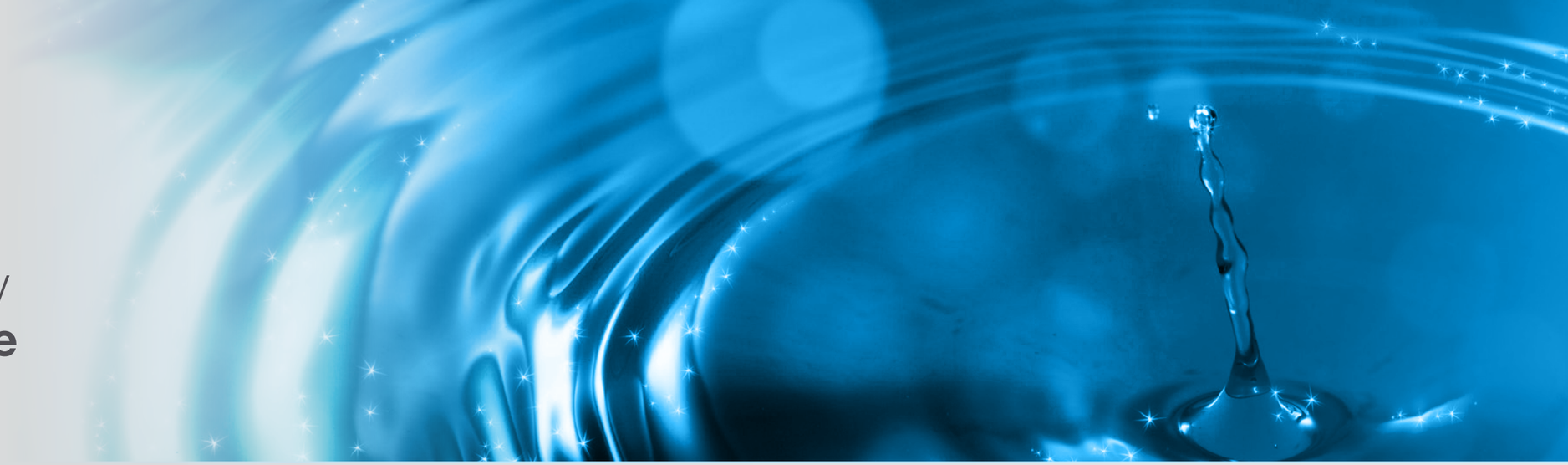
Water Cycle

Comprehensive water management solutions

PETROL

Energy for life

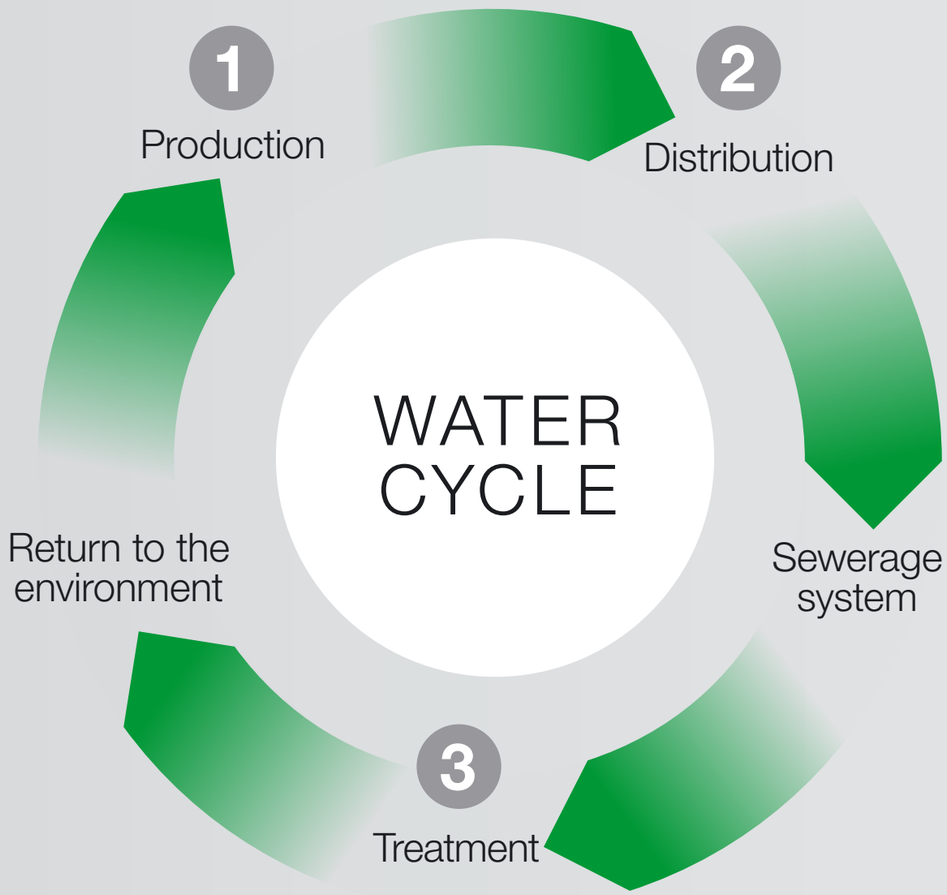
We take care of the quality of water resources and diligently and effectively **manage water** throughout the water cycle



