A world of energy savings

Cases and inspiration from companies around the world that have saved energy and costs by optimizing their heating and cooling processes.

GRUNDFOS

Possibility in every drop

Welcome to a world of energy savings

You will find inspiration and information from a wide range of commercial buildings that received expert energy consulting from Grundfos on how to optimize heating and cooling processes and save energy and costs.

Energy Check

A Grundfos Energy Check provides an overview of the life-cycle costs of your pumps. It gives you an indication of possible energy savings, and helps you make decisions on future pump replacements.

- **System Evaluation** – Evaluation of the life cycle costs of your pumps and installation.
- **Overview** – Detailed information about your energy-saving potential.
- **Sustainability** – Actionable sustainability areas to improve the environmental profile of your facility.
- **Installation Suggestions** – Prioritized installation list that details the pumps and systems which could benefit from an upgrade.

Grundfos performed either an Energy Check or an Energy Audit on the customers' pump installations and made proposals for replacement of pumps and solutions. All with the purpose of achieving energy savings and improving the environmental footprint.

Enjoy!

Energy Audit

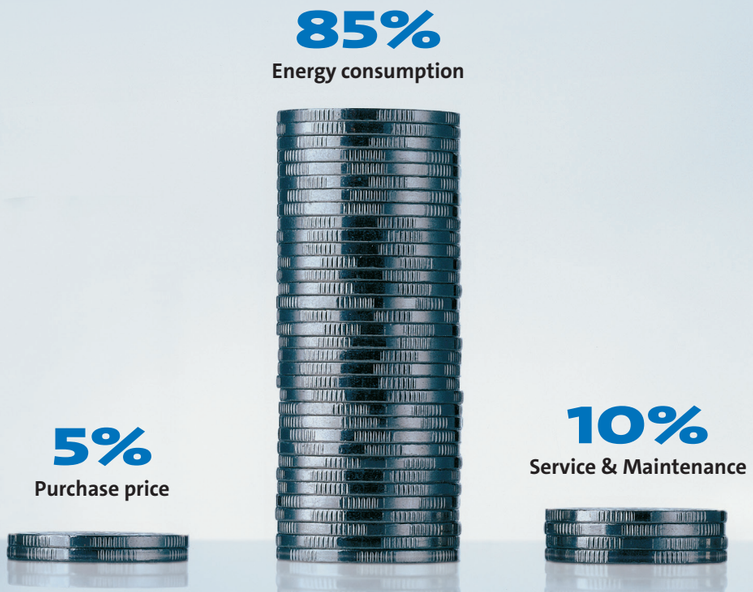
The Grundfos Energy Audit is a six-step diagnostic tool to identify excessive energy consumption in a pumping system.

1. **Initial contact** – Prequalification of the site through a discussion of relevant site information or an Energy Check.
2. **Diagnosis** – Inspection of the premises and draw up of a list of performance data and installed pumps, pinpointing focus areas.
3. **Proposal** – The Energy Audit is carried out by logging data, resulting in a load profile for the audited pump(s).
4. **Fulfilment** – Printed report with full details of the audit results and recommendations.
5. **Assessment** – Selection of the right pump solutions for the system based on optimum performance, energy efficiency and cost savings.
6. **Follow-up** – Review of the Energy Audit to ensure optimal service delivery and satisfactory pump performance.

Images are for illustration purposes only, and not from actual customer installations.

Why is energy optimization so important?

A Grundfos Energy Check or Energy Audit can help you find hidden savings in your organization. It can identify potential energy savings in your pump installation and help you understand how to save on your pump operating expenses.



95% of the life cycle cost of a pump is related to energy consumption, service and maintenance.

The price of a new pump typically makes up just 5% of the total lifetime cost of operating it. Maintenance accounts for the next 10%, while the remaining 85% are expenses related to running the pump. Life cycle costs are comprised of many contributing factors, however the energy consumption and maintenance are the most important factors to take into consideration.

Upgrading pumps can have other operational, environmental and business benefits as well.

Deciding to invest in greener and more energy-efficient pump solutions will boost your environmental profile and bring down carbon emissions. It will also help your organization comply with the latest energy saving regulations.

Operational benefits

- Energy savings
- Reliable operation
- Low failure rates
- Reduced down time
- Reduced repair costs
- Complete overview of pump installations

Environmental benefits

- Reduction in CO_2 emissions
- Increased corporate sustainability
- Pump life-cycle analysis and documentation
- Compliance with energy regulations

Energy Audit

Greater efficiency, lower costs.

Replacing oversized pumps operating in constant speed with smaller, space-saving pumps operating with variable speed increased efficiency for these high-rise condos.

Case

High-rise condominiums

Two luxury, high-rise condominium buildings were suffering from a number of operational and maintenance issues, in addition to wasting massive amounts of electricity, due to their aged boosting systems being oversized and inefficient.

