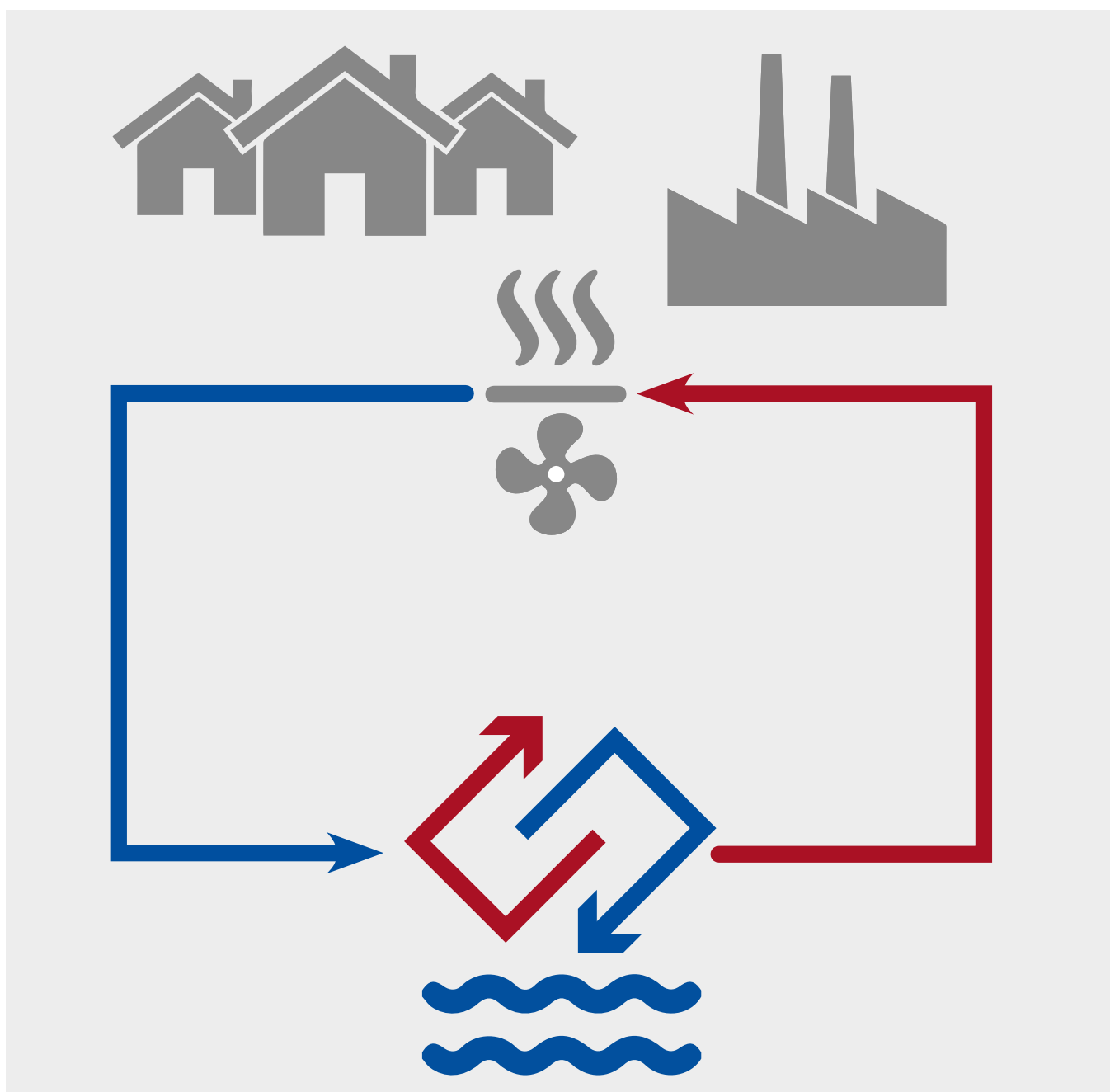




HYDRO

ANERGY NETWORKS – THERMAL USE OF WATER AND WASTEWATER

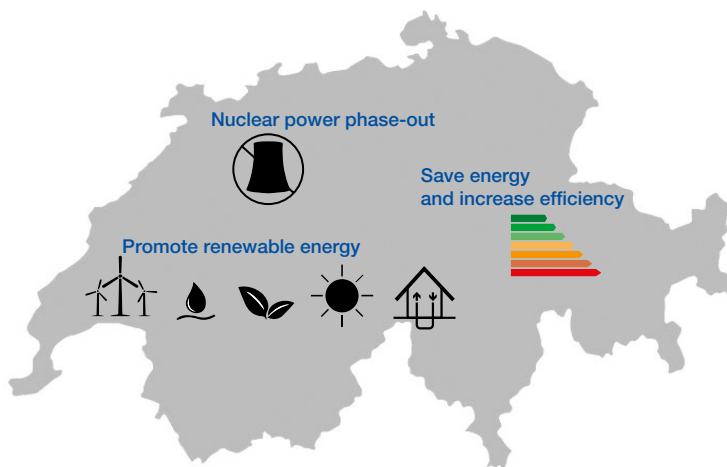
Transporting water in an energy-efficient way using ductile cast iron pipes



ZEROWATERLOSS
vonroll-hydro.world

Energiestrategie 2050

The Swiss Energy Strategy 2050 was endorsed by a referendum on 21st May 2017.
The main focus is on using local, renewable energy sources.



The objectives of the Swiss Energy Strategy 2050 are:

- Securing the country's energy supply on a sustainable basis
- Consistently exploiting existing energy efficiency potential
- Reducing CO₂ emissions
- Unlocking the existing potential of new renewable energies

Of the new renewable energy sources, the thermal usage of water and wastewater to heat or cool buildings via so-called «anergy networks» has massive potential.

Thermal use of lake or river water

When aiming for a sustainable energy supply and a reduction in CO₂ emissions, the use of the heat or cold from lakes and rivers appears to be increasingly attractive. Since the larger Swiss lakes – such as Lake Constance, Lake Neuchâtel, Lake Zurich, Lake Lucerne or Lake Geneva – also have large towns and cities located on their banks, the idea of using these huge reserves of potential heating energy readily suggests itself.



Using the heating energy of wastewater

Wastewater is significantly warmer in winter, and significantly colder in summer, than the outside air and can therefore be used to heat or cool buildings.

The prerequisite for using wastewater energy economically is the proximity of the energy consumer to a large sewer or wastewater treatment plant. Buildings with a high energy demand such as administrative buildings, schools, residential areas, etc. are particularly suitable.

Advanced technical development of heat pumps and heat exchangers has significantly improved their effectiveness, which makes deploying this technology in the thermal use of water and wastewater an appealing prospect.

Thermal energy recovery technology

Energy networks are made up of a combination of pumping stations, heat exchangers, a pipe network and heat pumps thanks to which the energy of the water or wastewater can be utilised.

