

White paper

# Beyond the pump A lifecycle partnership for optimising district energy

Learn more at [grundfos.com/solutions/industries/district-energy](https://grundfos.com/solutions/industries/district-energy)

**GRUNDFOS** 

Possibility in every drop

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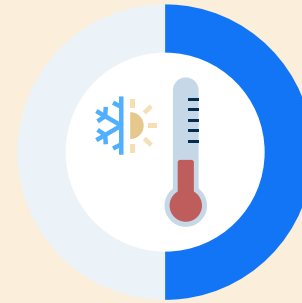
# Summary



The long-term financial success and sustainability of District Energy (DE) systems are best realised by actively managing the Total Cost of Ownership (TCO) over a 20-plus year asset lifecycle. By looking beyond initial capital expenditure to optimise long-term operational costs, operators can significantly enhance profitability and secure the role of DE as a true cornerstone of urban decarbonisation.

The scale of this opportunity is immense. Heating and cooling currently account for approximately 50% of global final energy consumption, yet 90% of global district heating production still relies on fossil fuels. Furthermore, while district energy currently meets around 9% of the world's heating needs, its role is expanding rapidly, with energy demand for space cooling projected to triple by 2050<sup>1</sup>.

These figures highlight a massive, untapped potential: even marginal improvements in efficiency across these vast networks can translate into gigawatt-scale energy savings and substantial financial returns. However, district energy operators face a combination of challenges: aging infrastructure requires significant reinvestment, volatile energy prices create operational cost uncertainty, and stringent decarbonisation mandates demand new, cleaner sources of thermal energy. Simultaneously, securing financing for these capital-intensive projects remains a primary obstacle in many cases. In this dynamic environment, high operational efficiency and reliability have not only become a necessity, they can prove to be powerful drivers of business growth and financial resilience.



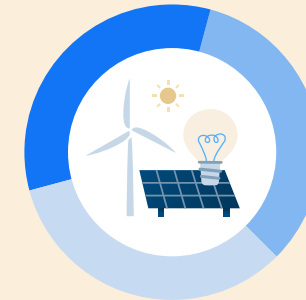
Heating and cooling account for **50%** of global energy consumption



**90%** of global district heating still relies on fossil fuels



DE meets around **9%** of the world's heating needs



Cooling demand to **triple** by 2050

1. Reports by the International Energy Agency (IEA), notably "The Future of Cooling" (2018), and is echoed by the UN Environment Programme (UNEP) in its recent global cooling watch reports (2023, 2025).

Grundfos invites district energy utilities and operators to join a strategic **lifecycle optimisation partnership**. This collaborative model is engineered to maximise value in the most critical TCO areas—**energy, maintenance, and uptime**—transforming operational risk into a competitive advantage. By systematically optimising performance across the entire asset lifecycle, DE operators can turn operational excellence into a distinct competitive advantage and unlock new levels of efficiency, reliability and profitability.

Through a comprehensive portfolio of intelligent **services** and integrated **solutions**, Grundfos provides the tools, expertise, and financial frameworks to guarantee reliability, maximise efficiency and lower the total cost of ownership.

This partnership is anchored by two powerful, synergistic offerings that bridge the gap between technical insight and financial execution:

**Grundfos Energy Optimisation** and the **Grundfos Leasing Solution**.

- **Grundfos Energy Optimisation** acts as the diagnostic and improvement engine. By systematically identifying opportunities to increase the overall efficiency of pumping systems, this service can dramatically reduce energy consumption and unlock significant operational savings.
- To turn these insights into reality, the **Grundfos Leasing Solution** addresses the challenge of upfront investment. This comprehensive solution converts capital expenditure into a predictable operational expense, providing immediate access to cutting-edge, energy-efficient technology.

Together, these offerings create a technically and financially sound pathway for DE operators to modernise their infrastructure immediately, without straining capital budgets.



Digital Integration in Action: An engineer utilizes advanced diagnostic tools to configure Grundfos control systems at the Changshu, China facility, ensuring seamless connectivity and operational efficiency.

Learn more about [Aftermarket](#) solutions and [Grundfos Energy Optimisation](#) at [grundfos.com/solutions](https://grundfos.com/solutions)



### System efficiency (kW/kW or kW/RT)

kW/kW (for district heating): target 0.7 - 1.2 kW/kW  
kW/RT (for district cooling): target 0.55 - 0.7 kW/RT for ambient temperatures <42 °C  
0.7 - 0.9 kW/RT for ambient temperatures >42 °C

### Supply and return temperatures (System Delta-T)

High-temperature district heating: Supply = 90-120 °C, Return = 60-80 °C (Delta T = 30-40 °C)  
Low-temperature district heating: Supply = 60-80 °C, Return = 30-40 °C (Delta T = 30-40 °C)  
District cooling: Supply = 4.5 - 6 °C, Return = 13.4 - 16 °C (Delta T = 6 - 9°C)

### Heat losses | Water leakage losses

### Cycles of concentration (COC)

>6-10 COC for district cooling  
>4-8 COC for campus cooling



Sector coupling | Smart grids | Flexible grid expansion  
Demand side management | Thermal Energy Storage (TES)



ROI | Lifecycle cost | OPEX (Operational expenditure)  
CAPEX (Capital expenditure)



Uptime  
Reliability (MTBF<sup>1</sup>, MTTR<sup>2</sup>, MTTF<sup>3</sup>)