Grundfos performed a full pump audit, collecting and analyzing data from both building's existing HVAC systems. The audit revealed the pumping systems were oversized for the building's needs, consuming more energy than needed, and were operating in constant speed mode and unable to vary their speed with the buildings water demand. Pressure reducing valves were also being used to regulate fluctuations in pressure, significantly wasting money and energy.

Based on the audit finding, two Grundfos Hydro MPC integrated packaged pumping systems were installed.

Using intelligent controls and smaller, space-saving pumps, the Grundfos Hydro MPC systems harness the power of parallel pumping for greater flexibility, scalability and efficiency in ever-changing load conditions, providing optimal performance. This significantly reduced energy consumption compared to previously installed HVAC system and delivered an incredible 85% reduction in operation and maintenance costs.

The two buildings also received a one-time government incentive rebate of $23,000 CAD. Grundfos assisted with the paperwork and pre-approval process for this rebate. Including the rebate, the first years' total savings were $50,000 CAD, and $37,000 CAD savings each year after that. This retrofit efficiency upgrade was projected to pay for itself in just three years.

$37,000
Yearly savings (CAD)

3
Payback time (yrs)

85%
Operation & maintenance savings

Neo and Montage at Concord luxury high-rise condominium buildings in CityPlace, Toronto.

Original, oversized, inefficient pumping system

After Grundfos energy optimization upgrades

Energy
Audit

Meeting the installation's real pumping needs.

Replacing a water fountain's oversized and inefficient pumps resulted in significantly lower OPEX costs and energy savings.

Case

Iconic fountain support area

For this water fountain, the pumps were extremely oversized, because they were designed for an expansion that didn't happen. Even at their lower speed threshold, the pumps were over-pumping, resulting in low DeltaT, for which the customer pays extra. Furthermore, cavitation is an issue, because the pumps' work far from their Best Efficiency Point (BEP).

Two Grundfos TPE 100 pumps were installed as replacements, which optimize operation and match the installation's real pumping needs, meaning the system is no longer oversized and unbalanced.

These highly efficient pumps have significantly lower OPEX costs and now operate in their BEP range, significantly decreasing energy and maintenance costs. This means that low DeltaT can now be tackled, making it possible to improve the return temperature regulation. This helps the customer save energy and avoid paying extra for low DeltaT.

Existing pump	Quantity	Potential savings (kWh/yr)	Grundfos replacement
Pump 1	1	54,128	TPE 100-93/2 22 kW
Pump 2	1		TPE 100-360/2 18.5 kW

$5,810
Yearly savings (USD)

3.4
Payback time (yrs)

54,128
Energy savings (kWh/yr)

35.8
Emission reduction (CO_2t/yr)

$19,481
Investment cost (USD)

2
Number of pumps assessed

2
Number of pumps with potential savings

Energy
Check

An optimally balanced system. Always.

Even in a long heating circuit where head losses need to be overcome, a hospital's upgraded pumps automatically adapted to the load, maintaining the required flow.

Case
Hospital

A hospital had a very inefficient boiler plant and heating system. The operating conditions meant that the pumps' shaft seals were breaking up constantly, causing downtime and putting pressure in the maintenance team. A very long heating circuit resulted in significant pipe losses, and DeltaT was lower than the original design.

Grundfos installed 5 TPE(D) pumps and 15 MAGNA3(D)(N) circulator pumps. Because the heating circuit is long, leading to significant head losses, the new pumps will speed up to overcome the head losses without compromising the required flow to ensure full comfort and optimal system balance.

Using the Heat Energy Monitor feature built into the MAGNA3 and TPE3 pumps, the system heat output is calculated, optimising DeltaT between the flow and return. BMS connectivity provides better control of the processes within the hospital, and the Grundfos GO app also provides invaluable operational data to improve the energy savings from the new pump system.

Existing pump	Quantity	Potential savings (kWh/yr)	Grundfos replacement
Pump 1	11	84,416	5x TPE3 (D)
Pump 2	4		15x MAGNA (D)(N)
Pump3	5		

$11,905
Yearly savings (USD)

4.7
Payback time (yrs)

84.416
Energy savings (kWh/yr)

38.6
Emission reduction (CO_2t/yr)

$67,016
Investment cost (USD)

20
Number of pumps assessed

20
Number of pumps with potential savings

Energy Check

Reduced system complexity, better steam quality.

Simplifying the boiler feed system with new pumps and better control of the boiler water level increased efficiency and reduced energy consumption.

Case

Hospital

A hospital had boiler feed pumps in two boiler lines, with all pumps working fixed speed with an on-off operation. The pumps were on average 10 years or older, and the system included a modulating valve and bypass line.

A total of eight Grundfos CRIE pumps in two different sizes were installed, and controlled via a level sensor installed in the boiler. Operation was regulated, depending on the water intake requirements for steam production.

Because pump operation is directly dependent on real system requirements, energy consumption was reduced by over 60% on each of the boiler lines. Better control of the boiler water level resulted in better steam quality and lower flame use. With the feed valve removed, system complexity was reduced, resulting in lower pressure loss and maintenance expenses.

