STULZ

mission energy

powered by STULZ

IT Cooling Solutions and Services

Performance up, consumption down

Mission Energy in the data centre

Too much energy for cool computers

Half disappears into thin air

Data centres run 365 days a year. Their tightly packed server racks generate ever increasing computing power in an ever decreasing area – power that is almost entirely converted into heat. Climate control ensures reliable operation. It conveys heat outside right away. But then, the air conditioning in data centres devours a huge amount of electricity. In the worst cases, it uses more than half of the energy supplied to the data centre.

STULZ expertise

Computing produces heat

Computers convert almost all the energy supplied to them into heat.
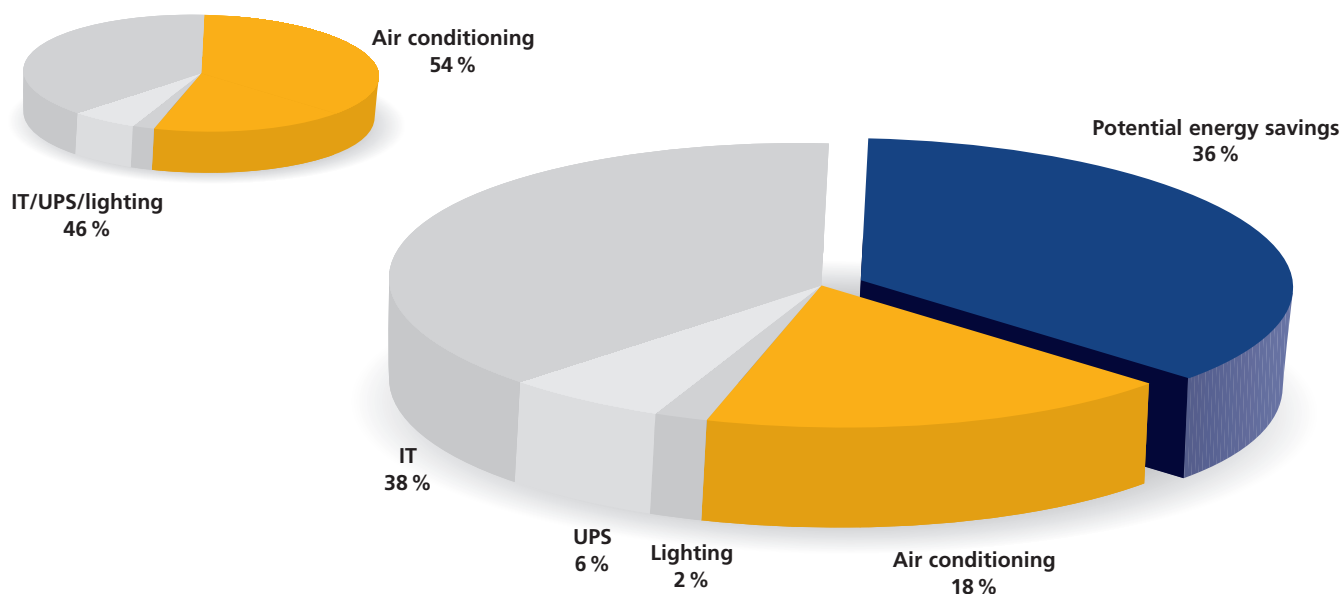The greater their performance, the more heat they emit. Only a small proportion is used for the actual work of computing. As computers in the cold aisle work reliably and best at temperatures from 18 °C to max. 27 °C, they have to be cooled. The more efficient this cooling, the less energy the data centre consumes.

Each kilowatt counts 8760 times

Modern data centres are in operation year in year out for 8760 hours – 365 days a year, 24 hours a day. Therefore, every saved kilowatt has a huge impact on savings. At a price of 13 eurocents per kilowatt-hour, every kilowatt that is cut equates to savings of 1,138 euros a year.

Example of energy distribution in a data centre

Air conditioning
54 %

IT/UPS/lighting
46 %

Potential energy savings
36 %

IT
38 %

UPS
6 %

Lighting
2 %

Air conditioning
18 %

Energy efficiency in optimising, building and operating

Whether you are building a new data centre or optimising or running an existing one – choose energy-efficient air conditioning from STULZ. With expert advice, intelligent products and lasting service, we will be there for you throughout the life of your air-conditioning system.