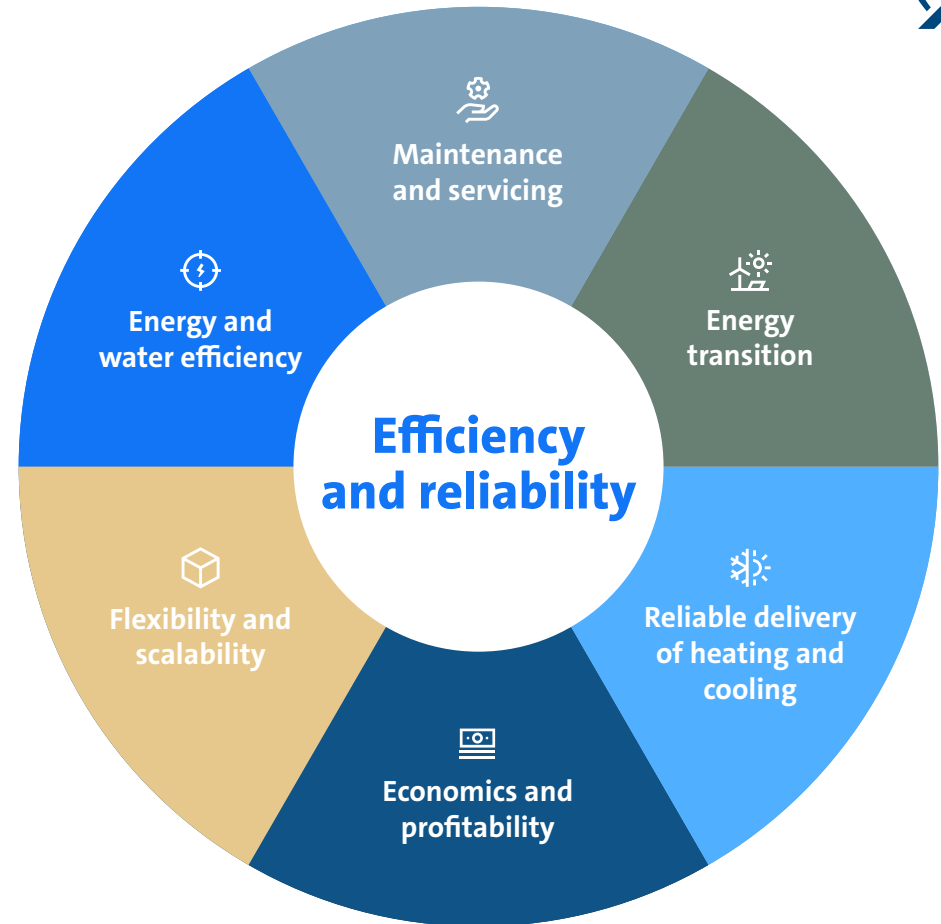


Decarbonisation | CO<sub>2</sub> emissions  
Sustainability requirements  
Regularity requirements  
Integration of renewable energy sources  
Waste energy reuse



Preventive and predictive maintenance and servicing  
Project requirements | Local assistance

1. Mean time between failures, 2. Mean time to repair, 3. Mean time to failure



This whitepaper provides a strategic blueprint for district energy stakeholders—from utility directors and operations managers to CFOs (Chief Financial Officers) and private investors—to de-risk their operations, enhance financial performance and accelerate their sustainability goals.

The path forward lies in embracing a TCO-centric approach, and the right partner is essential for navigating that path successfully.



# The district energy crossroads: Balancing ambition vs operational reality

District Energy (DE) is globally recognised as critical infrastructure for sustainable and net-zero cities. By aggregating heating and cooling needs, these systems create economies of scale that enable investment in highly efficient, low-carbon solutions.

**Modern DE networks can achieve efficiency gains of up to 80-90%**<sup>1</sup> compared to conventional, building-by-building systems and are uniquely capable of integrating diverse and often-overlooked energy sources:

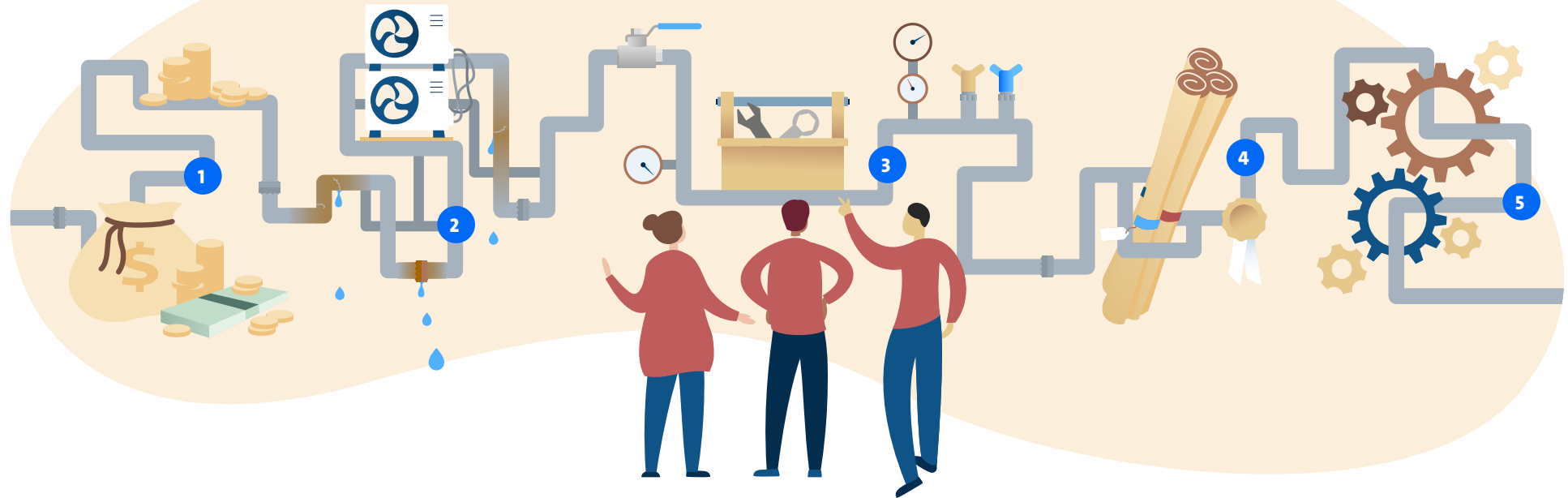
- **Heating:** Harnessing surplus heat from industrial processes and data centers, as well as geothermal and solar thermal energy, effectively transitions heating production away from fossil fuel dependence.
- **Cooling:** Leveraging free cooling sources like sea or lake water mitigates the urban heat island effect caused by individual air conditioning units. With global demand for space cooling projected to triple by 2050, district cooling is essential to significantly reduce the electrical load on already strained regional power grids.

1. District Heating and Cooling – Tracking Clean Energy Progress, <https://www.iea.org/reports/tracking-clean-energy-progress-2023>

# The wall of challenges



Despite this clear potential, the widespread deployment and modernisation of district energy faces a formidable wall of challenges.



1

**Financial barriers:** These systems are capital-intensive, characterised by "miles and miles of pipes in the ground". They require substantial upfront investment with uncertain payback periods that can exceed 20 years, acting as a major hurdle for both new projects and modernisation.

2

**Aging infrastructure:** Many current networks are decades-old legacy heating systems. These assets are often inefficient, prone to failure and in desperate need of reinvestment and renewal.

3

**Operational complexity:** Managing pressure, temperature and flow across vast grids serving diverse loads—from critical hospitals to residential complexes—is a constant technical challenge. The transition toward decentralised, multi-source energy systems further amplifies this complexity, demanding sophisticated control and optimisation strategies.

