TPTEC
THERMAL PURIFICATION TECHNOLOGIES

ZERO LIQUID DISCHARGE

OUR SOLUTION

OUR TECHNOLOGIES

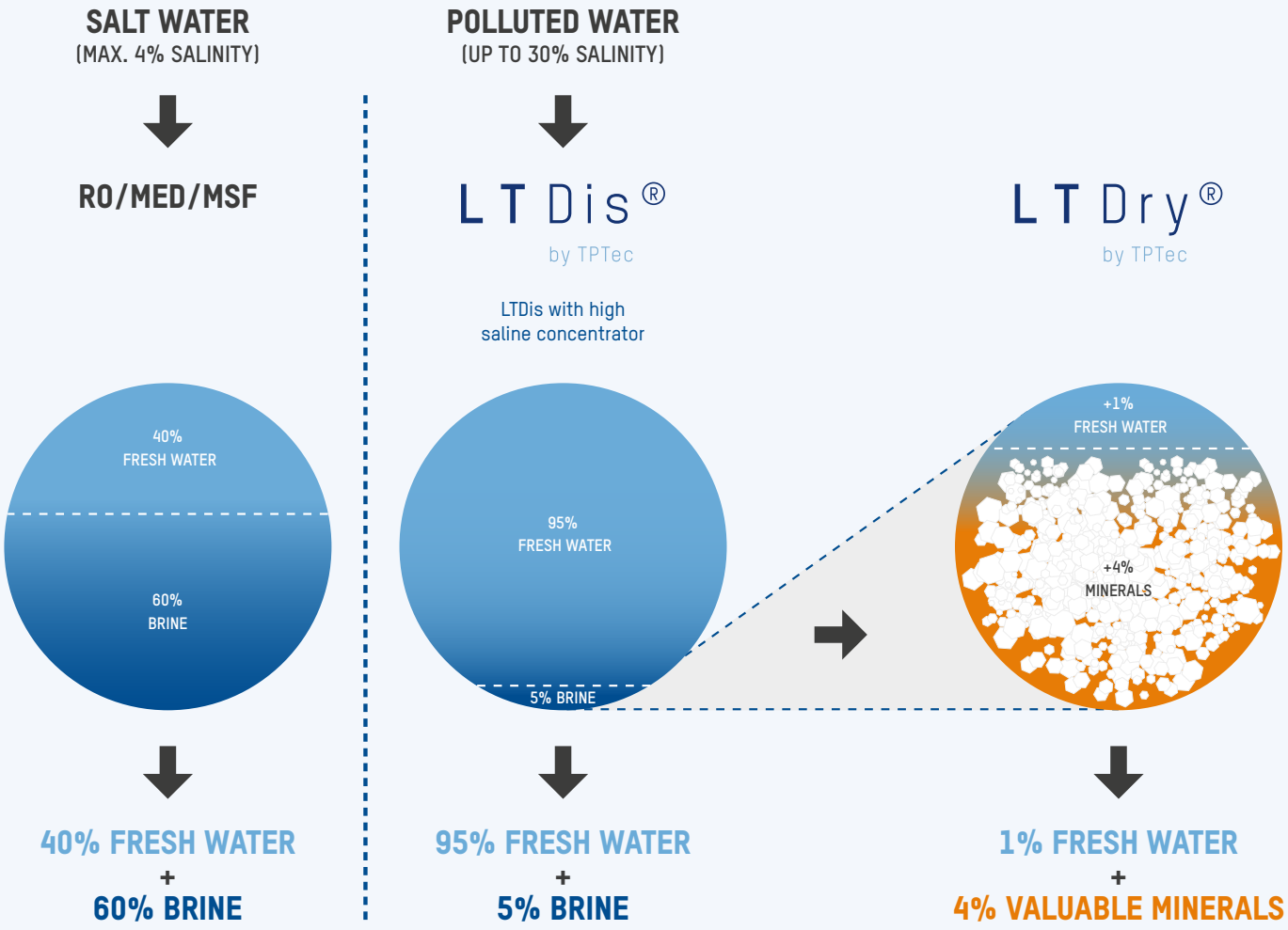
FOR A FUTURE DESALINATION STARTING NOW

Future desalination technology has to achieve complete separation of valuable solids and pure water resulting in Zero Liquid Discharge.