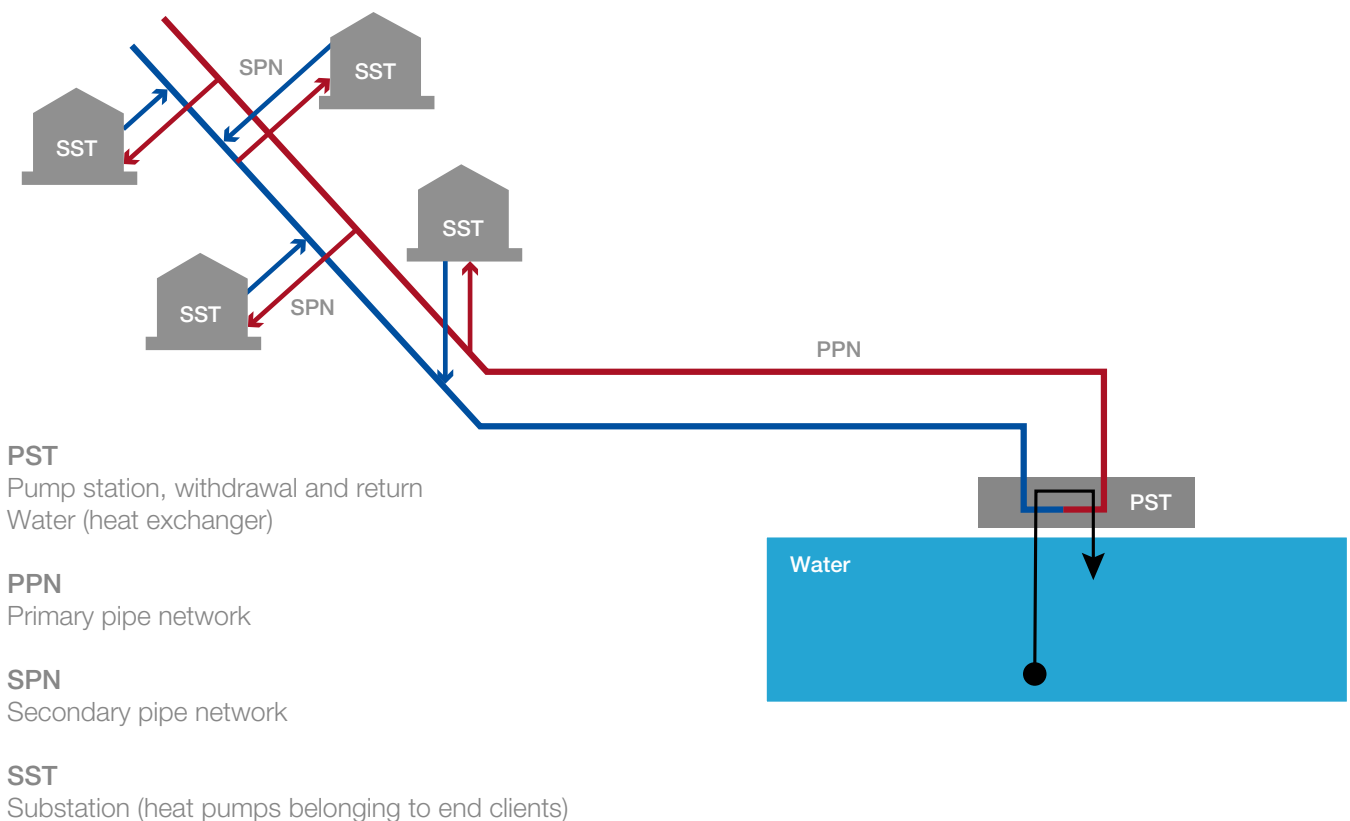
Today, the recovery of heat/cold by means of heat exchangers and heat pumps, which convert it via compression and expansion into heating energy and for heating water, are simple, tried-and-tested technologies which are very economic and competitive in many cases.

To generate energy this way, a great deal of operating power is required for the pumps of the pipe network. This sets high demands on energy efficiency, especially the hydraulic performance capability of the material used to make the pipes.

Energy networks – generating energy in a low temperature range

An energy network is a low-temperature network which consists of a closed circulatory system comprising double pipelines for the flow and return as well as inlet and outlet lines to the heat pumps in the buildings.

Energy network example diagram



ECOPUR, DUCPUR and CEMPUR ductile cast iron pipes facilitate energy efficiency

High operating reliability, economical operation and a long service life are key criteria when selecting a suitable pipe material for the construction of the pipe system.

Ductile cast iron pipes with their outstanding properties provide major advantages here:

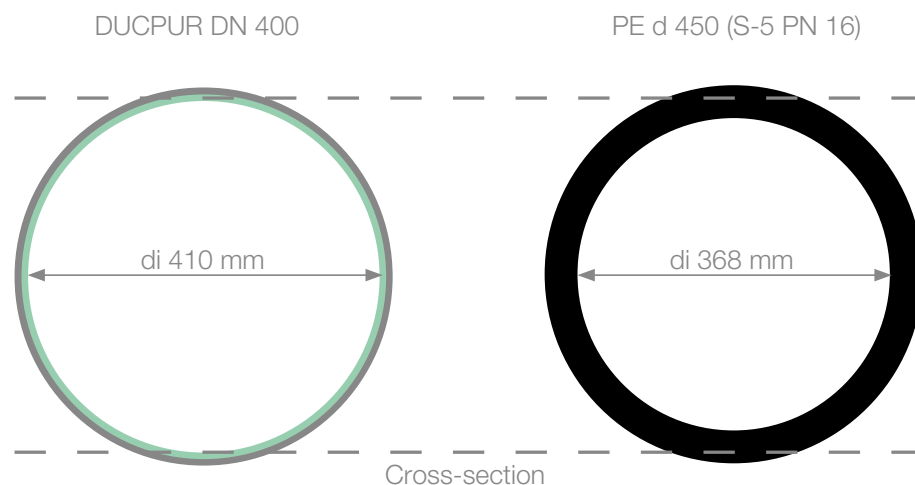
- Very high operating life of up to 140 years
- Very high static load-bearing capacity
- Simple to handle and process
- The socket joint systems from vonRoll guarantee 100% sealed connections in closed water circuit pipelines
- Cast standard fittings for optimised pipe layout and connection line solutions