4

**Regulatory complexity:** Projects must navigate a shifting landscape of government policy, environmental and cybersecurity regulations, tax credits and incentives. Furthermore, a potential lack of awareness among policymakers and end-users regarding the long-term value of DE can make building stakeholder consensus difficult.

5

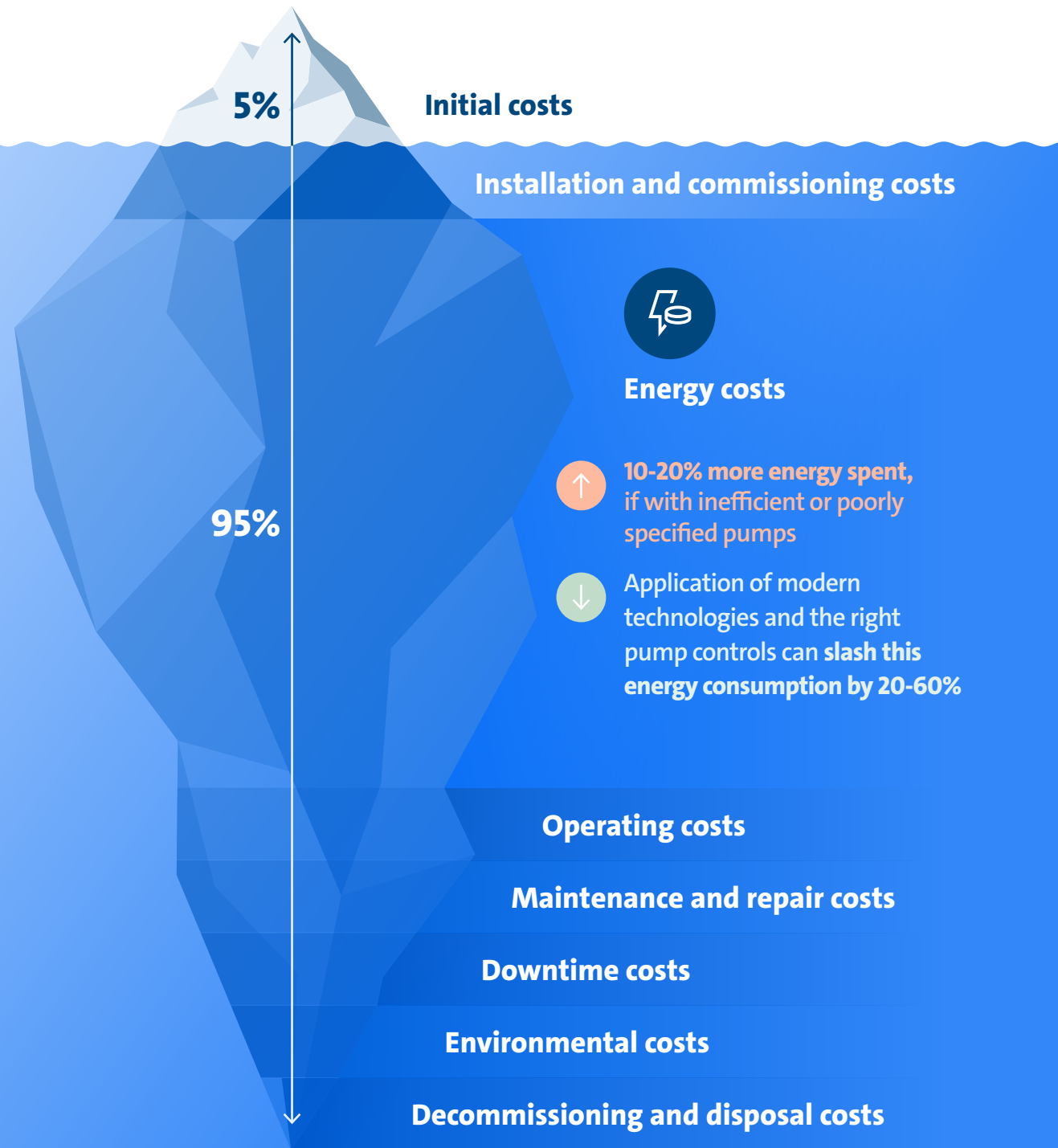
**The critical pivot:** The primary threat to district energy is not a failure of the concept, but a potential failure of its operating model. High capital risk, aging assets and rising energy costs converge to create a vicious cycle that deters the investment needed for modernisation.

To break this cycle, the industry must shift focus from initial investment to a model that actively manages the total lifetime cost of operation. This reframes the central question from "**How do we pay for it?**" to "**How do we guarantee its long-term performance?**".

**The answer lies in mastering the total cost of ownership.**

# The TCO iceberg: Uncovering the true costs of pumping systems in district energy

For pumping systems—the heart of any DE network—the initial capital outlay is merely the tip of a vast financial iceberg. The purchase price can represent as little as **5%** of the pump's Total Cost of Ownership (TCO) over its operational life. The other **95%** of costs are submerged, with energy consumption alone accounting for up to **85%** of the lifetime cost. These expenses, hidden in operational budgets, exert immense pressure on profitability and reliability.



Energy costs



10-20% more energy spent, if with inefficient or poorly specified pumps



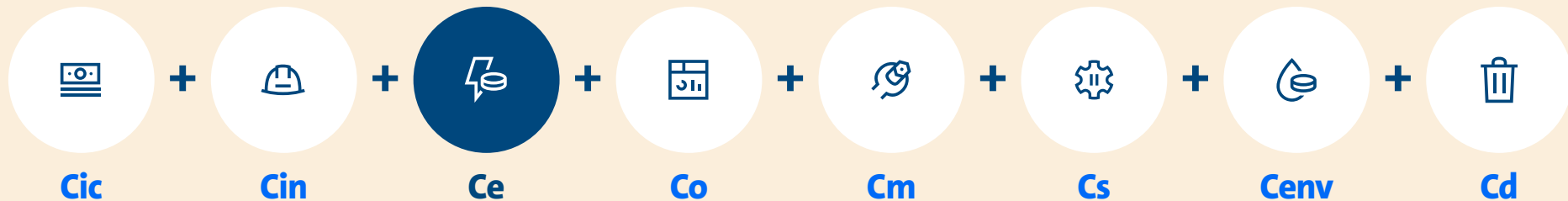
Application of modern technologies and the right pump controls can slash this energy consumption by 20-60%



A comprehensive understanding of TCO requires a methodical approach, best captured by the lifecycle cost (LCC) equation.