As in the global hydrological cycle, water also circles in the urban water cycle. It is marked by quick population growth, urbanisation, pollution and climate changes.

A safe and reliable water supply is thus one of the key challenges of the 21st century.

To face this challenge, Petrol developed a range of solutions for water cycle management, as sustainable, green and smart society is part of our vision for the future.



1 PRODUCTION

We ensure a **smaller required water** abstraction from the environment because of lower water loss in the distribution phase.

During the technological processes, we ensure water cooling and treatment, and its **return for re-use**.

2 DISTRIBUTION

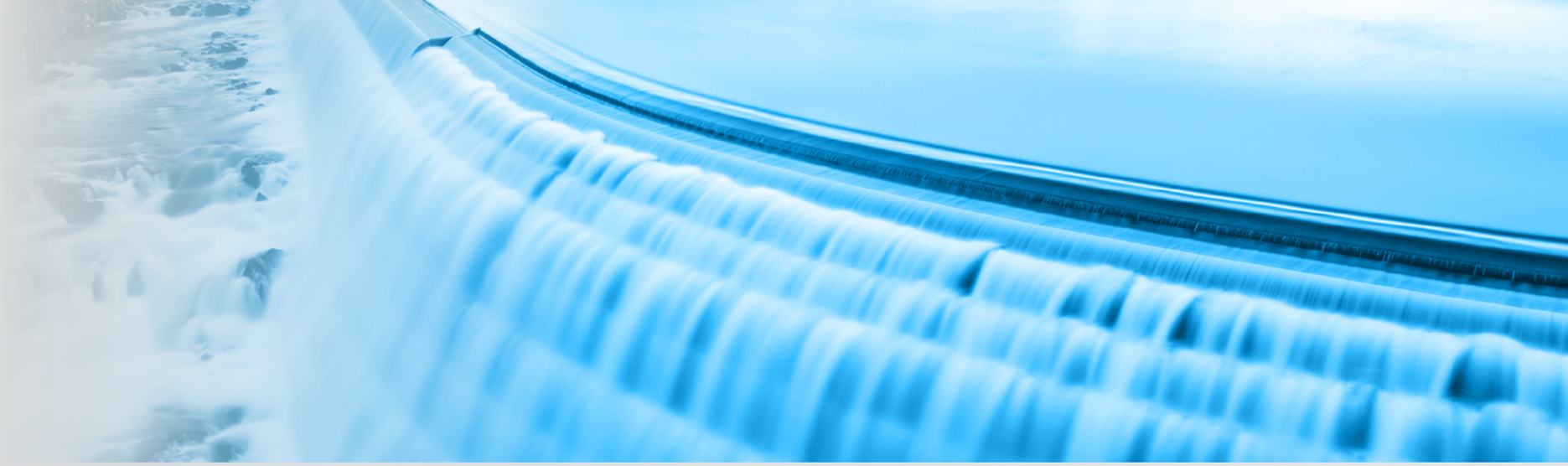
With comprehensive solutions **DISNet – WS** (Digital Intelligent Smart Networks – Water Systems), we improve the **efficiency of water distribution** systems operations and ensure their economical planning.

