

DEMAND DRIVEN DISTRIBUTION

The reliable solution for reduced
leakage and lower energy costs

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DRIVE DOWN WATER LOSS

The key issue of reducing and controlling non-revenue water (NRW) in distribution networks is many faceted with no single cure. Central to a typical strategy is to minimise losses through existing leaks and reduce the risk of new leaks.

Pressure management is now well recognised as being essential to effective leakage management. In addition to pressure management, the International Water Association (IWA) also recommends active leak control, speed and quality of repairs, and infrastructure management.

Grundfos' contributions lie within pressure management and infrastructure management, as presented on the following pages. We have developed systems to support pressure management systems, and these are integrated in our pumping solutions.

CUT WATER LEAKAGE BY 15% IN AVERAGE

With unique pressure control, the Grundfos DDD multi-pump controller automatically reduces surplus pressure in the water mains. Both leakage losses and energy costs are reduced significantly as a result.

START WITH THE PUMP FIRST

When you start replacing pipes, you also reduce water loss and friction loss, resulting in increased pressure in other parts of the network. It is therefore important to be able to manage pressure from the pump. So before you start digging up the streets to repair leaks, make sure you have the right pumps and controllers first. If you have variable flow, an analysis of patterns will reveal the potential benefits of optimising your pump systems.

In 2018, Non-Revenue Water (NRW) was estimated at 126 billion cubic metres globally, equivalent to an economic value of more than **\$39 billion per year***










PRESSURE MANAGEMENT: REDUCTION OF EXCESS AVERAGE AND MAXIMUM PRESSURE								
CONSERVATION BENEFITS			WATER UTILITY BENEFITS			CUSTOMER BENEFITS		
REDUCED FLOW RATES			REDUCED FREQUENCY OF BURSTS AND LEAKES					
Reduced excess or unwanted consumption	Reduced flow rates of leaks and bursts	Reduced and more efficient use of energy	Reduced repair and reinstatement costs, mains & services	Reduced liability costs and reduced bad publicity	Deferred renewals and extended asset life	Reduced cost of active leakage control	Fewer customer complaints	Fewer problems on customer plumbing & appliances
								

Figure 1: Multiple benefits of pressure management

WHAT IS YOUR ISSUE?

Operation of pumping stations and water networks is both interesting and challenging at the same time. Some of the issues, and the following consequences, you meet as a Water Networks Professional are listed below. Luckily, sometimes the toughest problem can be solved with a simple solutions – such as pressure management and/or clever design.

