

# Calculating the Total Cost of Ownership (TCO) in Pump Operations

For Industrial & Large Commercial Applications

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# Introduction

This Insight Report looks at the Total Cost of Ownership of a pump and why it's an important consideration before purchasing.

Understanding the Total Cost of Ownership, or TCO, is the only way to calculate the actual cost of running and operating a pump or a group of pumps. This includes all the associated costs of running a pump and is now even more critical when planning the transition to more efficient and sustainable solutions.

Trebles offers businesses the opportunity to create a pump specific TCO cost comparison and calculate and analyse the respective overall costs throughout the pump lifecycle.



# What is TCO?

TCO is a financial estimate that encompasses all direct and indirect costs associated with acquiring, operating, and maintaining a product or asset over its entire lifespan.

One can understand these costs by using this model for pumping systems that can be extended to almost any class of manufacturing equipment:

$$\text{TCO} = \text{Ca} + \text{Cc} + \text{Co} + \text{Cm} + \text{Cp} + \text{Cd}$$

## Ca - Cost of Acquisition

Includes the cost of engineering, procurement, equipment cost, auxiliary equipment cost, inspections and documentation.

## Cc = Cost of Commissioning

Includes the cost of construction, testing, training and technical support.

## Co = Cost of Operation

Includes energy, operating personnel, facility costs, support and handling for raw materials.

## Cp = Cost of Maintenance

Includes maintenance personnel, maintenance facility costs, test equipment, support and handling cost, spares and repair parts.

## Cp = Cost of Production

Includes production losses, quality cost, environmental cost and cost of redundancy.

## Cd = Removal and Disposal

Minus any reclamation value.



# Components at Play

## Initial Purchase Cost

The initial purchase cost of a pump is the most apparent component of TCO. It includes the price of the pump unit itself, along with any additional accessories, customisation, or installation charges.

Factors such as pump type, capacity, construction material, and technology influence the initial purchase cost. While opting for lower-cost options may seem economical upfront, it is essential to consider long-term implications on energy consumption, maintenance, and reliability.

## Installation and Commissioning

Proper installation and commissioning are critical for ensuring optimal pump performance and longevity. Costs associated with installation include labour, materials such as piping and fittings, and downtime during installation.

Inadequate installation can lead to inefficiencies, premature wear, and increased energy consumption, ultimately impacting the TCO over the pump's operational lifespan.

## Energy Consumption

Energy consumption during pump operation constitutes a significant portion of the TCO. The efficiency of a pump directly influences its energy consumption, with more efficient pumps consuming less power for the same output.

Energy-efficient features such as variable speed drives (VSDs), high-efficiency motors, and optimised pump designs can substantially reduce energy costs over time.

## Maintenance and Repairs

Regular maintenance is essential for preserving pump performance, preventing unexpected failures, and extending its operational life. Maintenance costs encompass scheduled servicing, replacement of wearing components, and repairs due to unexpected breakdowns.

Neglecting maintenance can lead to reduced efficiency, increased energy consumption, and costly repairs, significantly impacting the TCO.



### Downtime and Production Losses

Pump failures or downtime can disrupt production schedules, leading to substantial financial losses. Downtime costs include lost revenue, labour expenses for repair work, and potential fines for missed deadlines or contractual obligations.