Save electricity, increase performance

Gain room for manoeuvre in the management of your operating costs. Our energy-efficient precision air-conditioning systems cut the power consumption of your data centre by up to 40 %. Save on electricity bills. Or invest your saved energy in expanding your hardware.

Cut CO_2 emissions – and save hard cash

Air conditioning a data centre in Berlin with a surface area of 300 square metres and a thermal load of 1 kilowatt per square metre costs just 40,757 euros a year with a Free Cooling system, as opposed to 87,737 euros a year with compressor cooling only. This is equivalent to savings of 46,980 euros and 202,013 kg of CO_2 per year*.

Plus 40 % power reserve

With this computing power, modern precision air-conditioning systems lower the energy consumption required for cooling computers by up to 40 %.

* Source: STULZ comparison of system costs, basis for calculation 13 ct/kWh, CO_2-Emission factor: German electricity mix 2012

STULZ room tuning:
First Aid for your data centre

Room tuning optimises your energy usage quickly and effectively. Cover panels seal gaps in server racks, processor power is evenly distributed, raised floors are free from cable spaghetti, and operating values are tuned to the optimum level. Your data centre can then breathe freely. Cooling capacity is put to more effective use, and energy consumption drops.

A question of fine-tuning

Be chilled, not chilly!

Computers are at their best at a supply air temperature of 18°C to max. 27°C and 30% to 60% relative humidity. If the cooling power is turned up, the cooling compressor runs more often, and the air loses humidity. The result? The air-conditioning system dehumidifies the air. If humidity drops below the setpoint, it humidifies it again. Energy consumption rises – due to the longer compressor running time and the necessary extra power for humidifying and dehumidifying.

STULZ expertise

Fine-tuning from the air-conditioning experts

Thermodynamics in the data centre is a complex affair. There are many ways to achieve greater energy efficiency.

Our experts help you with a thorough analysis and competent advice.

Freeing the airways in the raised floor

In most data centres, the cooled air is conveyed to the server rack through raised floors. Unneeded cables and awkward pipework installations impede the air flow and reduce the effectiveness of cooling. Taking a few simple measures will bring you noticeable improvements.

Traffic jams in the air flow

Data centres are divided into hot and cold aisles to ensure the best possible air distribution. The cold aisle conveys cooled supply air through the raised floor to the front of the server racks. In the hot aisle, heated exhaust air flows back to the air-conditioning unit. If the air flow is blocked or misdirected, the cooling effect is diminished – and power consumption rises. This is caused by raised floors clogged up with cables, short circuits of air in server racks, and an incorrectly set room temperature.

Hotspots

Often, planning of an air-conditioning system is based on the assumption that heat is distributed evenly. But the reality is different: Heat from high-powered computers, or misdirected cooling air, lead to so-called hotspots. If the thermal load on site lies above the planned average, not enough cold air gets to the computer. Simply reducing the target temperature results in considerable extra consumption, without solving the hotspot problem. For the flow of air is too weak to reach the hotspot.

Hot aisle

Cold aisle
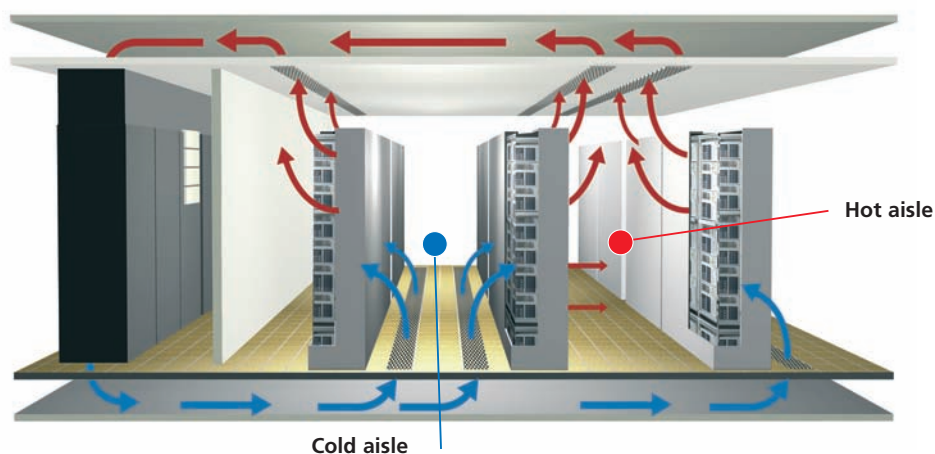
Layout plan for server racks

Distribute computer power evenly between all server racks. A layout plan increases operational reliability and reduces the risk of hotspots.