Cast iron pipes coated with polyurethane (PUR) are perfectly suited to energy-efficient use in energy networks.

The successful, innovative vonRoll PUR internal coating exhibits unparalleled performance values:

- Suited to all types of water and wastewater from pH 1 to pH 14
- Suited to soft and lime-dissolving water types
- Resistant to glycol
- Hydraulically smooth, roughness $k = 0.0014$ mm (as per SVGW W4)
- Very large hydraulic interior cross-section
- Minimal pressure losses
- Ideal hydraulic capacity

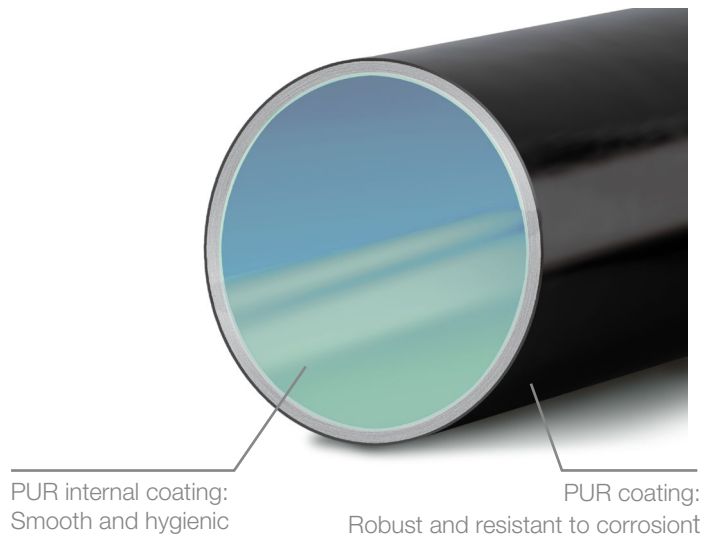
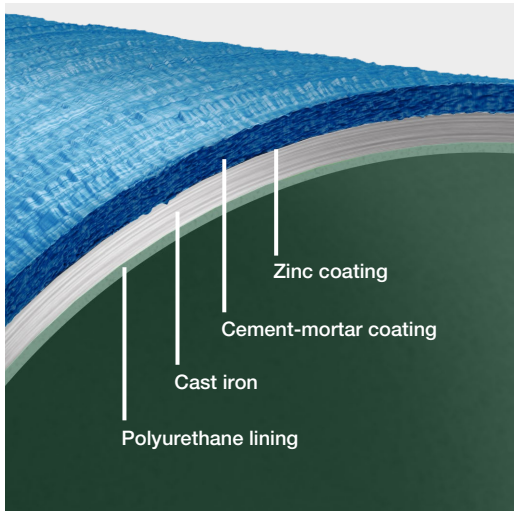
Comparison of a hydraulically usable inner diameter



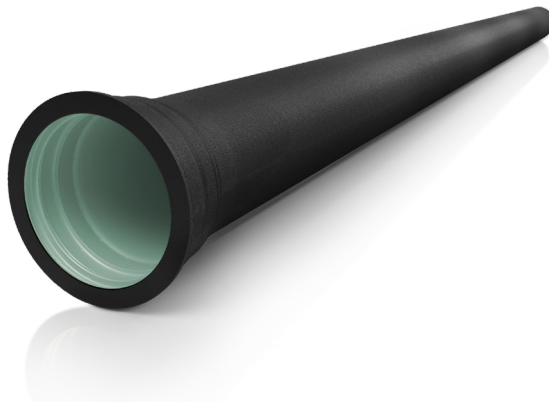
Coated with cast PUR = maximum hydraulically usable inner diameter
(less pump energy required)

The PUR internal coating is predestined for pump operation where a high degree of energy effectiveness is key.