We identify and **reduce water loss**, and manage water distribution systems in (near) real-time.

3 TREATMENT

Waste water is treated with treatment plants or technological solutions until it is **suitable to be released back into the environment**.

Water distribution systems management is supported by the modern information solution Tango, to ensure efficient (near) real-time management.



We provide efficient, accessible and sustainable supply of health-compliant **drinking water**, ensuring quality throughout the distribution network

In supplying drinkable water, public utility services and infrastructure operators face increasing demands in terms of safety, quality, sustainability, and efficiency of water distribution systems.

Our primary goal is to provide **healthy drinking water** to end users with lowest operating and maintenance costs.

It is essential to ensure long-term sustainability and reliability of the operating system in a public-private partnership, and to reduce water loss en route to the end user, to **increase revenues**.

WATER LOSS

EVERY DROP COUNTS!

Over **1/3** of global drinking water is lost on the way to end users due to undetected leaks.

€11,360 billion revenues are lost by drinking water distribution companies across the world because of water loss.

49.5 million m³ of 160 million m³ of drinkable water produced in Slovenia is lost on the way to end users.

€33 million is the estimated loss for companies due to drinking water loss, considering the average price in Slovenia.

Source: Miya & The World Bank with Clean Edge Analysis

Source: Operational Programme of Drink Water Supply 2016–2021, June 2016

The right to healthy and safe drinking water is the fundamental basic right of every person.

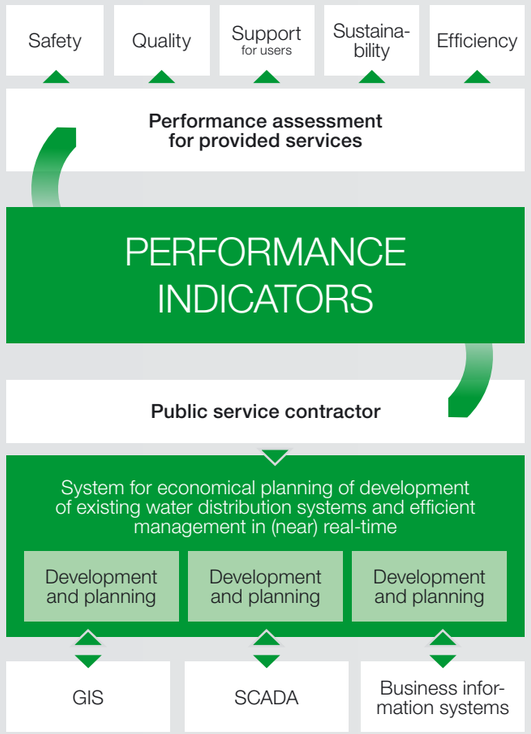
Petrol knowledge and technological equipment provides complete support in effective planning and systems management:

- Creating realistic recordings of actual state.
- Planning development programmes.
- Control of regular operations.
- Monitoring system operations in (near) real-time.
- Maintenance in regular and extraordinary operational circumstances.
- Target-oriented monitoring of produced, distributed and network-discharged quantities of drinking water.
- Monitoring efficiency of management with non-revenue water (NRW).
- Reducing actual water loss (CARL) and retaining the achieved level.

This ensures the following to operators:

- **Increased reliability and operating safety**
- **Higher efficiency**
- **Lower costs**
- **Reduced risks**

Drinking water supply



Source: Operational Programme of Drink Water Supply 2016–2021, June 2016

We provide comprehensive support for improving the **operating efficiency** of the water distribution system

We manage water distribution systems with the help of **modern information platforms**, which gather, check and collect data in one location.

Data is controlled and visualised with key process indicators, alarms and dashboards. Using advanced algorithms for business and artificial intelligence, we then implement automatic procedures for efficient management.

The goal of management processes is to improve operational energy efficiency and to provide the highest level of quality of services at the lowest possible costs.

COMPREHENSIVE SOLUTIONS PROVIDED BY DISNet – WS

Optimal water supply with the lowest operating costs

- Economic and technical control of network operation.
- Reducing costs with preventive actions and proactive management.
- Quicker identification of malfunctions and better response time in the field.
- Supervision of work in the field.
- Optimisation of operations and maintenance.
- Simpler and quicker responsiveness in end-user communication.