This management tool is designed to identify and quantify all cost components over the typical **15 to 20-year lifespan** of a pumping system. The standard LCC formula is:

**LCC =**



Here, each component represents a critical cost center for a DE operator:

**Cic – Initial costs:** This is the purchase price of the pump, pipes, and auxiliary equipment. While it is the most visible cost, it is often the least significant in the long run. An exclusive focus on minimising Cic is often the primary driver of inflated TCO.

**Cin – Installation and commissioning costs:** This includes the labour, site modifications and system integration required to make the pump operational. Crucial steps like professional installation and precision laser alignment fall into this category. Cutting corners here may directly translate to higher costs later in the pump's life.

**Ce – Energy costs:** This is unequivocally the **single largest component of TCO**, often accounting for up to 85% of the total lifetime cost. Pumping systems are major energy

consumers, responsible for nearly 20% of the world's electrical energy demand and up to 50% of the energy usage in certain industrial facilities. **An inefficient or poorly specified pump can consume 10-20% more energy than a properly maintained one**, a staggering and continuous financial drain. **The application of modern technologies like Variable Speed Drives (VSDs) and the right pump controls can slash this energy consumption by 20-60%**, representing the most significant opportunity for TCO reduction<sup>1</sup> in any DE network.

**Co – Operating costs:** The labour costs associated with the day-to-day operation of the system.

**Cm – Maintenance and repair costs:** The second-largest operational cost, encompassing routine servicing, inspections, labour, and the procurement of spare parts. Proactive, planned maintenance is a strategic investment; reactive maintenance in response to a failure is always more expensive.

**Cs – Downtime costs:** This is the most sudden and potentially catastrophic cost. For a DE network, the failure of a critical circulation or booster pump is not just a technical issue; it is a full-blown crisis. It means an immediate loss of revenue, a failure to deliver essential heating or cooling services to customers like hospitals and commercial centres, severe reputational damage and potential safety hazards. The cost of a single major downtime event can easily exceed the initial purchase price of the entire pumping system, making its prevention a top priority.

**Cenv – Environmental costs:** These are costs associated with environmental compliance, cleaning up spills or leaks and regulatory fines.

**Cd – Decommissioning and disposal costs:** The expenses incurred at the end of the asset's life.

1. U.S. Department of Energy (DOE), Improving Pumping System Performance – A Sourcebook for Industry. [PDF document](#).

# The domino effect: How initial choices shape long-term value



It is critical to recognise that TCO is not a static calculation but a dynamic system of interconnected risks. A decision made to reduce costs in one area inevitably creates a cascading effect that can exponentially increase costs in others.

Consider a common scenario: A DE operator, under pressure to reduce capital spending, selects a pump based on the lowest purchase price. To further cut upfront costs, they may opt for in-house installation without professional commissioning or precision laser alignment. The consequences are immediate and severe.

## Impact on Ce – Energy costs:

The misaligned pump shaft creates excess vibration and friction, forcing the motor to work harder, instantly increasing energy consumption.

## Impact on Co and Cm – Operating and maintenance/repair costs:

This constant vibration accelerates wear on bearings, seals, and couplings, leading to more frequent breakdowns and a sharp increase in maintenance labour and spare parts costs.

## Impact on Cs – Downtime costs:

Eventually, this neglected and over-stressed pump suffers a catastrophic failure, triggering a network-wide shut down. The operator now faces the enormous costs of downtime, including lost revenue, customer penalties and emergency repair fees, which dwarf any initial savings.

**Strategic implication:** This chain reaction demonstrates that a single focus on capital expenditure (CAPEX) is a flawed and expensive strategy. The initial "saving" on the purchase price has directly caused an uncontrolled explosion in operational expenditure (OPEX) and systemic risk. **True financial control can only be achieved by optimising the entire TCO system, not by squeezing individual cost items into isolation.**

# The Grundfos lifecycle partnership: A framework for end-to-end value



Recognising the complex, long-term challenges faced by district energy operators, Grundfos is moving its role from that of a world-class pump manufacturer to a holistic service and solutions partner. The objective is to move beyond transactional relationships and forge long-term partnerships that deliver measurable value across the entire lifecycle of our customers' assets. This "lifecycle partnership" is a structured framework designed to systematically address every component of the TCO equation, transforming operational challenges into opportunities for enhanced efficiency, reliability and profitability.

The "lifecycle partnership" is a structured framework designed to optimise every component of the TCO equation. It is organised across four distinct but interconnected phases, ensuring targeted expertise and solutions at every stage—from initial design to strategic renewal.



## Phase 1: Plan

The most effective way to control TCO is to prevent built-in inefficiencies. A significant portion of lifetime costs is locked in during design due to incorrect equipment selection or improper setup.

In this phase, Grundfos collaborates with DE engineers to avoid common errors like miscalculated system curves, which force pumps to operate far from their Best Efficiency Point (BEP). Proper sizing matches equipment to real-world duty points, preventing energy waste and hydraulic stress on bearings and seals.

For existing installations, during the planning stage, Grundfos specialists provide valuable insights to maximise energy efficiency. We utilise data-driven tools to establish a roadmap before investment:

- **Grundfos Energy Optimisation:** This systematic process evaluates pumping systems to identify improvement opportunities. It includes [Energy Check](#) (based on nameplate data), [Energy Check Advanced](#) (using system measurements) and the comprehensive [Energy Audit](#) for a data-driven investment roadmap.

- **Grundfos Health Check:** A comprehensive evaluation that provides a complete window into the health of your installed base, delivering a tailored roadmap focused on long-term performance and risk mitigation.
- **Grundfos Leasing Solution:** To help you upgrade outdated equipment, this flexible financing model converts CAPEX into a predictable OPEX, providing access to premium, energy-efficient technology for a fixed monthly fee.

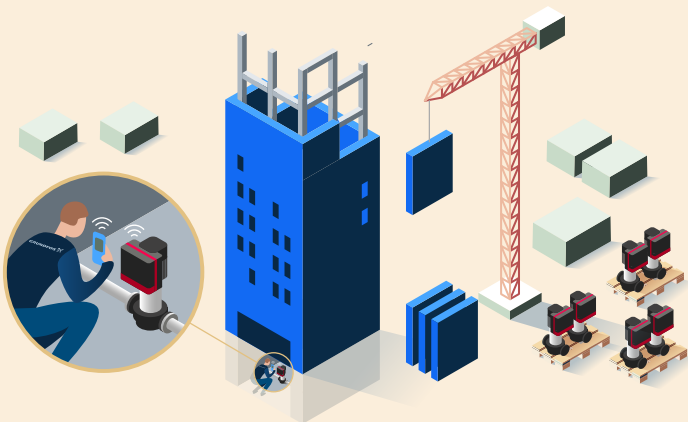


## Phase 2: Build

In the building phase, you'll get the necessary equipment and digital solutions to ensure the reliability and optimal performance of the systems being installed. This helps minimise downtime and ensure that the system's infrastructure is set up correctly from the beginning.