With optimised hydraulics; actively lowers the operating costs of the system.



DUCPUR ductile cast iron pipes, with active corrosion protection made of zinc/aluminium, and a top layer as per standard EN 545, can be installed underground in many different soil types.



DUCPUR standard pipe

Soils with varying degrees of aggressiveness require special attention.

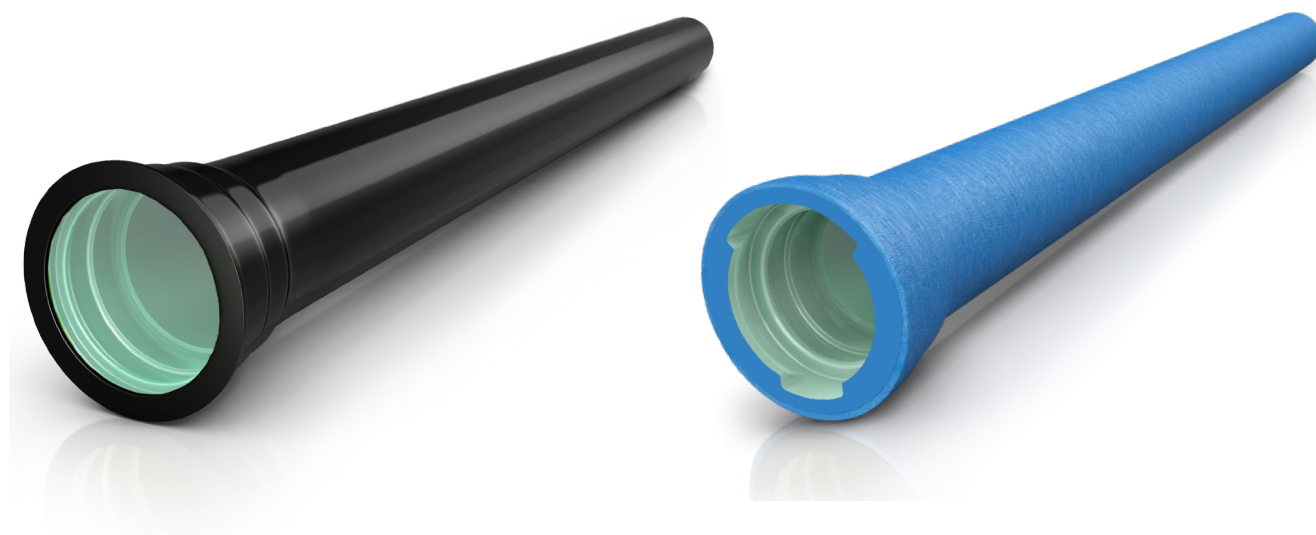
If the following conditions apply, it is recommended to use ECOPUR and CEMPUR ductile cast iron pipes with a reinforced coating.

- Electrical ground resistance $<500 \Omega \cdot \text{cm}$ below sea level
- Contaminated soils (refuse, slag, ash, etc.)
- Stray current
- Acidic, peaty soil

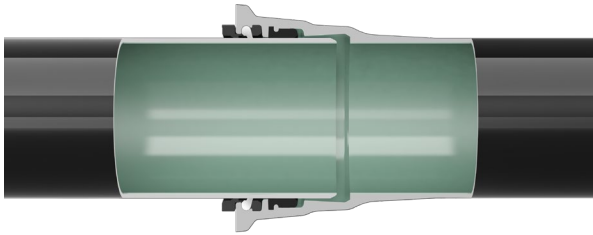
The ECOPUR and CEMPUR fully protected pipe – the solution for every installation situation

