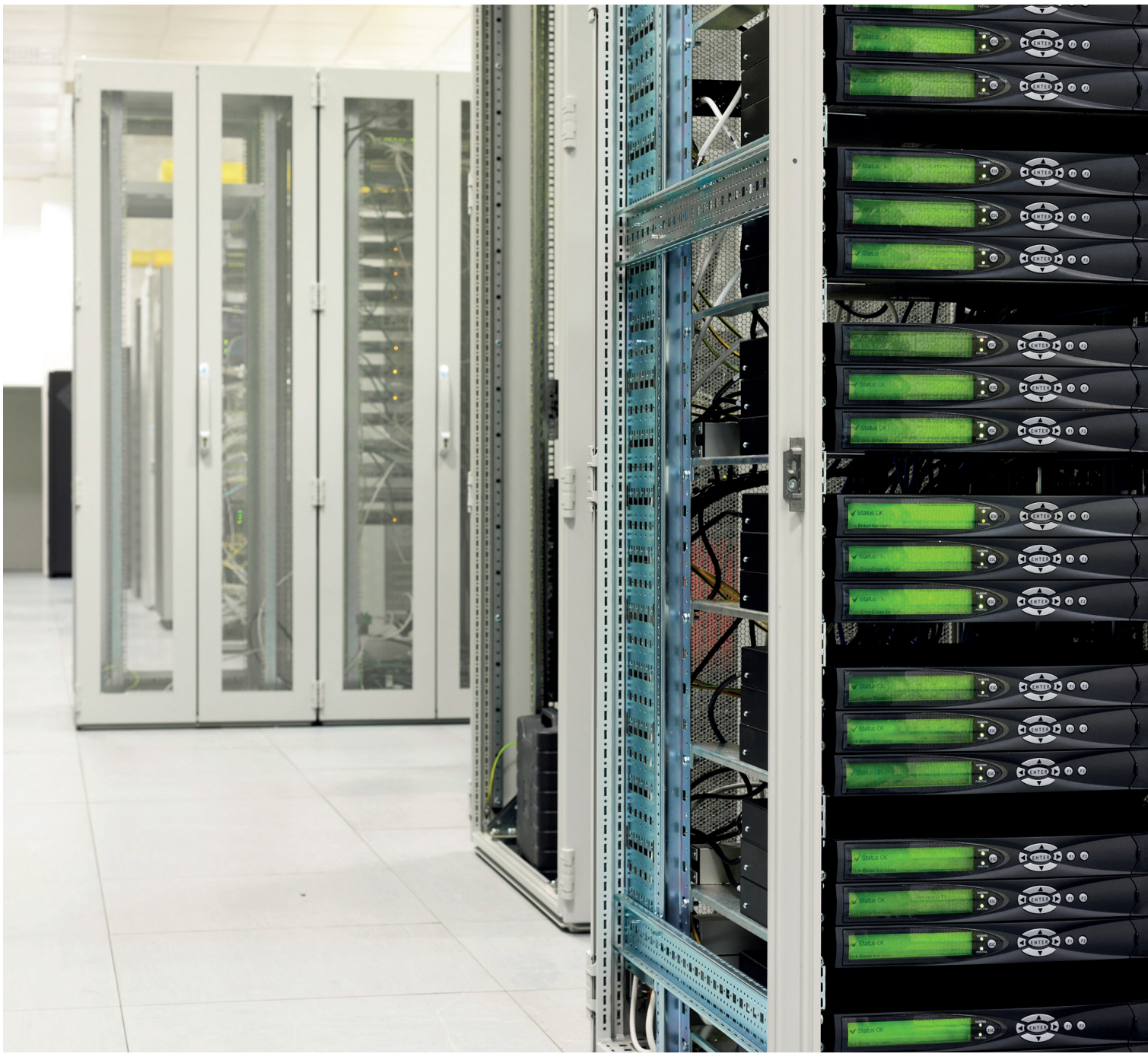
Operational optimisation measures for companies: ICT equipment



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Let your servers chill out – and save money!

Many companies use their servers with the basic setting as delivered. With targeted use of energy-saving features, you can considerably reduce the electricity consumption of your servers.

Action

Activate the energy-saving features or the energy management tool on your server – and save as much as 40% of the energy consumed.

Requirement

You operate an in-house server room (a small data centre) or your own servers in your company.

What to do

- Check whether your servers have energy-saving features or an energy management tool. If this is not the case, ask your supplier to install an application of this type.

How to start:

- Log on to the server as an administrator.
- In the backup programme, clarify the times when your backups are active.

How to activate the main energy-saving features on the server:

- Define the power schedule
- Select the ventilation mode
- Define the hard disk rest (sleep) mode
- Activate “Wake-on-LAN”
- Switch off unused services

See overleaf for details.

Costs – outlay

- If energy-saving features or an energy management tool are installed, your “only” outlay is your own labour, of about 1 to 2 hours.
- If you have to retrofit the energy-saving feature, ask your supplier for information about the labour charges and any licence costs that may be incurred.

Please note

- When making adjustments to the server system settings, it is worth calling in an IT specialist in case of doubt – because secure, reliable and trouble-free operation of the IT infrastructure is essential for all companies, and the costs of IT outages can mount up very quickly.