### Spare Parts and Inventory Management

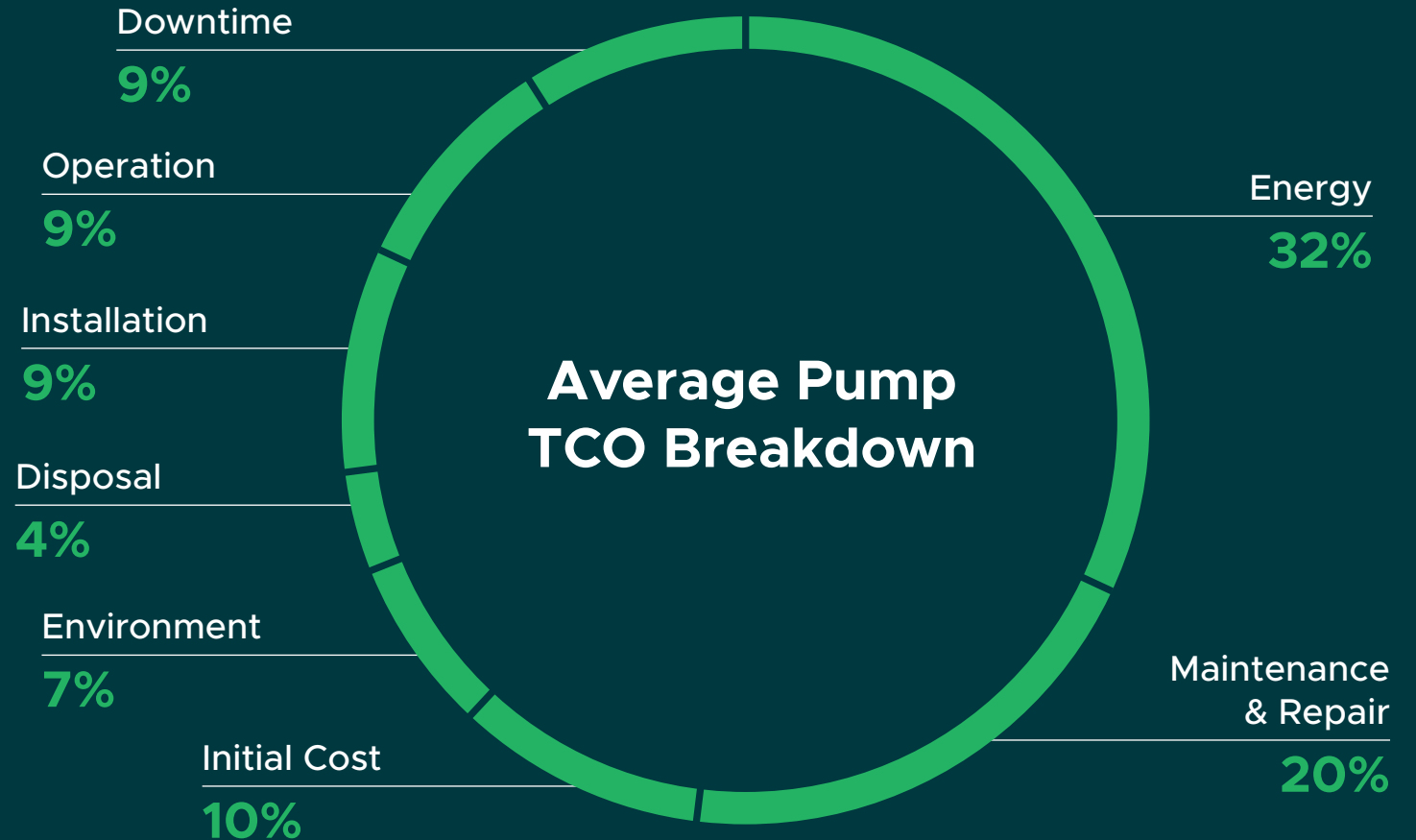
Maintaining an inventory of critical spare parts is essential for minimising downtime and ensuring prompt repairs but incurs additional costs related to inventory storage, procurement, and obsolescence.

Effective inventory management strategies, such as just-in-time procurement and predictive maintenance, can optimise spare parts inventory while minimising costs.

### Lifecycle and Replacement

Industrial pumps have finite lifespans, beyond which their efficiency and reliability may decline. Planning for pump replacement involves assessing factors such as technological obsolescence, changing operational requirements, and environmental regulations.

Replacement costs, including purchasing new equipment, installation, and disposal of the old pump, contribute to the overall end-to-end TCO.