OUR SOLUTION
FOR ZERO LIQUID DISCHARGE

With our Low Temperature Distillation LTDis® and Low Temperature Drying LTDry® technologies, we achieve Zero Liquid Discharge ZLD and convert heavily polluted water into pure water and valuable solids.

TPTec technologies LTDis® and LTDry® produce up to 2.5 – 3 times as much fresh water from the same feed water than other desalination technologies.



THE FUTURE DESALINATION IS ZERO LIQUID DISCHARGE

Conventional desalination technologies, such as RO, MED and MSF, have a low conversion ratio from salt water to fresh water of about 40 %. The remaining 60 % of the water accumulates as high saline brine which is usually led back to the sea. To avoid the negative environmental impact of the brine disposal, Zero Liquid Discharge (ZLD), with a complete separation of pure water and solids, must be pursued as a long-term strategy.

Only with the combination of the LTDis and LTDry technologies a real ZLD can be achieved – with no waste water output and the extraction of valuable solids.

GOOD ARGUMENTS
FOR TPTEC TECHNOLOGIES

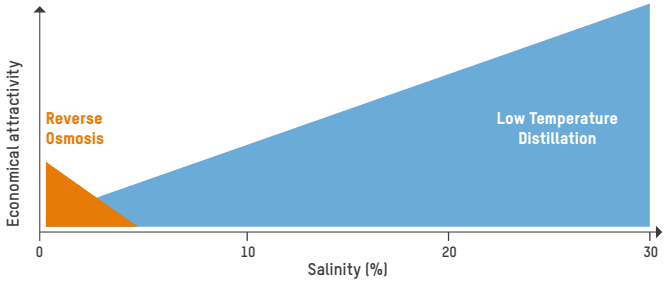
LTDis IS BEST SUITED FOR A MULTITUDE OF APPLICATIONS BECAUSE...

...it makes use of low grade waste heat from possible upstream processes.
...it can be used as a complete desalination system for sea water with additional salt production.
...it processes highly polluted water with TDS 100'000-300'000 ppm and brine from existing desalination plants (RO, MED, MSF).
...industrial waste water, oily water or even radioactive ground water can be treated.

LTDis TECHNOLOGY IS A UNIQUE SOLUTION

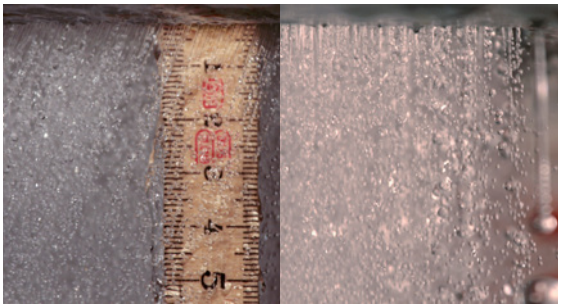
- Our hardware are billions of water droplets that do the job, as an efficient heat transfer surface.
- In the LTDis technology there are no tube bundles, no phase change on solid surfaces and only a low risk of scaling, fouling and clogging.
- Precipitation inside the plant is accepted.
- There are no membranes involved in the LTDis technology.

LTDis IN COMPARISON TO REVERSE OSMOSIS



The diagram illustrates how economic attractiveness increases with higher salinity.

Picture 1-4: Apollo Tyre Manufacturing Plant,
Hungary / 2018 / 70 m³/d
Technology: LTDis / www.t-p-tec.com
EPC/Manufacturer: UTB Envirotec / www.utb.hu



Billions of droplets provide the surface for the heat exchange in condensation.