Optimisation of water production costs

- Reducing quantities of extracted water.
- Reducing water preparation costs.
- Reducing charges for extracted water.
- Reducing power costs for extraction and preparation.
- Lower environmental impact.

Optimisation of water distribution costs

- Reducing power consumption for pumping water.
- Extending the useful life of the network.
- Efficient pressure management.
- Monitoring quantities of supplied water using metering areas and prompt measures.
- Timely identification of critical sections of the distribution network.

Sustainable and effective development of drinking water supply

- Cost-effective planning of new investments, renovations and revitalisations of existing network.
- Ensuring additional water quantities for new users, without an additional search and exploitation of water resources.
- Upgrade of documented system of management processes (ISO 9001).
- Improving energy efficiency of the entire system (ISO 14001).

Efficient management of drinking water distribution and maintenance of distribution network

- Control of flow, pressure and temperature at any point in the network in (near) real-time.
- Control of water composition.
- Preparation of safety plans for extraordinary events.
- Planning regular and extraordinary maintenance and measures to be taken in case of discrepancy.
- Managing water distribution with minimum interruptions.
- Ensuring continued end-user communication.

	Business models for collaboration with Petrol as the private partner
Contractual provision of water savings (WPC)	• Comprehensive consideration and comprehensive measures for efficient water distribution and consumption. • In the stage of preparatory services on infrastructure, the private partner establishes the conditions for immediate savings. • Ensuring savings without financial risk for the principal. • Preparation of turnkey project.
Public-private partnership (concession)	• Improved drinkable water supply services by public utility service for end users, at unchanged or lower price. • The investment is funded by the private partner; the public partner can therefore allocate budget funds during the PPP into other investments, increasing investment capabilities. • Private partner's multidisciplinary expert know-how with many years of experience.
Standard contractual relationship	• Various services for ensuring efficiency of operations, water distribution system management, and quality drinking water supply services, which the owner/contractor of public utility service submits in a call for tender in accordance with the Public Procurement Act. • The investment can be financed by the public partner, while the private partner provides a performance guarantee. • An efficient investment ensures a modernisation of infrastructure, including an update of management processes.

By reducing losses, we save for our partners enough drinking water to meet the household needs of a city with 80,000 residents

Optimisation of water distribution system in the municipality of Kranj

- Establishment of management centre and implementation of modern information system for (near) real-time management.
- Implementation of efficient and comprehensive control of water distribution network operations.
- Reduction of water loss and energy costs.
- Reduction of maintenance costs for the water distribution network.
- Monitoring and improving the quality of drinking water for all users.

» Our company was established for the purpose of providing mandatory public utility services, which clearly defines the fundamental framework of our mission. Amongst others, we are responsible for managing drinking water. We are committed to sustainable management of resources and development of comprehensive and high-quality solutions for users. We hope to exceed expectations of users, and to provide state-of-the-art municipal utility services in Slovenia. As the first in the region, we implemented comprehensive control of drinking water supply, from the water source to the end user. We are upgrading this demanding process every day by using state-of-the-art tools, thus acting responsibly to the environment as well as our users. With the support of Petrol experts, we continue our initial measures for reducing water loss.«

Marko Kocjančič,
director of public undertaking
Komunala Kranj

WE PROVIDE DISNet - WS SERVICES

- on over 10 water supply systems in over 70 municipalities
- with a total length of water distribution network of over 7,000 km
- with over 700,000 users
- with over 170,000 water meters

70 million m³

of controlled annual produced and distributed drinking water.

3.5 million m³

of recognised non-revenue water.
With estimated costs of water extraction, preparation and distribution at €0.35 per m³, this amounts to at least €0.8 million savings from the water source to end users.

Initially, the quantity of water loss in the municipality of Kranj was approximately 42%.

With our help, it has been reduced to 34%.

We helped reduce water loss in Šalek Valley by 900,000 m³ per year, with savings in water preparation costs and power costs equalling €500,000 per year.

Optimisation of water distribution system in Šalek Valley

- Implementation of efficient control of system operations in (near) real-time.
- Quick detection of water loss.
- Increased operational reliability of the unified water supply system in all included municipalities – Velenje, Šoštanj and Šmartno ob Paki.
- Increased quality of distributed water and reduced time of water supply from production source to end user.
- Reduced assets used for water preparation.