Existing pump	Quantity	Potential savings (kWh/yr)	Grundfos replacement
Pump 1	2	66,066	2x CRIE 5-12
Pump 2	6		6x CRIE 5-16

$9,725
Yearly savings (USD)

3.4
Payback time (yrs)

66,066
Energy savings (kWh/yr)

18.4
Emission reduction (CO_2t/yr)

$33,164
Investment cost (USD)

8
Number of pumps assessed

8
Number of pumps with potential savings

Energy
Check

Energy and environmental savings.

Upgrading 12 pumps saved a hospital over $25,000 per year.

Case
Hospital

Grundfos performed an analysis of a hospital's pump installations and found that by upgrading the system there was a potential to save thousands of dollars a year.

The energy check determined the hospital could reduce energy consumption by 192,685 kWh per year and provide more than $25,000 savings annually by upgrading 12 pumps.

The investment cost for the system was $50,757 and had a payback time of just 1.74 years. An added benefit of the upgrade was the reduction of emissions by 72.84 CO_2t/yr, providing a substantial sustainability case for the system upgrade.

Existing pump	Quantity	Operation hours/yr	Potential savings (kWh/yr)	Grundfos replacement
Pump 1	1	8760	4,715	MAGNA 40-150 F
Pump 2	1	8760	52,209	NBE 80-160/161 AF2ABQQE + 0-4DPI
Pump 3	1	8760	51,555	NBE 80-160/161 AF2ABQQE + 0-4DPI
Pump 4	1	8760	27,156	TPED 80-250/2 S-AF-A-BQQE-MD1
Pump 5	1	8760	21,900	TPE 80-240/2 S-AF-A-BQQE-LD1
Pump 6	1	8760	6,745	MAGNA3 40-120 F N

Existing pump	Quantity	Operation hours/yr	Potential savings (kWh/yr)	Grundfos replacement
Pump 7	1	8760	6,443	MAGNA3 D 50-120 F
Pump 8	1	8760	3,708	MAGNA3 D40-120 F
Pump 9	1	8760	4,562	MAGNA3 D 50-120 F
Pump 10	1	8760	4,562	MAGNA3 D 50-120 F
Pump 11	1	8760	4,562	MAGNA3 D 50-120 F
Pump 12	1	8760	4,562	MAGNA3 D 50-120 F

$27,174
Yearly savings (USD)

1.74
Payback time (yrs)

129,685
Energy savings (kWh/yr)

72.84
Emission reduction (CO_2t/yr)

$50,757
Investment cost (USD)

12
Number of pumps assessed

12
Number of pumps with potential savings

Energy Check

Massive energy savings. Fast payback time.

A leading international university could save in multiple ways with a pump upgrade.

Case
University

A Grundfos Energy Check performed at a leading international university showed there was an opportunity to reduce energy consumption and emissions by upgrading existing pumps.

The analysis of the medical science block at the university showed a potential to reduce emissions by 72.24 CO2 T/YR and provide an annual savings of $27,582 by replacing nine existing pumps with Grundfos TPED high-efficiency pumps that include two parallel power heads for added reliability.

The pump upgrade could save 206,978 kWh per year with an initial investment cost of $127,905. The payback time would be 4.64 years.

Existing pump	Quantity	Operation hours/yr	Potential savings (kWh/yr)	Grundfos replacement
Pump 1	1	8760	43,907	TPED 100-250/2 AF-A-BQQE+ DPI T 0-4+Coms Card
Pump 2	1	8760	1,392	TPE3 D 50-200-S AF-A-BQQE+ Coms Card
Pump 3	1	8760	12,731	TPED 80-330/2-S AF-A-BQQE
Pump 4	1	8760	656	PED 100-250/2 AF-A-BQQE+ DPI T 0-4+Coms Card
Pump 5	1	8760	947	TPE3 D 50-200-S AF-A-BQQE+ Coms Card

Existing pump	Quantity	Operation hours/yr	Potential savings (kWh/yr)	Grundfos replacement
Pump 6	1	8760	71,455	TPED 80-330/2-S AF-A-BQQE
Pump 7	1	8760	45,098	TPED 100-250/2 AF-A-BQQE+ DPI T 0-4+Coms Card
Pump 8	1	8760	11,398	TPED 100-310/2-S A-F-A-BQQE
Pump 9	1	8760	19,389	TPED 80-210/2 A-FA-BQQE+DPI T 0-2.5

$27,582
Yearly savings (USD)

4.64
Payback time (yrs)

206,978
Energy savings (kWh/yr)

72.24
Emission reduction (CO_2t/yr)

$127,905
Investment cost (USD)

9
Number of pumps assessed

9
Number of pumps with potential savings

Visit grundfos.us/pei to learn more about Department of Energy (DOE) pump energy index (PEI) requirements and PEI ratings on specific Grundfos models.

Grundfos Americas
Brookshire, TX 77423

grundfos.us | grundfos.ca | grundfos.mx

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