the living comfort by ensuring an adequate climate,
- increase safety,
- simplify facility management,
- ensure adequate communication with the outer world and
- produce own electrical energy.

Example of such construction is the business building Kobra, where all of the above goals were met, therefore the building can be placed in a group of intelligent and energy efficient buildings.

By implementing a photovoltaic power plant on the roof and the car parking canopy the building is producing its own electrical energy, therefore the building can be deemed environment friendly.

cient building

SCADA Topology



During the electrical installation design phase we faced the challenge how to connect:

- lighting regulation,
- detection and reporting of fire,
- technical surveillance and
- HVAC,

into an operational system, which can be easily managed.

To reach the above goal we used a number of innovative technical solutions and implemented a central supervisory system (SCADA), which represents »the brain« of the building. Shown on the above scheme is the SCADA topology, presenting main components of the supervisory system, such as the programmable logic controller and the supervisory unit.

To successfully complete the project a number of experts were involved:

- Protim Ržišnik Perc d.o.o. for electrical installation design,
- Utrip d.o.o. for implementation of electrical installations,
- Kovintrade d.o.o. for implementation of the SCADA system,
- Reteh d.o.o. for implementation of the photovoltaic power plant.

Gregor Bavdaž, MSEE

functionality hand-in-

Concept design of the building

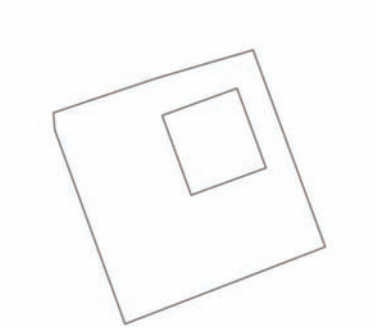
The complexity of the project, complying all solutions alongside functionality to sustainable development, was calling for integral design and intensive interdisciplinary cooperation of the project team and the investor already in the phase of concept design.

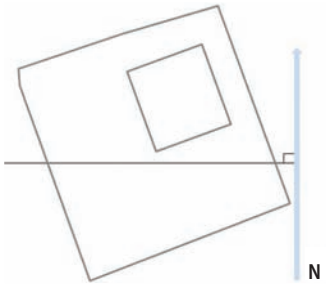
The low energy consumption principles have influenced the placement of the building on the construction plot and the strict orientation of the southern facade. The shape of the ground plan is therefore an implication of the defined construction line and the orientation of the southern facade.

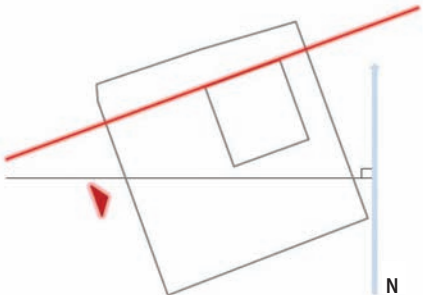
Based on the needs for usable space and consequentially the number of floors the volume of the building was designed compact to ensure the smallest possible surface of the wrap.

Rounded corners ensure lower transmission loss than the rectangular ones, at the same time they are co-creating the architectural character of the building. Indent of the basic ground plan shape clearly marks the main entrance. The deliberate vertical division of the facade to a horizontal ground floor pedestal and an accentuated upper floor is the implication of a modest wrap dynamic.

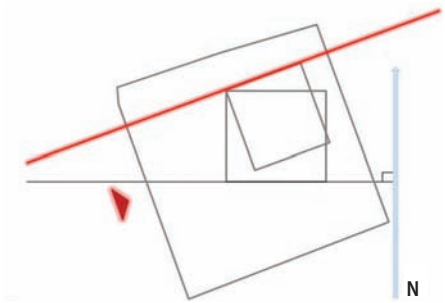
The facade design articulates the public function of the ground floor and the business intended use of the upper floor.