Cover panels for unused height units

Air always finds the path of least resistance. So seal unoccupied height units in the server racks with blanking panels, so that the cooled air flows through the server – not past it. This way, you will avoid short circuits of air, in which warm return air flows back into the server from the front.
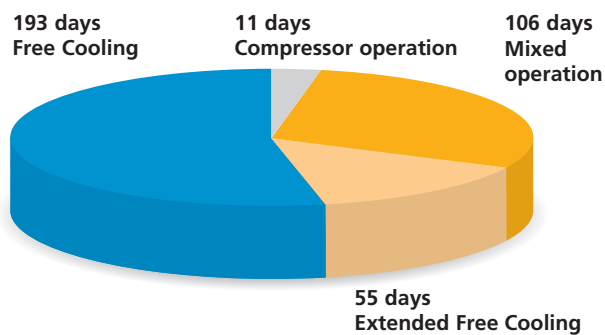
Good planning means efficient cooling

Free Cooling with ambient air

Economical precision air-conditioning systems also make use of cool ambient air for indirect cooling of the data centre. Modern control electronics only switch on energy-intensive compressor cooling when really necessary. They continuously monitor the climate in the data centre and select the optimum operating mode in no time.

New buildings without compromise

Energy efficiency is a question of planning. In new buildings, you can design the air-conditioning system to the specific requirements of the room and computing equipment with particular precision. Many possible systems exist, but only one solution will supply optimum energy efficiency for you. We will be glad to help you choose the right one.

Spot-on cooling with water

Where high-powered computers produce hotspots, chilled water goes to the heart of the problem and dissipates the heat. Liquid cooled server racks work especially efficiently in these cases. All liquid-bearing parts are strictly separated from the electronics.

193 days Free Cooling **11 days Compressor operation** **106 days Mixed operation**

55 days Extended Free Cooling

Source: STULZ calculation of system costs, location Nuremberg

STULZ expertise

Why precision air-conditioning systems?

Precision air-conditioning systems are designed for efficient continuous operation in data centres and telecommunications systems. The sensible cooling capacity of precision air-conditioning systems is considerably higher than in conventional room air-conditioning units – which means that more than 95 % of the energy is used for cooling the room. The air is circulated three times faster, the temperature and humidity are maintained with the utmost accuracy.

Plan scalability in good time

Computers are replaced every 4 years at the latest, air-conditioning systems have a considerably longer life. So when planning your new building, leave space for additional pipes, connections, interfaces and installation sites for future expansion. This is the only way to ensure that your computers and air-conditioning system can work together efficiently and grow together far into the future.