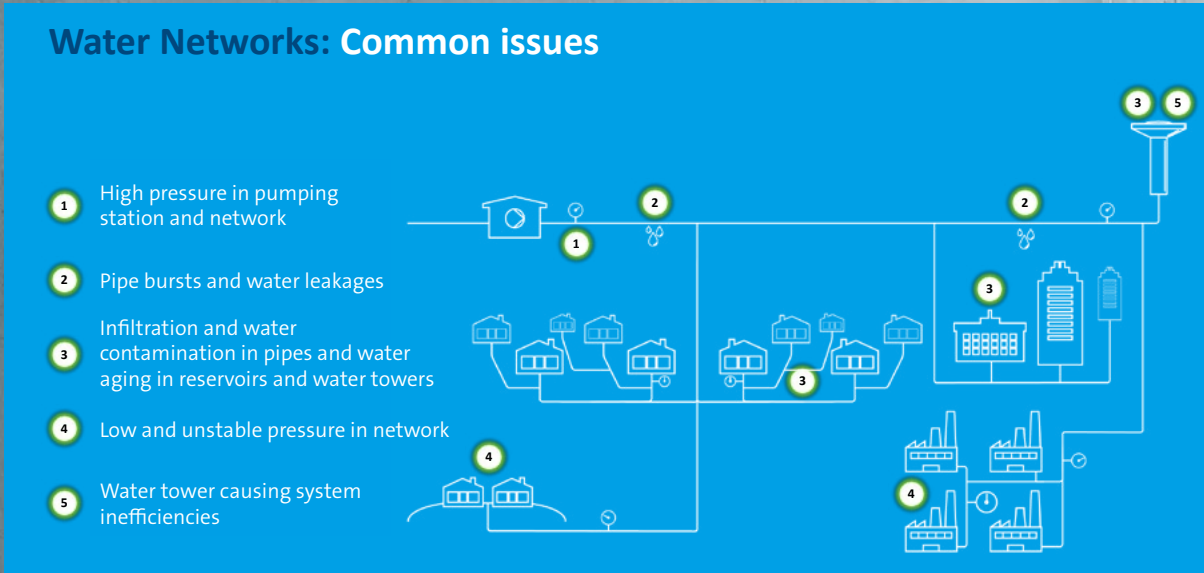


Figure 2

Which of these issues do you recognise in your Water Network?

ISSUES	CONSEQUENCES
1 High pressure in pumping station and network	<ul style="list-style-type: none">• Too high energy consumption• Too high leakage level• Too many pipe bursts• Too high service & maintenance costs on pumps and pipes
2 Pipe bursts and water leakages	<ul style="list-style-type: none">• Too high non-revenue water level*• Too high service & maintenance costs on pipes
3 Infiltration and water contamination in pipes and water aging in reservoirs and water towers	<ul style="list-style-type: none">• Higher health risks• Risk of bad publicity• Risk of fines
4 Low and unstable pressure in network	<ul style="list-style-type: none">• Increasing number of customer complaints• Too high pumping pressure to compensate for low demand periods
5 Water tower causing system inefficiencies	<ul style="list-style-type: none">• Too high energy consumption• Too high leakage level• Higher health risks• Risk of bad publicity and fines

*According to IWA, 80% of non-revenue water is caused by leakage & bursts

Figure 3

TAKE CONTROL OVER NETWORK PRESSURE WITH DEMAND DRIVEN DISTRIBUTION

Taking control of pressure equals control of your water distribution system – this is the key learning from Pressure Management. Grundfos has developed DDD for pressure management in different types of water distribution networks, such as single pumping station network, with or without water tower as a part of the design. It is estimated that the current solution fits between 40% to 90% of all water network pumping

stations, depending on local standards/traditions for design. DDD is under constantly development, and strive to cover as many different network design as possible. DDD is self-learning and self-tuning, and individual customization to each project is kept to a bare minimum. This is Plug&Play in its purest form. The different DDD solutions are described on the following pages.

The Grundfos Demand Driven Distribution solution ensures complete, instant control and unbeatable efficiency, while reducing leakage loss, energy costs and maintenance work.



DDD1 FOR SINGLE PUMPING STATION NETWORK

THE SOLUTION

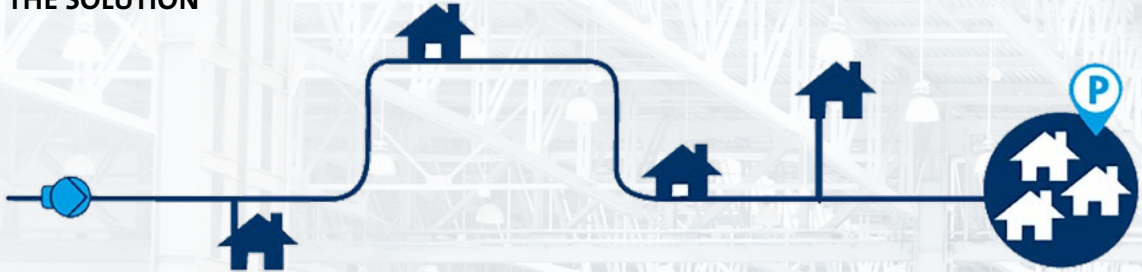


Figure 4

Demand Driven Distribution measures the pressure in the network using a number of battery-driven data loggers that transmit the measured and logged values to the Demand Driven Distribution pump controller. The data are then used in a smart adaptive control approach that controls the pumping station, stabilizing the pressure in the network at the desired level, without compromising end-user comfort.