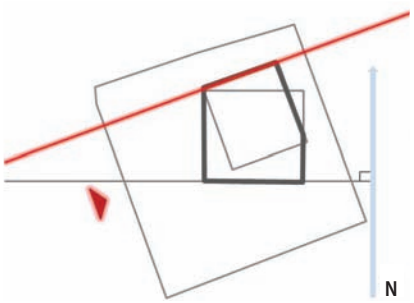




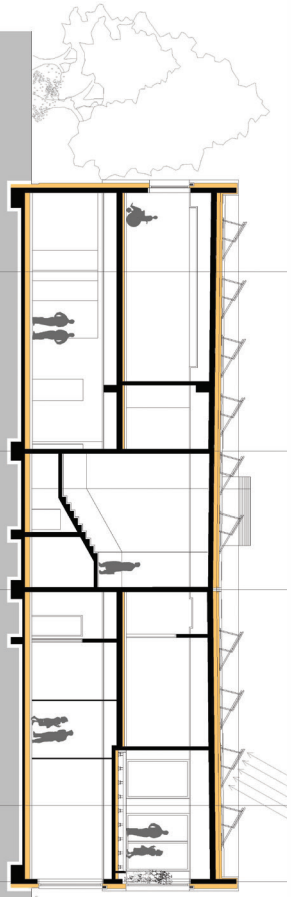


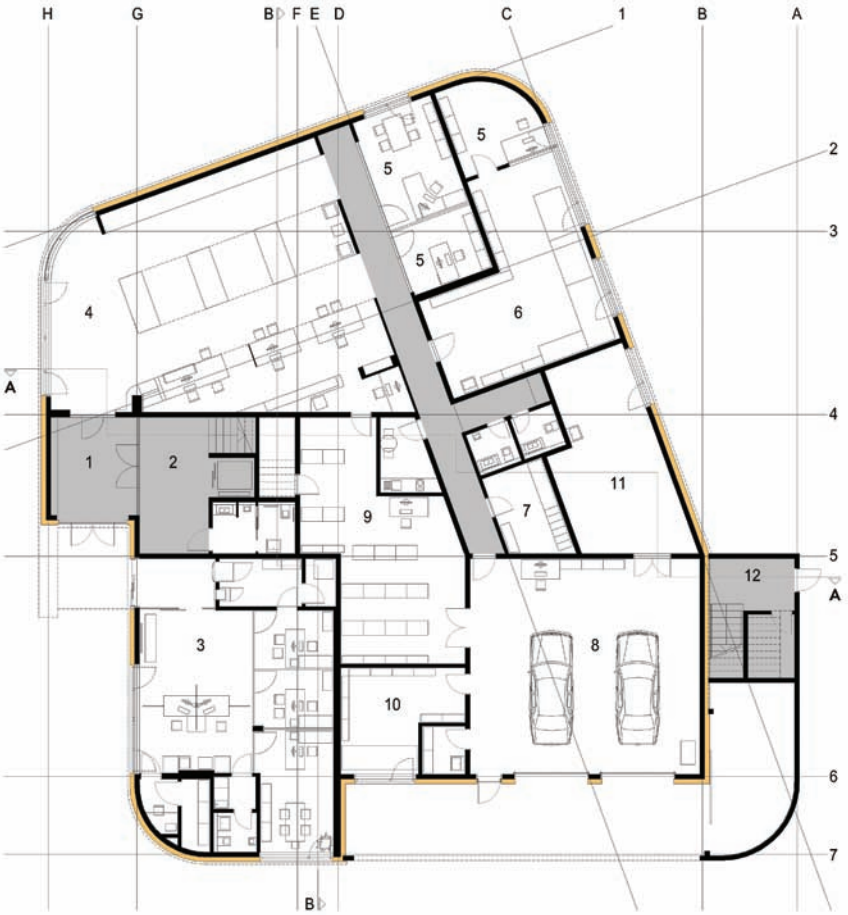
hand with sustainability





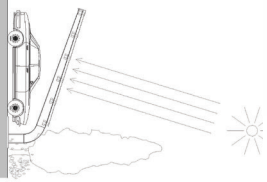
integral design

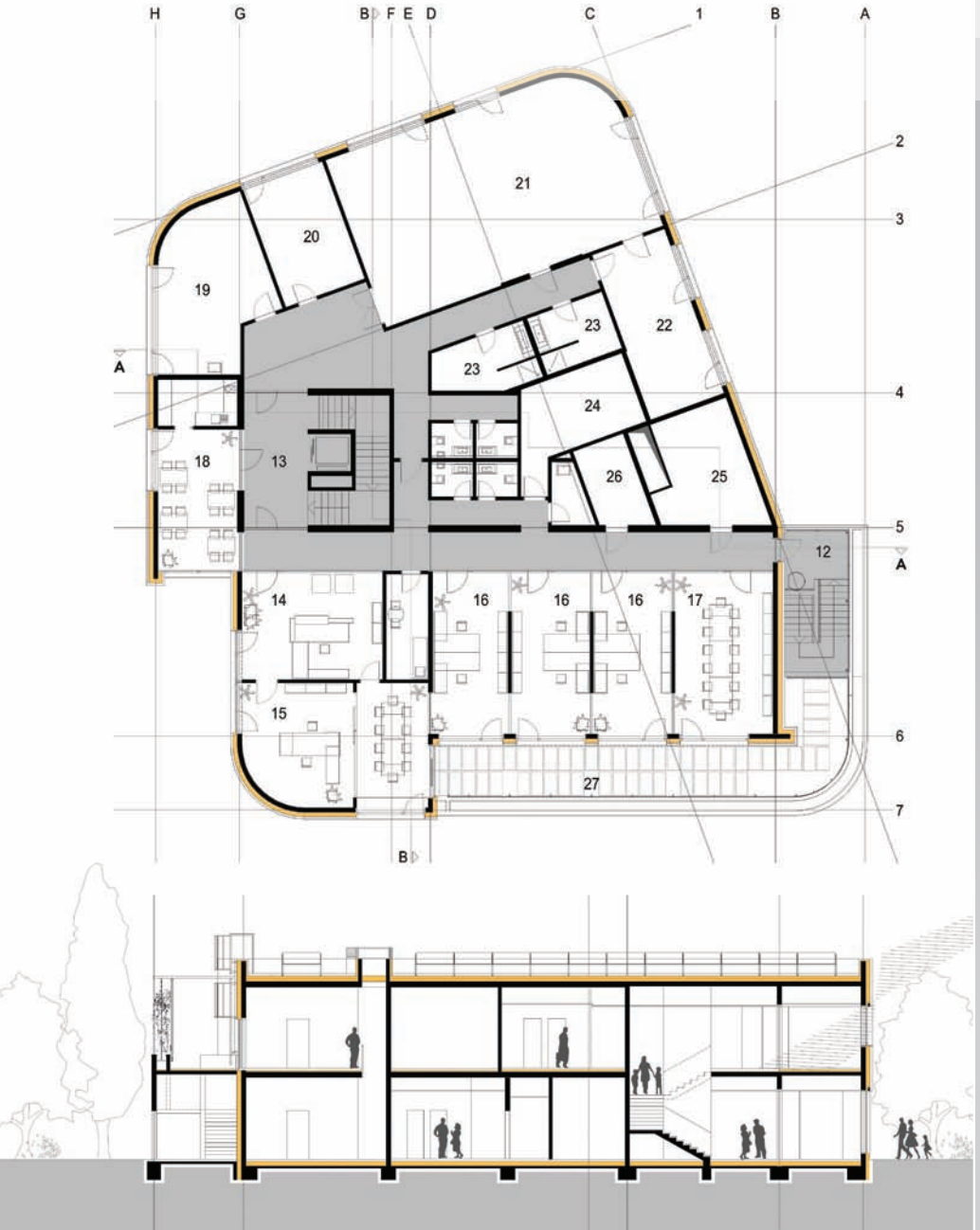




1 vestibule
2 staircase
3 bank branch
4 show room
5 office
6 service room
7 wardrobe
8 work shop
9 storage
10 storage
11 engine room
12 external staircase
13 staircase
14 reception
15 director's office
16 office
17 conference room
18 social room
19 office
20 office
21 multifunctional room
22 auxiliary room
23 wardrobe
24 archive
25 technical room
26 IT room
27 terrace

N





The planning process followed the principles of integral design, which is our common practice with demanding projects. Designers from all fields of expertise exercise day-to-day harmonization and cooperate closely with the investor, end users as well as potential technical solution providers and contractors. Already in the phase of concept design, which is in the process of integral design more comprehensive and time consuming, all functional details, technical solutions, key construction principles and material are determined as well as the specific and detailed investment frame set. The investment frame was set based also on the comparable assessment of life-cycle costs for the building and built-in devices (LCA and LCCA principles).