Additional explanations

Activate the power schedule

Small servers that are not active at night can be shut down using the power schedule. To do this, you should ideally arrange the backup times so they are usually completed about 1 hour before work begins (reserve). With a power schedule, you can then automatically shut down and restart the servers after work ends, until the backup begins.

Example:	End of working day	6:00 pm
	Switch server off	8:00 pm
	Switch server on	04:15 am
	Start backup –	04:45 am
	Backup duration (e.g. 45 minutes)	
	End of backup	05:30 am
	Reserve (1 hour)	06:30 am
	Start work	06:30 am

Set ventilation mode

For the ventilation mode, select the operating mode where the fan (ventilation unit) speed adapts to the actual requirements of the server according to its system temperature.

Hard disk rest mode

Ensure that rest (sleep) mode for the hard disks is already activated after a short time (e.g. 30 minutes).

Switch off unused services

Active services that are not used by the server or any applications consume energy unnecessarily. Check the services in your system settings. Uninstall or disable the services you do not use. In case of doubt, if you are not sure whether a particular service is required by applications, you are best to allow it to run.

Wake-on-LAN

Shut the server down manually or with the help of a scheduler. With Wake-on-LAN (WOL), you can “wake it up” from any workstation so that it starts up automatically. To do this, you must enable Wake-on-LAN in the system settings and define a schedule.

Additional information

- Less electricity and more efficiency in server rooms and data centres: Information platform for server rooms and data centres, SwissEnergy
- Promoting efficient data centres: the PUEDA+ funding programme
- Site analysis for your company: The energy check for server rooms and data centres
- Efficient data centres: list of actions

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Images: 123rf.com

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More is less: don’t cool your servers below 27 °C

Modern servers still operate reliably with a supply air temperature of 27 °C. Cooling the air down to a lower temperature with the mechanical cooling system requires unnecessary energy and increases the operating costs.

Action

Allow temperatures of up to 27 °C in the server room to cut your cooling costs by as much as 60%.

Requirement

You operate an in-house server room (a small data centre) or your own servers in your company.

What to do

- Measure the temperature in the intake airflow, in the uppermost position of the server installation. The temperature at the top of the rack is usually somewhat higher.

A: For air-cooled server rooms with their own split air conditioning unit:

- Set the split air conditioning unit so it only starts cooling the air in the intake flow at 27 °C.

B: For air-cooled server rooms that are cooled via the central cooling system:

- Set the room cooling so the air in the intake flow only starts cooling at 27 °C.

C: For water-cooled server rooms that have their own cooling system (air-water):

- Set the water circuit temperature so that cooling of the air upstream of the servers only starts at 27 °C.

Costs – outlay

- A simple factory-certified thermometer with an accuracy of ±0.1% costs between CHF 100 and CHF 150.

Please note

- The ambient temperature in the room can be up to 30 °C or more if a separation between the cold air going to the server and warm air coming from the server is present in the room. The high room temperature has no negative impact on equipment availability. Ideally, the supply air temperature is adapted to the actual demand, and is not kept at a constant temperature level.
- Targeted dehumidification of the supply air is not usually required. Ensure that the relative air humidity in the room is between 20% and 80% (also see overleaf).

Additional explanations

Increasing the temperature

According to ASHRAE[1] 2012, the industry standard, and the IT equipment manufacturers, it is possible to increase the supply air temperature upstream of the IT equipment to as much as 27 °C without problems. In this case, adhere to the requirements specified by the hardware suppliers (servers, hard disks, switches, etc.).

Pay attention to air humidity

ASHRAE also recommends a higher tolerance for humidification of the supply air in order to keep energy expenditure low. The relative humidity must not be less than 20% (static discharges) so the equipment is not damaged. However, humidification to more than 30% relative humidity is just as unnecessary as dehumidification to below 70% relative humidity. In overall terms, the accepted bandwidth for air humidity in the server room is broad (e.g. 20% – 80% relative humidity) before there is a need to condition the air.

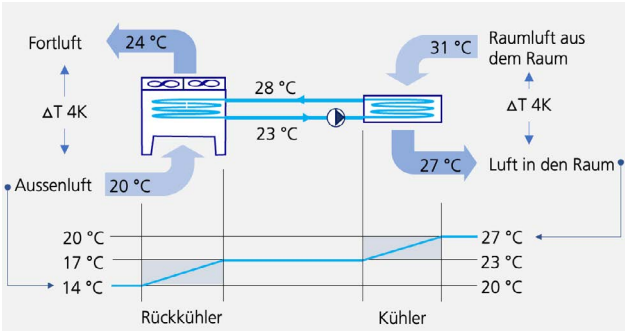
Avoid solar radiation into the server room

Protect the server room against direct solar radiation. This is because the sun introduces additional heat into the room, which then has to be removed again by the cooling system. If external windows cannot be avoided in server rooms, they therefore require good shading (blinds).