- Permanently protect against mechanical and chemical attack
- Suitable for all soil types at all levels of aggressiveness
- Permitted grain size of pipe coating: 0–63 mm, maximum grain size: 100 mm
- Resistant to galvanic corrosion from stray current (e.g. due to earthing, along train lines or due to mixed soils)
- Passive and active corrosion protection over the entire service life

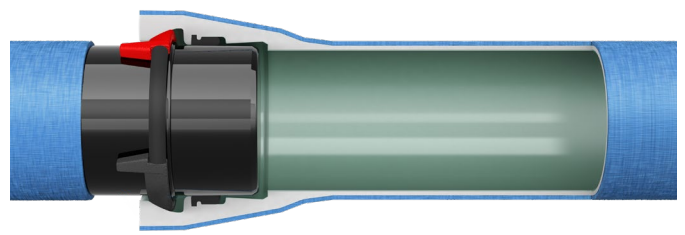
ECOPUR fully protected pipe with reinforced coating



vonRoll – connection technologies



HYDROTIGHT system



BLS system

Optimised installation using the flexible push-in socket connection technique

The ECOPUR and CEMPUR fully protected pipes effectively provide the pipeline system with integral protection from all underground influences.

In addition, the flexible HYDROTIGHT and BLS socket joints guarantee optimum operating reliability in anergy networks thanks to:

- Firmly rooted push-in socket connection technique
- Guaranteed tight pipe joints (positive and negative pressure)
- Alignable connection system incl. thrust resistance

When installing pipe networks in urban conditions, due to existing gas and water pipes and cables, there is often a number of pipe trenches close together. Therefore, the ductile cast iron pipes, which are often installed in anergy networks as double pipelines with flow and return, need to be equipped with multiple fittings and valves and cut to size.

Thanks to the flexible HYDROTIGHT and BLS socket joints, construction progress is greatly accelerated with an extremely high level of reliability and the highest installation quality. As successful and safe connection technologies, they offer major advantages:

- Quick and flexible installation
- No need for concrete abutments
- Optimised trench widths for double pipelines

The result is greater cost savings on underground construction and pipe installation work

ECOSYS pipe system

Complete range for the thermal use of water and wastewater

The vonRoll ECOSYS pipe system is perfectly tailored for use in anergy networks and fulfils the most demanding requirements both during installation and during continuous operation. DUCPUR and ECOPUR type pressure pipes are available from DN 80 to DN 700 mm



vonRoll DUCPUR, double pipeline with flow and return

ECOSYS system offer with ECOFIT fully protected fittings and fully protected valves

DN 80 to DN 700 push-in socket fittings



VS 5000 DN 80 to DN 400 gate valves and DN 200 to DN 700 butterfly valves



The internal connection technologies reliably connect all system components.



Side outlets with DN 400 butterfly valves



DN 600 ECOPUR installation in a shored trench

vonRoll ECOSYS fully protected pipe system – for the economic, sustainable and safe thermal usage of water and wastewater in anergy networks.

References

The CAD LA TOUR-DE-PEILZ anergy network project, Lake Geneva



DUCPUR DN 700 double pipeline in a shaft, entry into concrete micro tunnel

— Pipeline network diameter:	DN 200 to DN 700 DUCPUR/ECOPUR
— Length of the network (double pipeline):	15 km (when completed)
— Volume of water from the lake:	3'600 m ³ /h
— Grid-connected output:	18'500 kW
— Energy produced:	Approx. 35'000'000 kWh/year
— Equivalent amount of energy in heating oil:	Approx. 3'745'000 litres/year
— Equals a reduction in CO ₂ of:	Approx. 10 tons/year

ARA Werdhölzli anergy network project, Zurich



ARA Werdhölzli DN 600 double pipeline PFA 25 bar

- Removal of cleaned wastewater
 - Flow/return double pipeline
 - Specified permitted component operating pressure:
- | |
|---------------|
| DN 600 ECOPUR |
| 25 bar |

Swisspeak Resorts anergy network project, Zinal



ECOPUR DN 250 with house infeed DN 100 to the heat exchanger

- Pressure line diameter:
 - Line length (single pipe system):
 - Max. flow rate:
 - Operating pressure:
- | |
|-----------------------|
| DN 250 ECOPUR |
| 200 m |
| 150 m ³ /h |
| 3 bar |