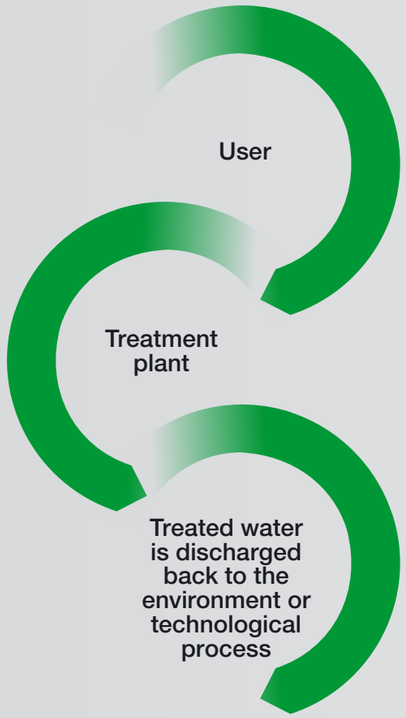
At Komunalno podjetje Velenje, we improve drinking water supply in terms of quality of drinking water and its sustainable development, as well as the energy and economic efficiency. Using cohesion funds, we built three new plants for drinking water preparation and upgraded 42 km of the water distribution system, with Petrol helping us modernise the technological processes of water distribution system management, which are now supported by modern proactive tools for hydraulic modelling, planning and management of the water distribution network.« «

Primož Rošer
head of BU Komunala,
Komunalno podjetje Velenje

We provide municipal **waste water treatment** and enable water discharge back into nature. This decreases the water pollution and reduces the environmental impact.

At Petrol, we provide:

- Comprehensive municipal waste water treatment.
- Economical municipal waste water and industrial waste water treatment, thereby protecting the environment and creating competitive advantages.
- Implementation of sustainable infrastructure and decreased environmental impact.
- Sustainable resource management (reduced raw material usage, extending their use and life cycle).
- Ensure optimal industrial and municipal waste water treatment plant operation.
- Achieving contractually permitted parameters regarding legally allowed quality of emissions and treatment plant operation in accordance with legislation.
- Implementation of technological solutions for optimisation and automation of treatment plant operation, optimisation of investments and operating costs.
- Execution of required investments, from contractual solution planning, construction and management, to new constructions and renovations.



We help cities and regions to make optimal investments into treatment plants, using the PPP model

If cities decide on this investment model, they save their allocation assets, which they can use for other investments, while to a certain extent reducing the burdens of reporting, invoicing and other administrative obligations.

In 2018, as part of the public municipal waste water treatment, service we treated **5.6 million m³ of municipal waste water** at four municipal treatment plants (Murska Sobota, Mežica, Sežana, Ig).

Investment into a treatment plant in a partnership with Petrol

MANAGEMENT CONCESSION

1. Design, engineering	2. Construction	3. Management
Investment optimisation	Financing	Performance guarantee
Selection of technology		Optimisation of technological measures in management
Correct dimensioning of population units		Assumption of reporting obligations
		Assumption of invoicing obligations
		Assumption of risk

CONSTRUCTION AND MANAGEMENT CONCESSION

Optimisation of treatment plant operation, investments and operating costs

When emissions from a treatment plant exceed permitted parameters, operation of treatment plant has to be optimised with an upgrade or selection of the correct and optimal technological processes – Petrol takes care of that.

Advantages of implementing a technological solution for partners:

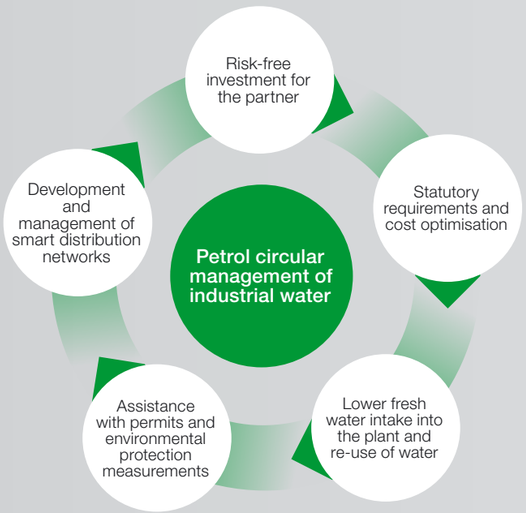
- Reduced risk of uncontrolled discharges into the environment.
- Optimisation of chemical consumption.
- Optimisation of power consumption.
- Prevention of unwanted and offensive odours.
- Automated and digitalised operation using advanced control systems (SCADA, Tango).