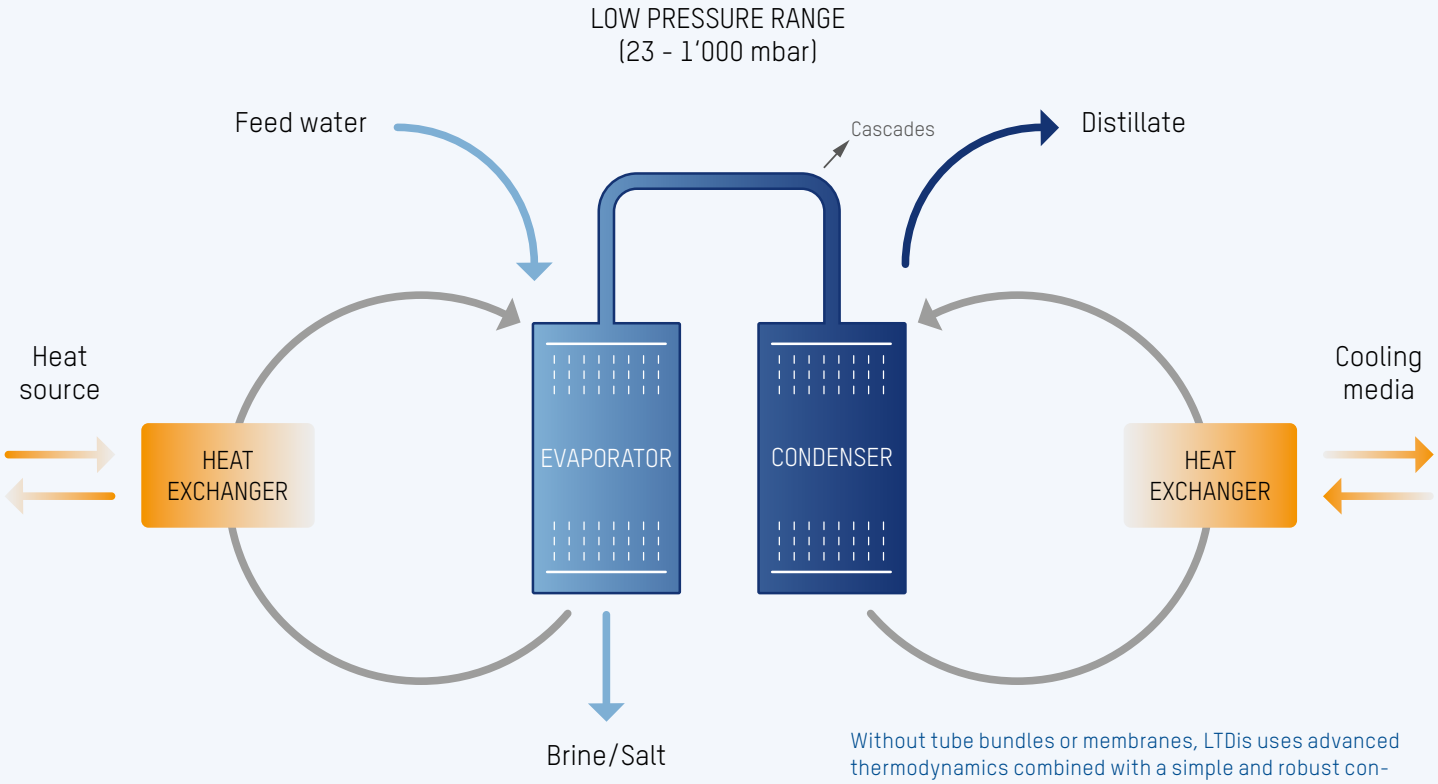
LTDis®

LOW TEMPERATURE DISTILLATION TECHNOLOGY

The patented and award-winning Low Temperature Distillation technology LTDis® uses direct evaporators and condensers for a very efficient heat transfer. LTDis has the ability to operate at high concentrations (up to and into precipitation of the dissolved solids, typically about 330'000 ppm). It achieves high conversion ratios – up to 95 % from seawater. The main applications are seawater desalination, brine concentration (capacity extension) for existing plants, wastewater from Oil and Gas exploration and various industrial wastewaters.

LT Dis®

by TPTec



Without tube bundles or membranes, LTDis uses advanced thermodynamics combined with a simple and robust construction to distill even highly concentrated and polluted feed waters in an efficient and economical way.