Use free cooling when outdoor temperatures are low

Server rooms need to be cooled throughout the year. This makes them particularly suitable for “free cooling”. Please note: valuable heat is removed with free cooling. If you can use this heat in the building (for heating in the transitional period), utilisation of heat makes more sense than free cooling. But if you are not able to use the heat, the server room can be cooled with free cooling.

- With air-cooled systems, you can use the cold outside air (up to 27 °C) directly as supply air.
- With water-cooled systems, the cooling water (and therefore – indirectly – the server room) is cooled by the outside air, without a mechanical cooler. This indirect free cooling operates with two heat exchangers, each of which requires a temperature difference of 3 to 4 K in order to operate cost-effectively. This means that outdoor temperatures of less than 20 °C are necessary for indirect free cooling (see image).



Additional information

- Less electricity and more efficiency in server rooms and data centres: Information platform for server rooms and data centres, SwissEnergy
- Promoting efficient data centres: the PUEDA+ funding programme
- Site analysis for your company: The energy check for server rooms and data centres
- Efficient data centres: list of actions

[1] The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) publishes standards and guidelines for air conditioning technology, including ASHRAE TC 9.9 – Data Center Power Equipment Thermal Guidelines and Best Practises – regarded in the industry as the standard reference for air conditioning in data centres.

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Using your server capacities virtually will save money and energy

Virtualisation allows you to optimise the capacity utilisation of your servers as well as memory and network resources. This way, you minimise the number of physical servers and the amount of storage capacity required. And you also reduce the energy demand for your server infrastructure by 40% to 60%.

Action

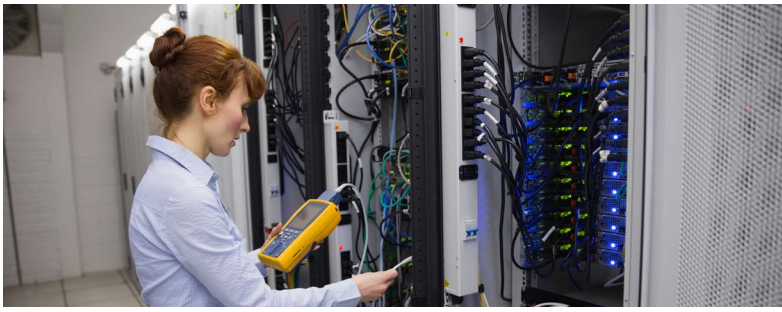
When you next expand your server infrastructure, take advantage of the opportunities offered by virtualising your server architecture. That will save up to 60% of your energy consumption.

Requirement

You operate an in-house server room (a small data centre) or several of your own servers in your company.

What to do

- Analyse the utilisation of your servers' capacity for two to three months.
- Consolidate the data so you can define the effective storage requirement for all your servers and applications.
- Assess which server applications with their own hardware (mail, ERP and web servers, etc.) you can consolidate on one physical server.
- In connection with the virtualisation, also consider (partial) cloud outsourcing for the server infrastructure.
- Avoid storing old, unnecessary or duplicate data ("data garbage").
- Design the concept for your new virtual server, storage and network infrastructure. To do this, evaluate the necessary software and (if required) the hardware components that are missing.
- Implement the virtualisation concept.



Costs – effort

- If you don't have an IT expert with experience of virtualisation projects in your company, it is worthwhile to develop and implement the virtualisation concept in collaboration with an external IT partner.
- The actual investment costs for hardware are often low. But you may also need to consider the effort expended by your IT staff for planning and implementing the virtualisation solution.

Please note!

- Secure, reliable and trouble-free operation of the IT infrastructure is essential for all companies. Always call in experts if you don't have sufficient IT experience.
- The minimum time required for a virtualisation project is between three and six months.
- The potential for savings is very promising: power consumption by the storage systems (for example), which easily accounts for one quarter of the power required by the server infrastructure, can be reduced by up to 80%.

Additional explanations

Server capacity utilisation

A virtual server forms what are known as storage pools – for example, from the storage capacities of the individual physical servers. This enables the storage space to be used dynamically. Storage capacity can be used more efficiently, and it becomes possible to work with less physical storage space. This cuts costs (hardware) and saves energy (less connected power). Moreover, server capacity utilisation is improved – which, in turn, saves energy.

A server in idle mode (i. e. when no work is being done) still consumes 50% to 75% of the electric power it would require if its full capacity were utilised. The following example shows three servers with electrical power of 400 watts each (total: 1200 watts) and their capacity utilisation. With unchanged capacity utilisation, the data can be processed on a virtualised server with only 600 watts of connected power.

Capacity utilisation control

The server infrastructure is often over-dimensioned, even if it is already virtualised. This means that most servers operate at less than half their potential capacity, and the full potential of virtualisation is not exploited. So: clarify your actual requirements for physical servers, and implement targeted reductions of overcapacity. Remember that server capacity utilisation of 80% to 90% presents no problems for the hardware, given proper operation and correct cooling.

Additional information

- Less electricity and more efficiency in server rooms and data centres: Information platform for server rooms and data centres, SwissEnergy
- Promoting efficient data centres: the PUEDA+ subsidy programme
- Situation assessment for your company: The energy check for server rooms and data centres
- Efficient data centres: list of actions

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Visuals: 123rf.com (title image), two-way

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