To prevent built-in inefficiencies and premature wear, Grundfos secures this foundation with the following key services:

- **Grundfos Installation and Commissioning:** Trained specialists ensure all mechanical and electrical setups meet OEM specifications, guaranteeing flawless initial operation.
- **Grundfos Laser Alignment:** Precision alignment is a prerequisite for long-coupled pumps. This service aligns pump and motor shafts to a fraction of a millimeter, drastically reducing friction, vibration, and energy consumption.
- **Grundfos GO:** An intuitive mobile interface that simplifies pump configuration and commissioning, ensuring optimal parameters and settings are applied from day one.



## Phase 3: Operate



Once your system is in use, our team of specialists can assist with digital monitoring and control solutions to secure long-term performance and prevent unexpected breakdowns. With tailored support, check-up and consultancy services, we help you manage your systems effectively and ensure they're always running smoothly and operating at peak efficiency.

- **Grundfos Connect:** A simple, cloud-based digital solution for remote monitoring and control, providing real-time visibility into system performance to reduce downtime.
- **Grundfos GO:** An intuitive mobile dashboard that provides instant visibility into pump operation and system health. It simplifies daily monitoring by delivering real-time performance data ensuring you always have a clear view of asset status, operation and health.
- **Grundfos Machine Health:** Reduce downtime and maintenance costs with predictive insights from Grundfos Machine Health. Wireless sensors collect data that is stored in a secure, cloud-based platform, giving you remote visibility into equipment health at all times.



## Phase 4: Maintain and optimise

Once operational, the focus shifts to maximising performance in a dynamic environment where loads fluctuate and conditions drift. Proactive optimisation is essential to control energy costs, the largest component of TCO.

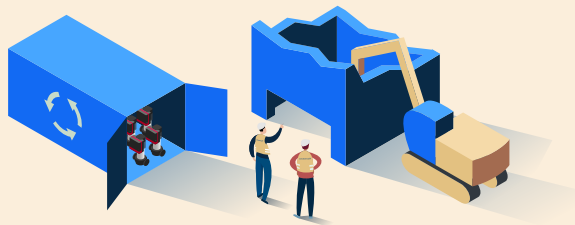
- **Grundfos Energy Optimisation:** This is the cornerstone of our partnership. It is a systematic process of evaluating pumping systems to identify opportunities for improvements that will reduce energy consumption.

The service is tiered into the following offerings:

- o **Energy Check:** A quick assessment based on nameplate data.



- o **Energy Check Advanced:** A precise evaluation using actual system measurements.
- o **Energy Audit:** A comprehensive diagnostic using attached measuring equipment to provide a data-driven investment roadmap.
- **Grundfos Health Check:** This comprehensive evaluation provides a complete window into the health of your entire installed base. Our specialists assess each asset's condition, reliability, and criticality, delivering a tailored upgrade roadmap focused on long-term performance and risk mitigation.
- **Grundfos Service Agreements:** To ensure ongoing reliability, Grundfos offers both Standard and Customised Service Agreements. A standard agreement provides fixed-price yearly inspections and reports, ensuring predictable costs and expert oversight. A customised agreement is tailored to your specific needs, considering the criticality of each asset to provide peace of mind and enhanced operational reliability for a fixed fee.
- **Condition Monitoring:** Advanced sensors continuously monitor parameters like vibration and temperature. This data detects early fault signs, allowing for precise, preventive maintenance scheduling.
- **Diagnostic Services:** Targeted checks like **Thermal Scanning** (for electrical panels) and **Vibration Measurement** (for pumping equipment) protect critical components and assess mechanical health before failures occur.
- **Spare parts:** Be ready for the unexpected with Grundfos Original Spare Parts. We provide continuous delivery – from individual components to bulk orders – ensuring you always have what you need to keep operations running.



## Phase 5: End of life

At the end of a product or building's lifecycle, we can assist with decommissioning and recycling processes to help ensure systems are disposed of in an environmentally friendly manner, with our [Grundfos Take Back](#) recycling programme. Then, it's back to the planning phase, where we also provide recommendations for new installations or upgrades to replace the old systems.

For more info, please visit [grundfos.com/campaign/aftermarket](https://grundfos.com/campaign/aftermarket)

# Activating TCO reduction: Grundfos service and solutions portfolio


















To effectively transition from a CAPEX-focused procurement model to a strategic TCO management framework, district energy operators require a partner equipped with a specific and comprehensive toolkit. Each service and solution must directly address a key driver of lifetime cost. The Grundfos portfolio is engineered precisely for this purpose, providing a targeted solution for every major financial and operational pain point within a DE network.

The following table provides a strategic overview, connecting each Grundfos offering to its core function, its specific value proposition for the district energy sector and the primary component of total cost of ownership it is designed to optimise.



FEDA's Hans Urban and Grundfos's Jordi Caballol inspect the SCADA system controls screen at the pressure breakage substation Serradells above Andorra la Vella, Andorra