Graph 1: Data from Pumps & Systems

# Strategies for Reducing TCO

Reducing the overall TCO involves implementing a range of strategies to optimise efficiency, minimise downtime, and extend the lifespan of equipment.

## Energy Efficiency Measures

Investing in energy-efficient pump technologies, such as those equipped with variable speed drives (VSDs), allows for precise control of pump speed according to demand, minimising wasted energy during periods of low usage. Additionally, retrofitting existing pumps with energy-saving features or optimising system configurations can further enhance energy efficiency and lower long-term operational costs.

## Proactive Maintenance Practices

Regular inspections, lubrication, and condition monitoring help detect and address potential issues before they escalate into costly failures, thereby extending the lifespan of pump equipment.

Leveraging predictive maintenance technologies, such as vibration analysis and thermal imaging, enables early detection of abnormalities and facilitates timely intervention to prevent unplanned downtime and reduce repair expenses.

## Lifecycle Cost Analysis (LCCA)

Conducting a LCCA is also essential. This evaluation considers all relevant cost factors associated with pump ownership, including acquisition, installation, operation, maintenance, and disposal. By comparing different pump options and considering long-term implications, businesses can make informed decisions that optimise TCO and maximise overall value. Additionally, selecting pumps from reputable manufacturers known for quality and reliability can mitigate the risk of premature failures and minimise repair costs over time.



# Comparing a Smart Pump to a Traditional Pump

## Efficiency and Energy Consumption

Traditional pumps typically operate at a constant speed, regardless of actual demand. This can result in higher energy consumption, especially during periods of low demand when the pump operates inefficiently. Smart pumps, on the other hand, are equipped with advanced control systems, such as variable speed drives (VSDs) or digital controllers, allowing them to adjust speed and flow rates based on real-time demand. This dynamic operation improves energy efficiency and reduces overall energy consumption, resulting in potential cost savings over time.

## Monitoring and Maintenance

Maintenance of traditional pumps often relies on reactive approaches, with maintenance performed based on predetermined schedules or in response to failures. This can lead to unexpected downtime, increased repair costs, and reduced overall reliability.

Smart pumps, however, feature built-in sensors and monitoring systems that continuously track key performance metrics, such as vibration, temperature, and flow rates. This data enables predictive maintenance strategies, where maintenance activities are scheduled based on the pump's actual condition, minimising downtime, and optimising maintenance costs.

## Remote Monitoring and Control

Monitoring and controlling traditional pumps typically require manual intervention, with operators physically inspecting pump systems and adjusting settings as needed. This can be time-consuming and may result in delays in responding to operational issues.

In contrast, smart pumps can be integrated into centralised control systems and networks, allowing for remote monitoring and control. Operators can access real-time data, adjust operating parameters, and diagnose issues from a centralised dashboard, enabling faster response times and more efficient management of pump systems.

## Data Analytics and Optimisation

Traditional pumps lack the capability to leverage data analytics for performance optimisation. Operators rely on manual analysis and experience to identify opportunities for efficiency improvements. Smart pumps, on the other hand, utilise advanced data analytics algorithms to analyse operational data and identify trends, patterns, and anomalies. This enables operators to optimise pump performance, anticipate maintenance needs, and implement energy-saving strategies based on data-driven insights.

## Integration with IoT and Industry 4.0 Technologies

Traditional pumps are standalone systems with limited connectivity to other devices or systems. Integrating them into broader Internet of Things (IoT) or Industry 4.0 initiatives may require additional retrofitting or upgrades. Smart pumps, however, are designed with connectivity in mind, enabling seamless integration with IoT platforms and Industry 4.0 technologies.



They can exchange data with other equipment, systems, and cloud-based applications, facilitating comprehensive asset management, predictive analytics, and optimisation across the industrial ecosystem.

### Optimal Pump Selection

Optimal pump sizing and selection play a crucial role in TCO reduction. Oversized pumps can lead to excessive energy consumption and inefficiencies, while undersized pumps may struggle to meet demand and experience premature wear. Conducting thorough hydraulic calculations and system assessments ensures that pumps are properly sized for their intended tasks, optimising energy efficiency and reducing unnecessary operating expenses.