Cool air guided with precision

To ensure that the cooled air gets to where it is needed, careful planning of the air conduction is part of every good climate control plan. Hot and cold aisles, raised floors and cover panels convey the cooled air to the computer with precision. Particularly efficient systems make use of closed air circuits, for example, which feed the waste heat from the server racks directly back to the air-conditioning unit via closed air ducts.
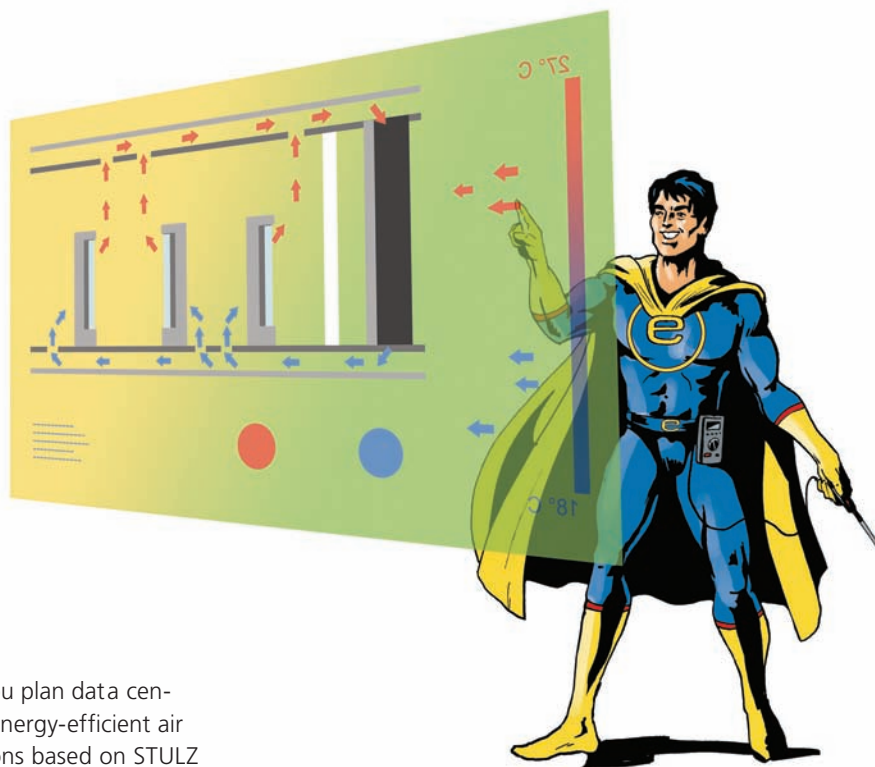
STULZ consulting: Solutions that last

Our STULZ air-conditioning experts help you plan data centres by providing advice and products for energy-efficient air conditioning. We develop individual solutions based on STULZ precision air-conditioning systems, saving you energy.

Energy-efficient Free Cooling up to 20°C

Invest in Free Cooling. This especially economical cooling system functions at moderate ambient temperatures of up to 20°C. Free Cooling does not need an energy-intensive compressor – it makes use of the natural drop in temperature between cool ambient air and hot exhaust air from the data centre.

Energy sappers in the system

Running cooling compressors and fans in the air-conditioning system is particularly energy intensive. Electronic control improves response in changing load conditions, while additional cooling with Indirect Free Cooling keeps compressor running times to a minimum.

Well-insulated premises

For your data centre, choose heat-insulated rooms without direct sunlight, ideally without windows, on the side of the building facing away from the sun. Examine the possibility of heat recovery – for heating offices, for example, or industrial water.
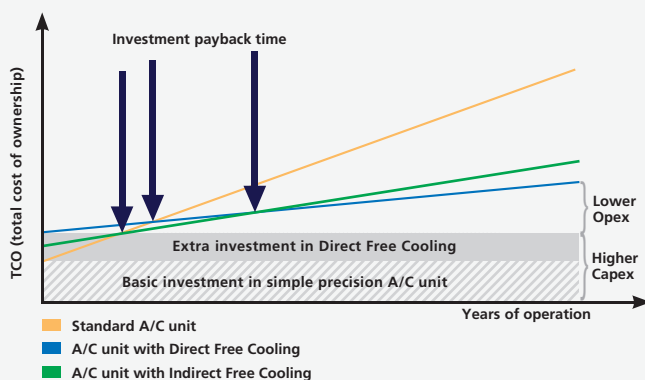
Energy-saving technology