Service/Solution offering	Description and function	Value proposition for district energy	Primary TCO impact
 <b>Grundfos Energy Optimisation</b>	A systematic evaluation of pumping systems to identify opportunities for energy reduction. This includes Energy Check (nameplate-based), Energy Check Advanced (data-based) and Energy Audit (in-depth monitoring).	Directly targets the largest TCO component (up to 85% of lifetime cost). Provides a clear, data-driven roadmap for DE operators to reduce OPEX, lower their carbon footprint and fulfill sustainability targets with attractive payback times.	<b>Energy costs (Ce)</b> 
 <b>Grundfos Leasing Solution</b>	A flexible financing model providing access to premium, energy-efficient pump solutions and comprehensive services for a fixed monthly fee over a 2-5 year contract period. Converts CAPEX into a predictable OPEX.	Directly addresses the primary barrier of high up-front capital investment for DE projects. Allows operators to immediately act on energy optimisation, health check and other findings and upgrade aging infrastructure without straining capital budgets.	<b>Financial model (CAPEX to OPEX), Initial costs (Cic), Maintenance costs (Cm)</b>  
 <b>iGRID Solutions</b>	A suite of intelligent solutions that create decentralised zones in the DE network, using mixing loops and booster pumps to dynamically adjust temperature and pressure based on real-time demand.	Dramatically reduces thermal losses in distribution pipes (often 20-30%), a major source of energy waste. Enables the use of low-temperature renewable and waste/surplus heat sources, future-proofing the network.	<b>Energy costs (Ce)</b> 
 <b>Grundfos Health Check</b>	A comprehensive on-site evaluation of the entire installed pump base, using objective standards to create a detailed database and a strategic roadmap for optimisation and risk mitigation.	Provides a holistic, system-wide view of asset health and efficiency in complex, multi-building DE networks. It moves planning from guesswork to a data-driven strategy, enabling targeted investments with the highest ROI.	<b>Energy costs (Ce), Maintenance costs (Cm), Downtime costs (Cs)</b>   
 <b>Service Agreements</b>	Standardised or fully customised fixed-price contracts for inspections and preventive maintenance performed by Grundfos experts, complete with detailed reports and recommendations.	Provides predictable maintenance budgets, which is crucial for public and private utilities. Ensures operational reliability and extends equipment lifespan by entrusting maintenance to the OEM experts, tailored to the criticality of the assets.	<b>Maintenance costs (Cm), Downtime costs (Cs)</b>  
 <b>Condition Monitoring</b>	Continuous monitoring of critical rotating equipment using advanced sensors to detect early signs of developing faults, enabling predictive maintenance.	Prevents catastrophic failures in critical circulation pumps for both heating and cooling networks. Enables a shift from scheduled to efficient, condition-based interventions, ensuring network reliability and uptime.	<b>Downtime costs (Cs), Maintenance costs (Cm)</b>  

Service/Solution offering	Description and function	Value proposition for district energy	Primary TCO Impact
 <b>Inspection</b>	<p>A thorough examination of equipment in scope, analysed by experienced personnel, resulting in a report with a complete overview of conditions and suggestions for optimisation.</p>	<p>Provides a clear overview for easier management of a large installed base in a DE network and helps in planning the maintenance budget effectively.</p>	<p><b>Maintenance costs (Cm)</b></p> 
 <b>Vibration Measurement</b>	<p>A periodic diagnostic service where Grundfos specialists measure pump vibrations to determine if they are within ISO standards, identifying potential issues before they cause significant wear.</p>	<p>Directly addresses the primary barrier of high up-front capital investment for DE projects. Allows operators to immediately act on energy optimisation, health check and other findings and upgrade aging infrastructure without straining capital budgets.</p>	<p><b>Financial model (CAPEX to OPEX), Initial costs (Cic), Maintenance costs (Cm)</b></p>  
 <b>Thermal Scan</b>	<p>Certified specialists use infrared cameras to detect overheating elements in electrical control panels that are at risk of malfunctioning. A report is provided with ratings of urgency.</p>	<p>Protects the "brains" of the pumping operation. The complex control panels for large pumps and VSDs in a DE plant are critical. This service prevents electrical failures that could trip the entire system, leading to sudden, network-wide downtime.</p>	<p><b>Downtime costs (Cs), Maintenance costs (Cm)</b></p>  
 <b>Installation and Commissioning</b>	<p>Professional mechanical and electrical installation of pumps and accessories by Grundfos specialists, ensuring correct setup from the start.</p>	<p>Avoids the common and costly mistakes of improper installation that lead to immediate inefficiency, increased wear and a shortened asset lifespan. Frees up the operator's internal resources for core tasks.</p>	<p><b>Installation costs (Cin), Energy costs (Ce), Maintenance costs (Cm)</b></p>   
 <b>Laser Alignment</b>	<p>Precision alignment of pump and motor shafts to fractions of a millimetre using laser optical technology, applicable for all long-coupled pumps that are common in DE plants.</p>	<p>Directly reduces energy waste caused by friction and vibration. Significantly extends the life of bearings, seals, and couplings, lowering maintenance costs and preventing premature failure. A foundational step for TCO reduction.</p>	<p><b>Energy costs (Ce), Maintenance costs (Cm)</b></p>  
 <b>Repair and Spare Parts, Service Kits</b>	<p>Rapid on-site or workshop repair services for any pump brand, using original Grundfos spare parts and pre-packaged service kits to ensure quality, preserve warranty and minimise disruption.</p>	<p>Guarantees the fastest possible response to a failure, minimising the financial and reputational damage of downtime. Using OEM parts ensures the integrity and longevity of the repair, preventing recurring issues.</p>	<p><b>Downtime costs (Cs), Maintenance costs (Cm)</b></p>  

# Case studies: Real-world partnerships in district energy optimisation

The principles of lifecycle optimisation and the value of a TCO-centric approach are best illustrated through real-world application. The success of Grundfos' service and solutions portfolio is not measured in products sold, but in the tangible, measurable outcomes achieved in partnership with our customers. These cases demonstrate that the "lifecycle partnership" model is a proven strategy for solving the most pressing challenges in district energy.