In 2018, we treated **1.8 million m³ of industrial waste water** in two industrial waste water treatment plants (Vevče, Paloma).

We provide treatment of industrial waste water and ensure its **re-use** in circulation systems

Economical use of industrial waste water – cooling, treatment and re-use – in addition to positive effects on the environment, it also creates **competitive advantages**.

At Petrol, we ensure re-use of industrial water in circulation systems for rational and environment-friendly use of water. Cooled industrial water in systems is not dangerous to the environment and can be discharged back to nature.



Review of undertaken measures:

- Capture of industrial water from water course and underground wells.
- Extraction of underground drinking water, distribution and supply.
- Capture, filtration and distribution of industrial cooling water.
- Treatment of industrial waste water.
- Extraction, distribution, filtration and cooling of industrial water.
- Treatment and discharge of industrial water and its re-use.
- Sludge dewatering and removal of waste to permanent disposal facilities.
- Management of industrial cooling systems using the online control system from energy process management centres, with constant presence of operators.
- Maintenance and installation of cooling systems with own capacities and with renowned contractual partners.

In the wider economic area of Ravne and Štore, we ensure a reliable and **safe supply of drinking and process water**

In both areas, we manage closed and open industrial water cycles.

WIDER ECONOMIC AREA OF ŠTORE

We annually extract approximately 170,700 m³ of raw water from the Voglajna water course, intended for cooling steel industry processes. The extracted water is improved using a decarbonisation process, treated, and added to various industrial systems.
In systems where water does not come in contact with the material to be processed, it is only cooled; in this closed system, approximately 16.4 million m³ of cooling water is circulated each year. In systems where water does come in contact with the material to be processed, it is first treated and then cooled; in this closed system, approximately 2.3 million m³ of cooling water is circulated each year.

With the closed system and treatment of industrial waste water, we reduce abstraction of raw water from the water course by approximately 18.5 million m³.

WIDER ECONOMIC AREA OF RAVNE

We ensure extraction and distribution of underground drinking and technological water from our own wells. The water is then used for cooling, preparation of domestic hot water and drinking water. **Annually, we extract and distribute over 600,000 m³ of water.**

We extract, filter and distribute industrial cooling water from the River Meža. We supply users with 450,000 m³ of water per month with a gravity flow system.

For the needs of the metallurgic processes, we manage closed cooling systems, and treat an additional 50,000 m³ of faecal water in the treatment plant.

OPEN water cycle

We discharge clean water into the environment when the systems are purged; the water is in contact with the external atmosphere.

At Štore ironworks, we treat industrial water from the steel and rolling process.

CLOSED water cycle

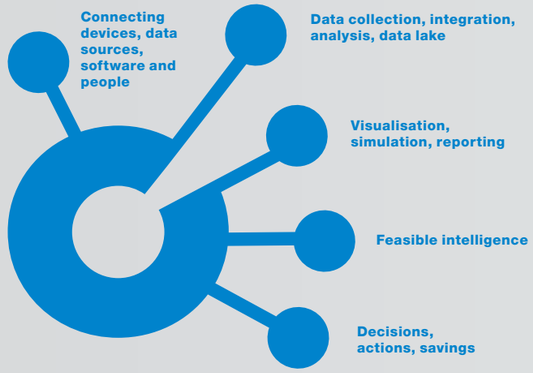
The water circulates in a closed system, is cooled when needed, and does not come in contact with the external atmosphere.

At Štore ironworks, we thus manage the cooling water in the intermediary system for gravity die casting, which requires the highest water quality.