By including designers in the process the construction of the business building Kobra has followed the design solutions to the point.

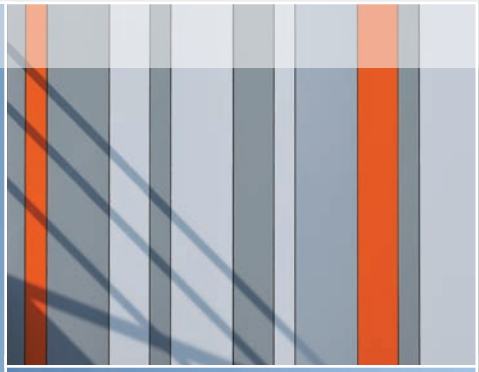
The set investment value was thus influenced only by the conditions on the market and was in the end effect a few per cent lower than the initial estimation.

Work of the project team and the investor was not concluded with the start of use, almost immediately the energy and technical operation monitoring of the building began. As expected the settings of devices were optimized within a year of use, from that point on the building is running automatically.

clearly voiced character

Architecture

of the building



Although the principles of sustainable development were the priority, the character of the building is clearly voiced. The building is distinguishable, on the first glance different and it expresses a sense of inner values. Contributing to this effect is the choice of quality and sustainable materials as well as perfection in implementation of a single detail. Nonetheless, the building remains simple and functional.

Our team of architects paid a lot of attention to the airtight wrap of the building, all potential thermal bridges at the foundation, facade and roof were handled. Structure wise is the terrace alongside offices on the upper floor the only separate external part of the building, the are no other stand-out elements.

External units of technical devices were not an issue for the architectural design, also due to the fact that the investor agreed to a costlier solution of placing all the HVAC equipment inside the building.

We have integrated the photovoltaic power plant as a cover to the car parking canopy.

green areas concept

Horticultural arrangement

At an early stage of the project we introduced elements of bio climatic construction with horticultural arrangements around the building and in the planters on the terrace. In addition to providing extra shading of the southern facade intensive planting also allows a more friendly climate.

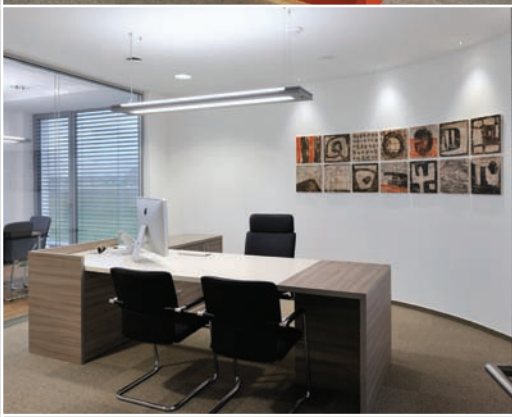
Exterior of the building is designed in the same spirit as the building itself - with simple, elegant solutions that meet their function and to achieve the effect require only routine maintenance. The arrangement covers the basic lawn surface and includes stand out shrubs, ornamental trees, wild hedgerow and a long flower bed, which reflects the shape of the building. The flower bed leading towards the main entrance is more complex: in the central gravel part a bench is placed, surrounded by beds planted with cover plants and a stand out round shaped box plant.

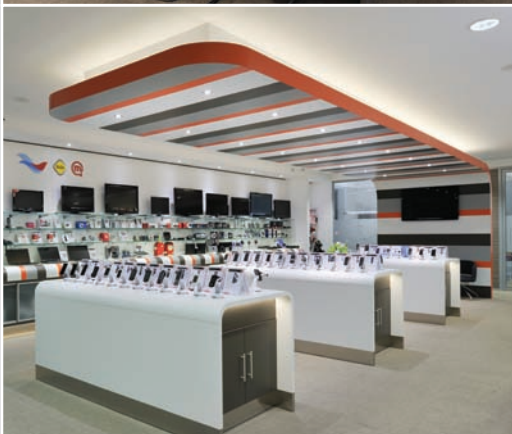
functional and creative

Interior design

Offices in the business building Kobra are designed in a dynamic and functional way, especially in a way that the interior design brings the user of a single working station closer to a creative and relaxed working environment.