1

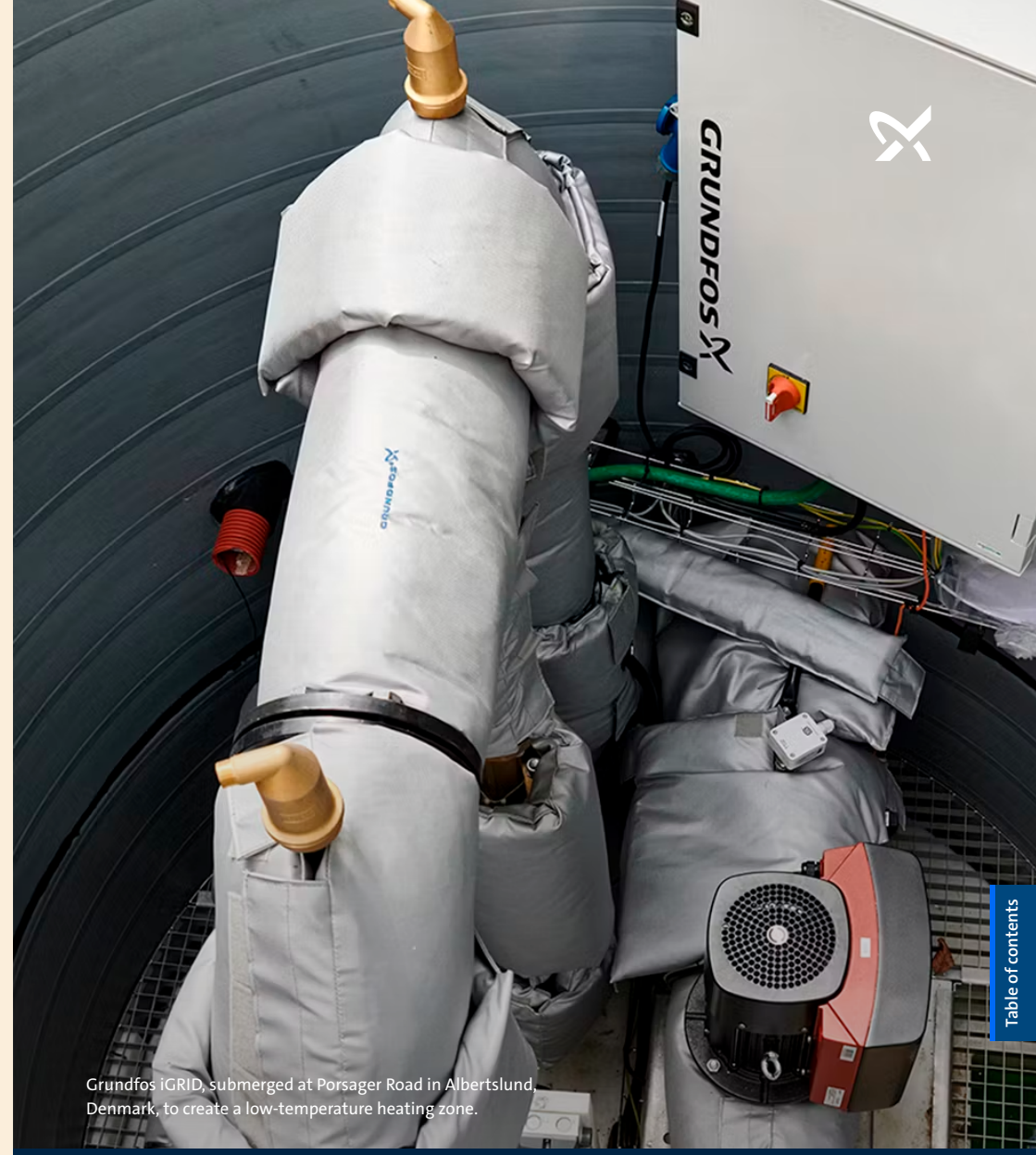
## Case study: The iGRID partnership for proactive optimisation

*Delivering quantifiable energy savings in Denmark*

**Partners:** Albertslund Forsyning, Denmark

**Focus:** Energy cost reduction (Ce)

Similarly, in Denmark, the utility Albertslund Forsyning partnered with Grundfos to deploy an iGRID solution with the goal of reducing its network supply temperature from 100 °C to 60 °C (212 °F to 140 °F). This strategic move was designed to slash heat loss in the pipes and, critically, to enable the use of low-temperature renewable energy sources and surplus heat from buildings. The partnership proved to be a cost-beneficial and highly effective strategy, increasing the overall system efficiency and future-proofing the network for the green energy transition. Both cases highlight how a proactive partnership focused on optimisation can deliver significant, quantifiable reductions in energy costs (Ce) and accelerate sustainability goals.



Grundfos iGRID, submerged at Porsager Road in Albertslund, Denmark, to create a low-temperature heating zone.

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## Explore further here:

→ **Albertslund Forsyning, Denmark:** <https://www.grundfos.com/about-us/cases/danish-utility-enjoys-ease-of-grundfos-igrid-to-control-low-temperature-district-heating>

## 2

## Case study: The iGRID partnership for proactive optimisation

*Delivering quantifiable energy savings in Poland*

**Partners:** OPEC Gdynia, Poland

**Focus:** Proactive Optimisation

In Gdynia, Poland, the regional district heating operator OPEC faced the dual pressures of a municipal mandate to cut carbon emissions by 43% and rising energy price volatility. In a collaborative pilot project, Grundfos and OPEC jointly planned and implemented a Grundfos iGRID temperature zone. This was not a simple product installation but a co-created solution tailored to the specific needs of the Karwiny district. The intelligent mixing loop solution immediately began to lower the supply temperature based on real-time demand, leading to a 30% reduction in flow rate from the main network and a projected annual energy saving of 984 GJ (273.3 MWh) in that section alone. This tangible result not only reduced costs but also allowed OPEC to obtain a government-issued 'white certificate,' a tradable financial instrument that provides additional income for further modernisation projects.



The operational iGRID mixing loop at OPEC Gdynia, Poland, featuring intelligent pumping units designed to lower supply temperatures based on real-time demand.

### Explore further here:



OPEC Gdynia, Poland: <https://www.grundfos.com/about-us/cases/more-efficient-district-heating>

### 3

## Case study: The strategic partnership for long-term resilience

*Engineering a resilient national energy supply in Andorra*

**Partners:** Forces Electriques d'Andorra (FEDA), Andorra

**Focus:** Long-term strategic collaboration, System design and resilience

The partnership with FEDA in Andorra exemplifies a long-term, strategic collaboration to support a national energy transition. Faced with a mountainous terrain that creates extreme pressure differentials in its DE networks, FEDA needed more than just pumps; it needed a partner with deep application expertise to help engineer a resilient and efficient system. Over a decade-long relationship, Grundfos has served as a key strategic advisor, providing what FEDA's leadership calls "excellent advice on using the best pumping systems".

This partnership went beyond standard product supply. Grundfos collaborated with FEDA to innovate, "updating the rules of the game" by deploying booster pumps in a novel configuration to manage the high pressures—a departure from typical DE design. FEDA's Head of Thermal Engineering emphasised that while the Grundfos product quality is high, "the support is better," highlighting the critical value of responsive, expert collaboration in solving complex, real-world engineering challenges. The result is a DE network that has secured Andorra's energy autonomy, reduced its reliance on fossil fuels and stabilised its power grid. This case demonstrates the profound value of a partnership built on trust, innovation and unwavering support throughout the entire system lifecycle.



FEDA Ecoterm uses vertical booster pumps from Grundfos to help deal with high pressures of transferring heated and chilled water in the extreme altitude differences of Andorra.