Low consumption over large areas

Large data centres are cooled by the low-consumption STULZ CyberAir® air-conditioning system with DFC. The DFC (=Dynamic Free Cooling) automatic air-conditioning system controls the output of the cooling fans in the blink of an eye, and switches to economical Free Cooling when weather conditions cool down. In this operating mode, the refrigerant in the system is cooled further with ambient air. Energy-intensive compressor cooling (DX) is only switched on when absolutely necessary.
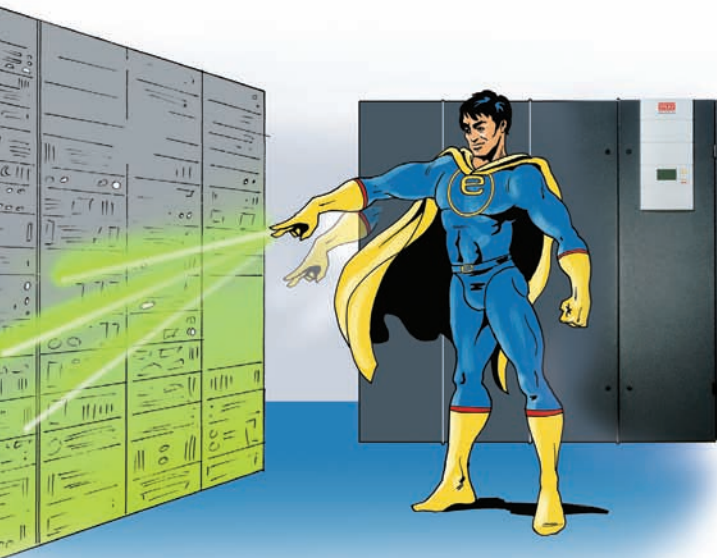
STULZ expertise

Energy efficiency pays

In view of rising energy prices, the investment in a STULZ precision air-conditioning system with energy-saving technology pays for itself in just a few years.

Free Cooling instead of compressor

In data centres with a thermal load of approx. 800 kilowatts or more, cooling the circulating air with water is a viable option. The cooling circuit is fed by an external chiller. Liquid cooling systems supplemented by economical Free Cooling are particularly energy efficient. Their investment payback times vary depending on climatic conditions at the site in question. Your STULZ expert adviser will carry out cost-efficiency calculations to help you with your decision.
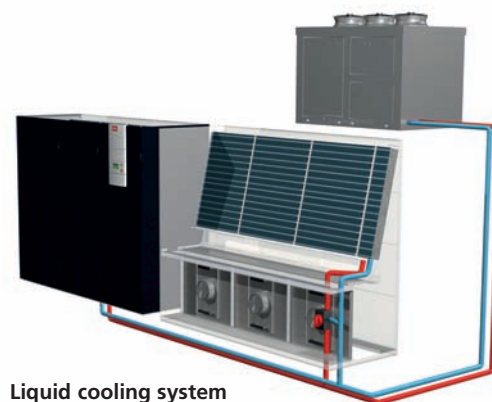
Liquid cooling system

Chilled water for efficient hotspot cooling

In combination with liquid cooled server racks, STULZ CyberCool produces chilled water for the direct cooling of high heat-density server racks.

Direct Free Cooling

Thanks to our many years of experience with precision air-conditioning solutions, we have succeeded in optimising all components for Direct Free Cooling, ensuring compliance with specified data centre temperature tolerances as per ASHRAE TC 9.9 – 2011. With Direct Free Cooling, filtered ambient air below 18°C is used to keep the data centre cool. This brings huge potential savings.

Fans with EC technology

Electronically controlled EC fans run particularly efficiently in partial load mode. They respond steplessly to changing power requirements and deliver precisely the air flow that is currently needed.

Thrifty Indirect Free Cooling

Precision air-conditioning systems with Indirect Free Cooling make additional use of ambient air for cooling the room. By means of a heat exchanger, cold ambient air keeps the refrigerant cool.

Thrifty operation

STULZ Service: Look ahead with an Energy Audit

With its intelligent service, STULZ ensures that you remain energy efficient on a permanent basis. The STULZ Energy Audit regularly checks the energy performance of your precision air-conditioning system. If measured values deviate from the setpoints, your air-conditioning system is recalibrated.

If the cooling capacity is no longer sufficient, STULZ Service identifies the causes and makes suggestions for a system upgrade. As a competent partner for IT and facility management, we are at your side as you tackle these tasks.

STULZ expertise

Management of air conduction

A new rack installed here, an old server taken out there – empty slide-in units in the server rack bring a state of confusion to the passage of air between cold and hot aisles. The cooled air does not flow through the server, but through unoccupied height units in the rack, leading to short circuits in the air. Therefore, you should always seal empty slide-in units with cover panels.