As part of the circular management, we provide:

- Assumption of all risks related to renovation and operation of industrial water systems.
- Clean and non-dangerous cooled industrial water that can be discharged back to the environment.
- Compliance with legal requirements.
- Performance guarantee for agreed parameters, including appropriate emissions into the environment and water quality.
- Rational and environment-friendly use of water.
- Automation of processes.
- The most optimal management processes.

We ensure economical planning, effective control and water cycle management with the modern **information solution – Tango**



Tango is an advanced operational technology platform (OT/IoT) that solves the challenges of modern business, with (near) real-time monitoring of changes, helping users to respond with **quick and smart decisions**. Allows remote control, data aggregation and implementation of key performance indicators. Using advance algorithms, it monitors processes, detects operational irregularities, and economically optimises them using **optimisation algorithms**.

Tango is used as a **report and control system** that can at any time access a smart device to check system operations parameters. It represents a reliable technological solution that, based on validated source data, ensures **simple control over processes and provides reports tailored to users**. By collecting data, Tango displays the required information to operators and allows a review of key performance indicators. Information is also grouped into dashboards for various user levels.

With its adjustable content and intuitive visualisations, Tango is fully configurable to meet your needs. Monitored parameters are determined by the user, based on built-in measuring equipment, while other parameters – such as laboratory measurements and operational monitoring – can be added manually.

Tango enables effective and efficient **monitoring and action on the entire water cycle**, based on validated information. Simple time aggregation allows monitoring of operational and management trends, on levels from management to process engineering, and information is always available on all types of smart devices.

Aggregation of various data sources in one location allows the data to be upgraded to information, information to knowledge, and knowledge to decisions.

Why choose Petrol?

- Diverse knowledge and abundant expertise
- Competencies and technological equipment
- Environment-friendly solutions
- Unique software Tango
- Financing and assuming risk
- Comprehensive solutions for energy and environmental systems
- 400+ energy experts
- State-of-the-art software tools
- Practical experience in past projects
- Many years of market experience
- Performance guarantee with contractual financial instruments
- All required investments for the project, without risks

Collaboration by SIJ Metal Ravne and Petrol

Petrol and SIJ Metal Ravne have been partners in the energy sector for many years. Because of their knowledge of industrial energy processes and many years of experience, Petrol became our reliable and trustworthy partner for ensuring a reliable energy supply, management of energy processes for the needs of SIJ Metal Ravne, and for implementing energy-efficiency projects. With their knowledge, experience and proactive attitude, Petrol employees working in Ravne na Koroškem everyday ensure operational capabilities of energy devices in the metallurgical industry and participate in development projects of SIJ Metal Ravne."

Andrej Gradišnik,
director general

PETROL PROJECTS POWERING SMART CITIES

Our smart solutions have been implemented in 80 cities in the region.

CITIES IN SLOVENIA

- Bled, Celje, Črnomelj, Hoče - Slivnica, Hrastnik, Hrušica, Ivančna Gorica, Jesenice, Kamnik, Kidričevo, Koper, Kranj, Kranjska Gora, Ljubljana, Maribor, Metlika, Mojstrana, Murska Sobota, Oplotnica, Piran, Postojna, Ravne na Koroškem, Ribnica, Sladki Vrh, Trbovlje, Velenje
- Idrija, Kranj, Ljubljana, Maribor, Murska Sobota, Novo mesto, Postojna, Ptuj, Trbovlje, Velenje
- Bled, Bohinjska Bistrica, Brda – Dobrovo, Celje, Cerkno, Črnomelj, Destrnik, Hrastnik, Hrvatini, Jesenice, Kamnik, Kidričevo, Kojsko, Koper, Košana, Kranj, Kranjska gora, Krško, Ljubljana, Ljutomer, Majšperk, Maribor, Medvode, Metlika, Novo mesto, Piran, Poljčane, Postojna, Sečovlje, Slovenska Bistrica, Sv. Peter, Sv. Trojica, Šmarje pri Jelšah, Trnovska vas
- Ankaran, Bled, Brda – Dobrovo, Črnomelj, Gorje, Hoče - Slivnica, Hrastnik, Ivančna Gorica, Koper, Litija, Mengeš, Miren - Kostanjevica, Piran, Poljčane, Postojna, Radlje ob Dravi

- **Smart district heating systems**
- **Smart water distribution systems**
- **Smart buildings**
- **Smart public lighting**

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