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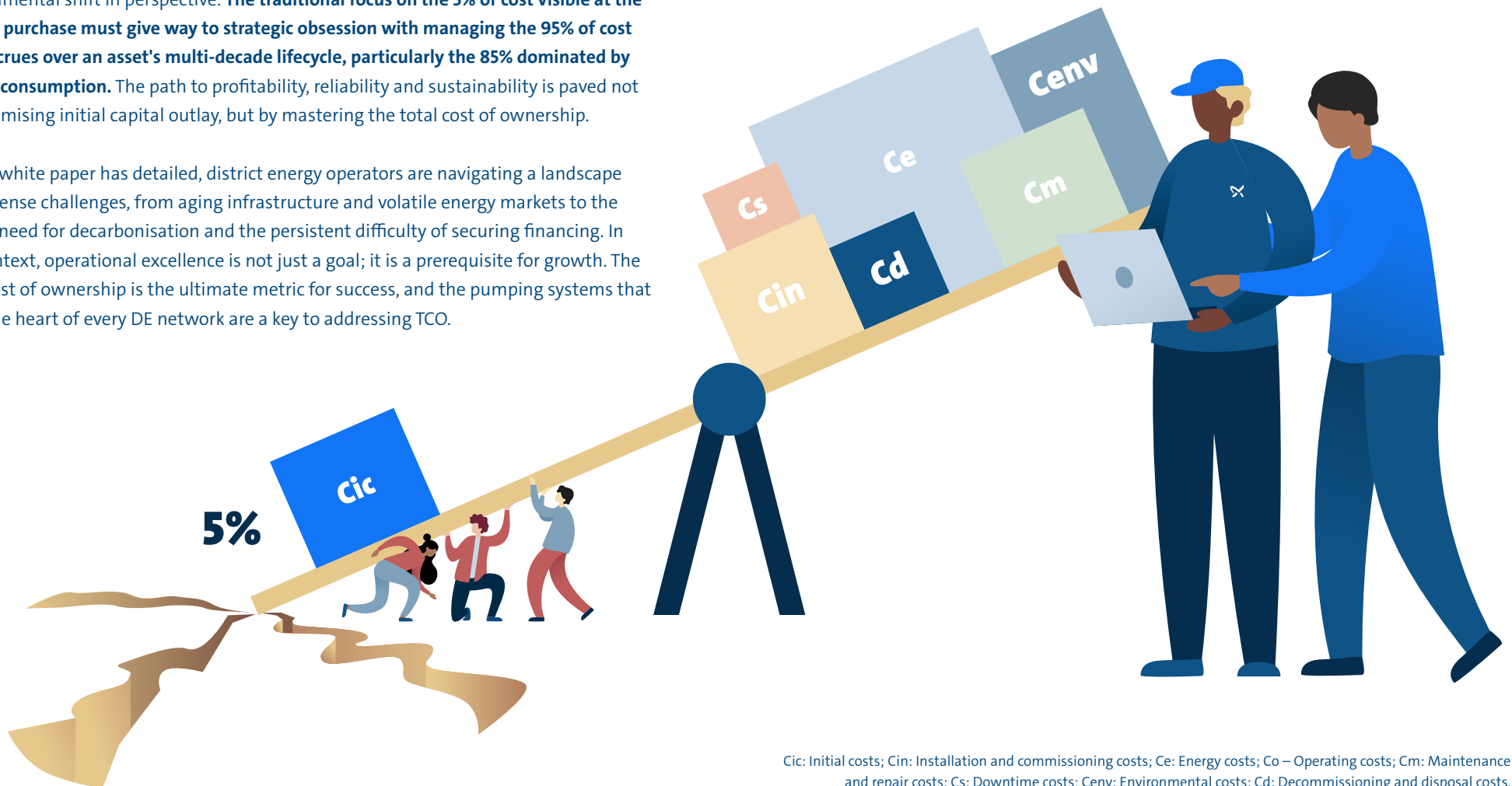


Forces Electriques d'Andorra (FEDA), Andorra: <https://www.grundfos.com/about-us/cases/district-energy-in-andorra-a-southern-european-pioneer>

# Conclusion: Forging a resilient and profitable future for district energy

The future of district energy—a sector essential for global decarbonisation—hinges on a fundamental shift in perspective. **The traditional focus on the 5% of cost visible at the time of purchase must give way to strategic obsession with managing the 95% of cost that accrues over an asset's multi-decade lifecycle, particularly the 85% dominated by energy consumption.** The path to profitability, reliability and sustainability is paved not by minimising initial capital outlay, but by mastering the total cost of ownership.

As this white paper has detailed, district energy operators are navigating a landscape of immense challenges, from aging infrastructure and volatile energy markets to the urgent need for decarbonisation and the persistent difficulty of securing financing. In this context, operational excellence is not just a goal; it is a prerequisite for growth. The total cost of ownership is the ultimate metric for success, and the pumping systems that form the heart of every DE network are a key to addressing TCO.



Cic: Initial costs; Cin: Installation and commissioning costs; Ce: Energy costs; Co – Operating costs; Cm: Maintenance and repair costs; Cs: Downtime costs; Cenv: Environmental costs; Cd: Decommissioning and disposal costs.



**Lifecycle  
optimisation  
partner**

Grundfos offers a clear and proven path to mastering TCO. We have moved beyond the role of a component supplier to become a dedicated **lifecycle optimisation partner**. Our approach is built on a comprehensive and integrated framework that addresses every stage of an asset's life and every component of the TCO equation. This is made possible by a unique and powerful combination of three core pillars:

- 1. Unmatched pump and application expertise:** Decades of leadership in designing and manufacturing the world's most reliable and efficient pumps, coupled with deep, system-level understanding of district heating and district cooling networks.
- 2. Data-driven optimisation:** A portfolio of services centered on Grundfos Energy Optimisation, which provides the data and insights necessary to identify and quantify the most significant opportunities for energy and cost savings.
- 3. Innovative business models:** A commitment to true partnership, exemplified by the Grundfos Leasing Solution, which removes the primary financial barrier to modernisation by converting capital costs into predictable operational expenses, giving operators immediate access to the best technology and services.



The journey toward a more resilient and profitable future for your district energy operations begins with a single step. We invite you to move beyond the traditional procurement process and begin a conversation about partnership.

Engage with Grundfos for a comprehensive Grundfos Energy Optimisation, Grundfos Health Check or a TCO consultation to uncover the specific optimisation potential hidden within your network. Let us work together to transform your operational costs from an unpredictable liability into a powerful strategic asset, ensuring that your district energy system delivers on its promise for decades to come.

You have seen the evidence: the path to profitability and sustainability lies in mastering the Total Cost of Ownership. But identifying the potential within your network is only the first step. Realising it requires a partner with the expertise to turn data into action.

Whether you are planning a new network, upgrading legacy infrastructure, or looking to unlock hidden efficiencies in your current operations, Grundfos is ready to help you transition from a CAPEX-focused model to a lifetime of operational excellence.

**Contact our District Energy experts**  
at [grundfos.com/solutions/industries/district-energy?tab=contact](https://grundfos.com/solutions/industries/district-energy?tab=contact)

Let's talk!



**Ready to optimize your operations?**

Scan here to connect with a Grundfos specialist and discuss your specific needs.



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