Distribute power evenly

Plan the occupancy of your server racks meticulously. The more evenly the processor power is distributed over the room area, the more effective air conditioning will be. The best results are achieved when IT and facility management work closely together.

A living IT landscape

During operation, the climate is constantly in motion. Like any technical system, air-conditioning systems in data centres need regular maintenance. When individual computers or racks are enhanced, converted or replaced by higher-powered equipment, this can become critical. For each new heat source changes the thermal load distribution, each new piece of hardware can force the flows of hot and cold air out of balance.
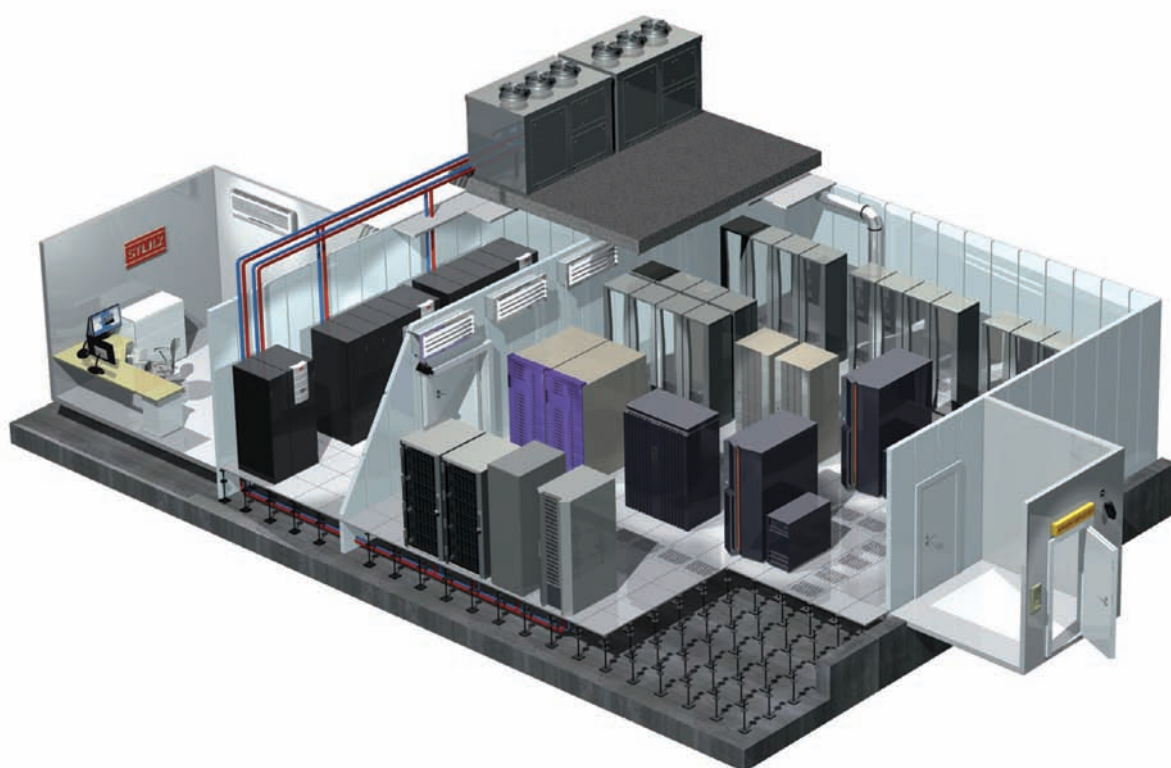
Lay cables tidily

Every new computer wants to be connected. The result is a colourful tangle of wiring harnesses. These block the flow of air in the raised floor. STULZ assists you by offering suggestions for systematic cable management.

Climate map with thermographic imaging

A thermographic image visualises the hot and cold zones in the data centre, as on a weather map. This provides you with an early warning system of conditions in the air-conditioning system that may increase consumption.

02/13 en · © STULZ GmbH, Hamburg

Subject to change. Errors excepted. · 1000239

IT Cooling Solutions and Services

Close to you all over the world.

... With specialist, competent partners in our subsidiaries and exclusive sales and service partners around the world. Our five production sites are in Europe, North America and Asia.

www.stulz.com