All equipment is designed in a modern and user-friendly way. The freshness of colour selection and brightness of the rooms is the red thread of interior design. Transparency and bold use of colours and highlights form an interesting and according to users a positive and stimulating working environment. We have not only designed the equipment, but also developed and implemented it with our subcontractors.





working environment

energy management of

Production/use of electrical energy in 2012

The year 2012 was the first full year of operation for the business building Kobra. During the year a familiarization with the building and its system took place. **The search for optimum operational settings** was of key importance, a process that is and will remain on-going.

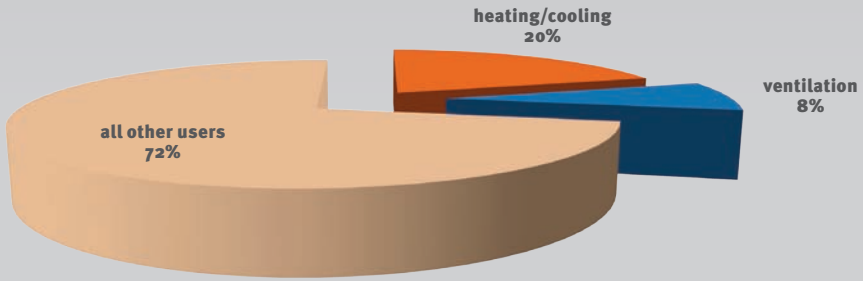
By **monitoring the building** we established (shown in graph 1) that the largest energy consumers in the building were the lighting and IT equipment - in 2013 the investor made the next step in energy efficiency by implementing LED lighting.

Based on the heating related specific energy use and total energy use we can state that **the building meets the passive standards**. By changing the lighting in 2013 the investor has achieved **a plus energy building**, which produces more energy than it uses.

use and specific energy use in 2012:

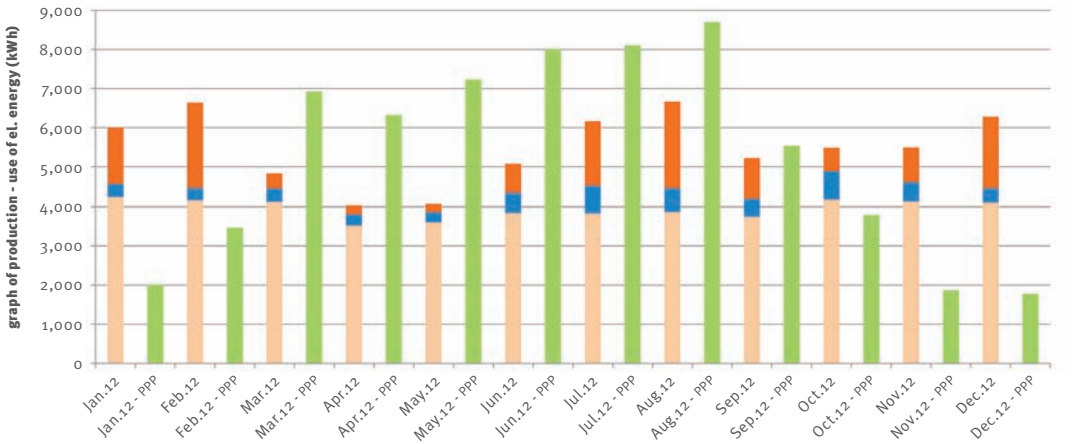
for heating:	7,7 MWh	6,1 kWh/m²,a
for cooling:	5,6 MWh	4,5 kWh/m²,a
for ventilation:	5,3 MWh	4,2 kWh/m²,a
all other users:	47,4 MWh	37,6 kWh/m²,a
sum:	**66,0 MWh**	**52,4 kWh/m²,a**
produced electrical energy in 2012:	**63,8 MWh**	