### Spare Parts Management

Efficient spare parts management is another key strategy. Maintaining an organised inventory of critical spare parts and components helps reduce downtime and repair costs in the event of equipment failures. By identifying key components prone to wear and keeping adequate stock levels on hand, businesses can expedite repairs and minimise production disruptions. Implementing inventory management systems and establishing relationships with reliable suppliers can streamline spare parts procurement and reduce associated costs, ensuring timely access to necessary components without overstocking or unnecessary expenditures.

### Employee Training and Knowledge Transfer

Investing in employee training and learning courses is essential. Well-trained staff can identify potential issues early, perform routine maintenance tasks correctly, and troubleshoot problems efficiently, reducing reliance on costly external service providers. Continuous training fosters a culture of ownership and accountability, where employees are empowered to take proactive measures to optimise pump performance and minimise TCO over time.

By implementing these strategies collectively, businesses can effectively reduce the TCO for their industrial pumps, optimising operational efficiency and maximising long-term profitability.

	Traditional	Smart
Functionality	Basic	Advanced
Energy Efficiency	Operate at fixed speeds	Dynamically adjust speed
Maintenance	Reactive	Predictive using sensors
Monitoring & Control	Limited	Remote and automated
Cost	Lower upfront cost & higher long-term expenses	Higher upfront cost & lower long-term expenses
Integration	Limited integration with modern technologies	Seamless integration with IoT and Industry 4.0
Adaptability	Limited adaptability to future needs	Scalable and flexible for future upgrades

# Overall end-to-end TCO

Pumps and their associated technological environment can seem complex and very incomprehensible at first. We can help to clarify any uncertainties and demonstrate the advantages of upgrading or replacing.

Financial transparency is created through our complete end-to-end TCO analysis.

Trebles is committed to reducing end-to-end TCO for industrial and commercial pump systems through a comprehensive approach. By providing energy-efficient pump models and retrofitting solutions equipped with features such as variable speed drives (VSDs), Trebles ensures optimal energy consumption aligned with demand, leading to substantial long-term savings.

By offering proactive maintenance strategies, including predictive maintenance techniques and remote diagnostics, to identify and address potential issues before they escalate, we help minimise downtime and maintenance costs.

With expertise in Lifecycle Cost Analysis (LCCA), optimal pump sizing, and comprehensive training and support services, Trebles empowers businesses to make informed decisions that optimise TCO, maximise efficiency, and enhance the reliability of their pump assets.

## Conclusion

Whether you are already in the pipeline to upgrade your pump solutions or just started to think about your journey, it's important to understand that it is not as simple as just comparing the upfront costs of acquiring a more efficient pump.

The longer-term benefits of upgrading to more efficient solutions will come at a higher initial cost. But understanding and using these longer-term benefits will make transitioning a much more attractive financial proposition.

Planning the change is vital. If you make the right decisions and choose the correct setup at the start of the journey, this makes for a more successful and sustainable journey in the long run.

# About Trebles

Trebles is the leading independent distributor, offering manufacturing and service capabilities backed by over 50 years of experience in the pump industry.

**We are Trebles.**  
We're committed to keeping the flow.

## What we do

Established in 1966, Trebles is the UK's largest independent pump distributor with manufacturing and service capabilities. With over 50 years of expertise, Trebles boasts technical knowledge spanning over 50 suppliers and 500 years of combined experience. Holding over £3.5 million in stock, including its branded products like EcoBoost and EcoBoost+ booster sets, Trebles ensures quick nationwide delivery from its branches in Wolverhampton, Derby, and Uxbridge. Offering bespoke solutions like packaged plant rooms and skids, along with comprehensive service and commissioning options, Trebles delivers unparalleled support and innovation to its customers across the UK.





# Get in Touch

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