+100 DDD Case studies: Results achieved

Average results/savings achieved in +100 DDD projects all over the world are:



15%
Leakage savings



25%
Energy savings



35%
Reduction in pipe burst



More about case stories:



Figure 5

DDD2 FOR WATER TOWER FILLING IN SINGLE PUMPING STATION NETWORKS

THE SOLUTION



Figure 6

By far the most water towers are filled using an on/off pumping strategy, that eventually can cause water hammer and increased risk of pipe burst and infiltration. Likewise, of/off pumping strategy will lead to fluctuation pressure conditions in the network, which can be considered unsatisfying for the consumer. Grundfos DDD for water tower applications is design to “level out” pump operation and tank filling as much as possible – without compromising the ability to secure a sufficient water supply. DDD Pressure Management Controller high efficient pumps, frequency drives and online level-sensors are corner stones in the infrastructure.

THE BENEFITS



Reduce Energy consumption
(13%)



Increase comfort
(Constant pressure in the city)



Reduce Service & Maintenance
(Less burst, Less water hammer)



Increase the life time
of the pipes and the pumps
(Less inrush current)



Easier to get control
over water age in the water tank

Figure 7

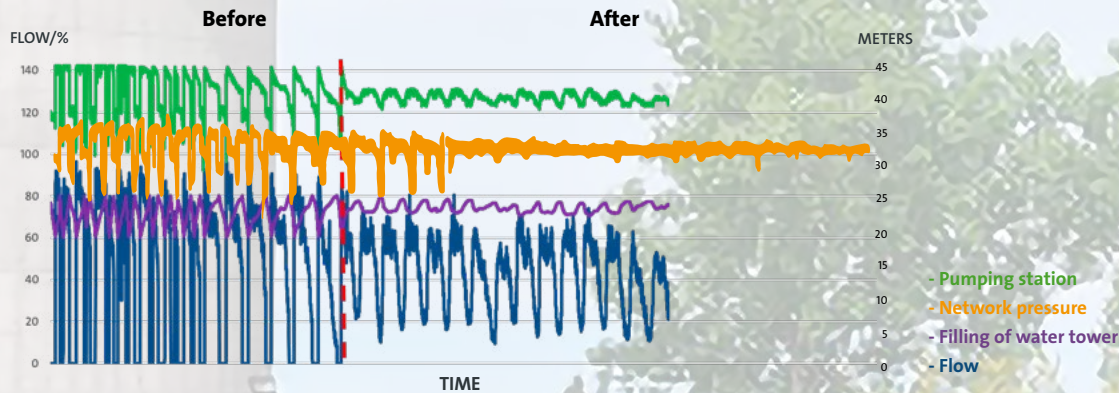


Figure 8

PRESSURE MANAGEMENT CASE STORIES

REDUCING LEAKAGE LOSSES (NRW) BY 30%

The Padania Acque Gestione S.p.A water company in Montodine, Italy was losing water and using more energy than necessary in its local distribution grid. The solution was to use the Grundfos Demand Driven Distribution (DDD) controller and state of the art pumps to monitor and adjust the pressure.

Pressure transducers were installed at the ends of the water network, where pressure values are measured and then sent to the DDD controller. The controller ensures optimum pressure, and by gradually ramping-up and ramping-down pressure avoids sudden momentum changes in the pipes, reducing water hammer and thereby water loss.



FACTS:

Total network of supply pipes:	10.3 km
Population served:	6,580
Energy used:	275,000 kWh
Water distributed:	670,000 m3/year
Reduction in real losses:	25,000 m3/year
Reduction from total losses:	30%

HIGHLIGHTS FROM OTHER CASES

29% PIPE BURST REDUCTION

Takéo Safe Water Supply Company, Cambodia
Implementing DDD ensured 24-hour water supply to 44,000 people in 45 villages in Takéo province, Cambodia. NRW was reduced by 13%, pipe bursts by 29% and energy savings by 20%.

32% ENERGY SAVING

Essbio-Nuevosur waterworks company, Chile
Eighteen months after installing DDD to serve the city of Talca in Chile, energy consumption has fallen by 32%. 300,000 households are now assured stable water supply.

30% ENERGY SAVING

Rottal Water Supply Association, Germany
A complete refurbishment with new Grundfos booster pumps and DDD pressure management realised energy savings of 30% in this rural area in Lower Bavaria, Germany.

+100 DDD CASE STUDIES: RESULTS ACHIEVED

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15%

Leakage
savings



25%

Energy
savings



35%

Reduction in
pipe burst
frequency

More info at