The share of individual electrical energy users

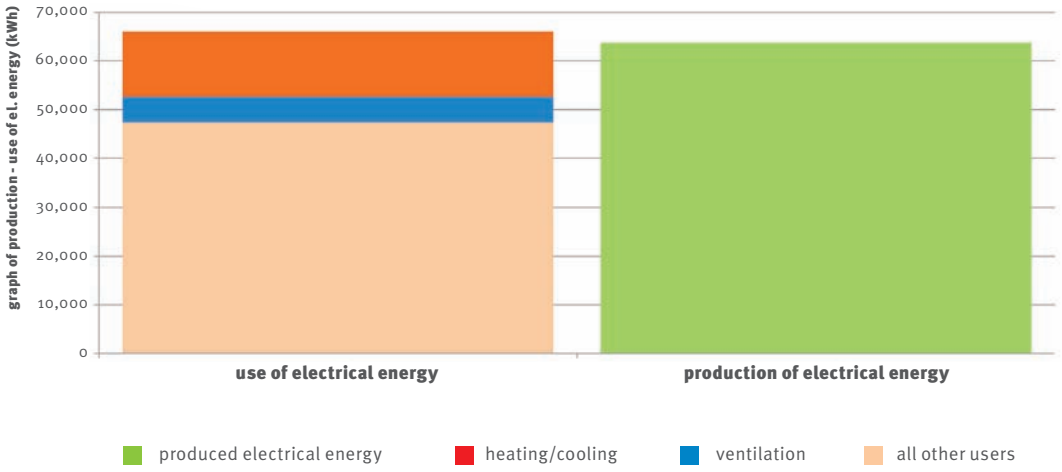


the building

Monthly production/use of electrical energy in 2012



Production/use of electrical energy in 2012



creating together

The beginnings of the group date back to 1991, when Ržišnik Perc d.o.o was founded - originally as an architectural and graphic design bureau. Our most important ally at that point was the market, which was in need of fresh ideas.

The mother company grew into a group of **6 specialized service oriented companies**, dedicated to professionalism and quality. We support other companies, municipalities and individuals with real estate investments, higher product recognition and IT solutions. We employ over **110 co-workers** and in the past 5 years constantly produce **a turnover of over 10 million €**.

MOTHER COMPANY

Ržišnik Perc

SERVICE COMPANIES

Protim Ržišnik Perc
ARCHITECTS AND ENGINEERS

Creatim Ržišnik Perc
MARKETING FOR DIGITAL WORLD

Infotim Ržišnik Perc
INFORMATION SYSTEMS

INVESTMENT COMPANY

RP investicije
REAL ESTATE DEVELOPMENT

COMPANY ABROAD

RP Urbana
ZAGREB

BRANCH OFFICES

Protim RP Belgrade

Protim RP Budva

Mother company

Ržišnik Perc
GROUP

Strategic activity of the mother company is to ensure central functions to the companies in the group (accounting, finance, controlling, HR management, facility and energy management and group owned restaurant management).

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Ržišnik Perc
GROUP

Service companies

Protim Ržišnik Perc
ARCHITECTS AND ENGINEERS

Protim is an independent consulting and design company with over 50 regularly employed architects and engineers. We work interdisciplinary to provide innovative solutions in the design phase and transfer them consistently to the construction site thus taking the responsibility from the concept to the remedy of the last deficiency. Our key markets are industry, craft, retail, tourism, health, infrastructure and public sector.

Creatim Ržišnik Perc
MARKETING FOR DIGITAL WORLD

Creatim is a digital agency specialized in e-commerce and related marketing services. We deliver end-to-end solutions from concept development up to integrations and operational support. Our added value is to combine the client's on-line and classic marketing tools into a united sales force.

Infotim Ržišnik Perc
INFORMATION SYSTEMS

Infotim develops its own software in three strategic areas: facility management, safety and health. Our products include advanced solutions for facility managers, public utility companies as well as other public institutions and ensure simplification of operations, shortening of work processes, faster achievement of results and support to field operations.

Investment company

RP investicije
REAL ESTATE DEVELOPMENT

The company has years of experience in real estate development and financing. We are a partner to municipalities, corporate and individual investors, whom we support with development and implementation of complex business zones, commercial and residential projects for the market. Our newest development project is the Žirovnica business zone. We also continue with the development of the Šenčur business zone, where we market buildable plots and built light production/logistics/office premises.

Company abroad

RP Urbana
ZAGREB

Branch offices

Protim RP Belgrade

Protim RP Budva

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