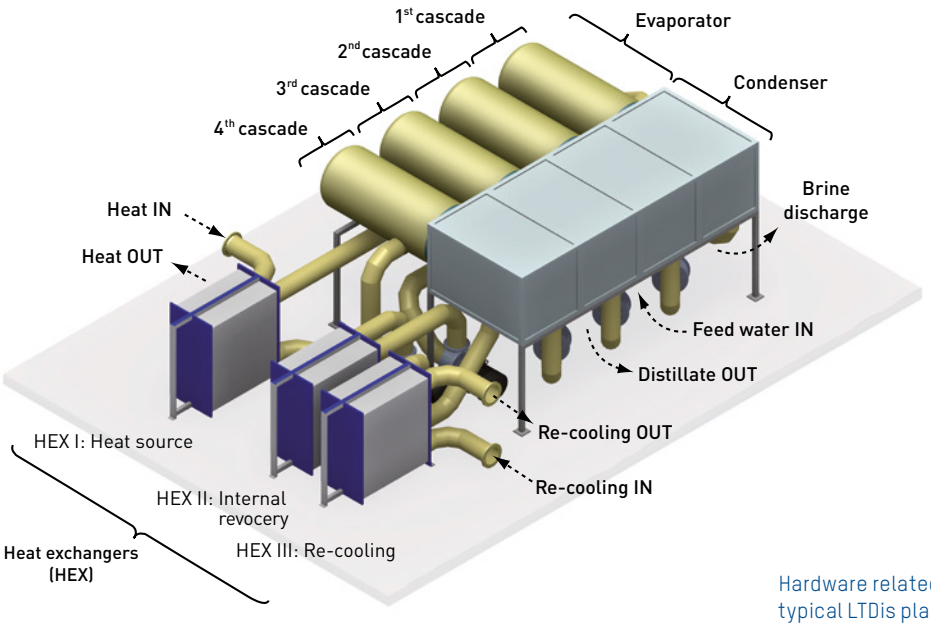
THE PROCESS

The LTDis technology is a thermal process using specially designed direct-contact condensers for most effective heat transfer. The process uses low grade heat from various sources with only small temperature differentials (<10 K) between the heat and re-cooling sources required. The process can also desalinate highly saline feed water (including brine from existing desalination plants).

A TYPICAL LTDis PLANT

The plant is typically designed to be simple and robust, yet very effective. It consists of:

- Evaporation and condensation chambers where billions of water droplets from a large, robust and cost-effective surface (there are no tube bundles nor membranes).
- External plate heat exchangers (titanium) with no phase change on the surface, thus greatly reducing the risk of scaling, with only limited pre-treatment required.
- Pumps (including a vacuum pump), sensors, piping and a control panel.



Hardware related scheme of a typical LTDis plant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LTDry®
LOW TEMPERATURE DRYING TECHNOLOGY

The Low Temperature Drying technology is built on advanced thermodynamics using the dry matter as a carrier. This greatly reduces the risks associated with other drying technologies, including eliminating the risks of clogging (no glue phase), dust/explosions and smell. Applications include drying of sewage sludge, drying of salt, pre-drying of lignite for coal fired power plants and various other industrial and agricultural applications.

Using the dry matter as a carrier material, LTDry is a particularly robust method for drying various sludge and wet materials. Thanks to the unique design the risks of conventional drying techniques (clogging, explosion, dust, and smell) are largely reduced or removed.

LT Dry®
by TPTec

Dry matter up to 97% from a vast spectrum of wet materials

LTDry pilot plant, Switzerland

LTDry ADVANTAGES

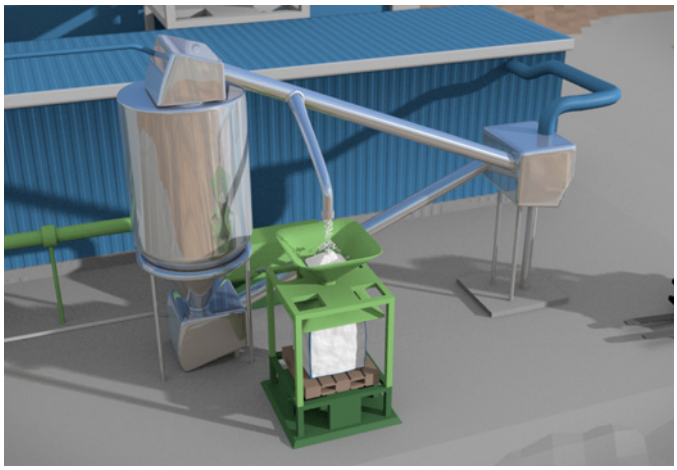
- Robust and simple process, tolerant towards different properties of the feed material and changing temperatures of the heat source
- High drying performance, high degree of dryness
- Low emissions (odor, noise, dust)
- Energy-efficient process: use of waste heat, heat recovery (low energy costs)
- Low-cost and safe operation
- User optimized maintenance

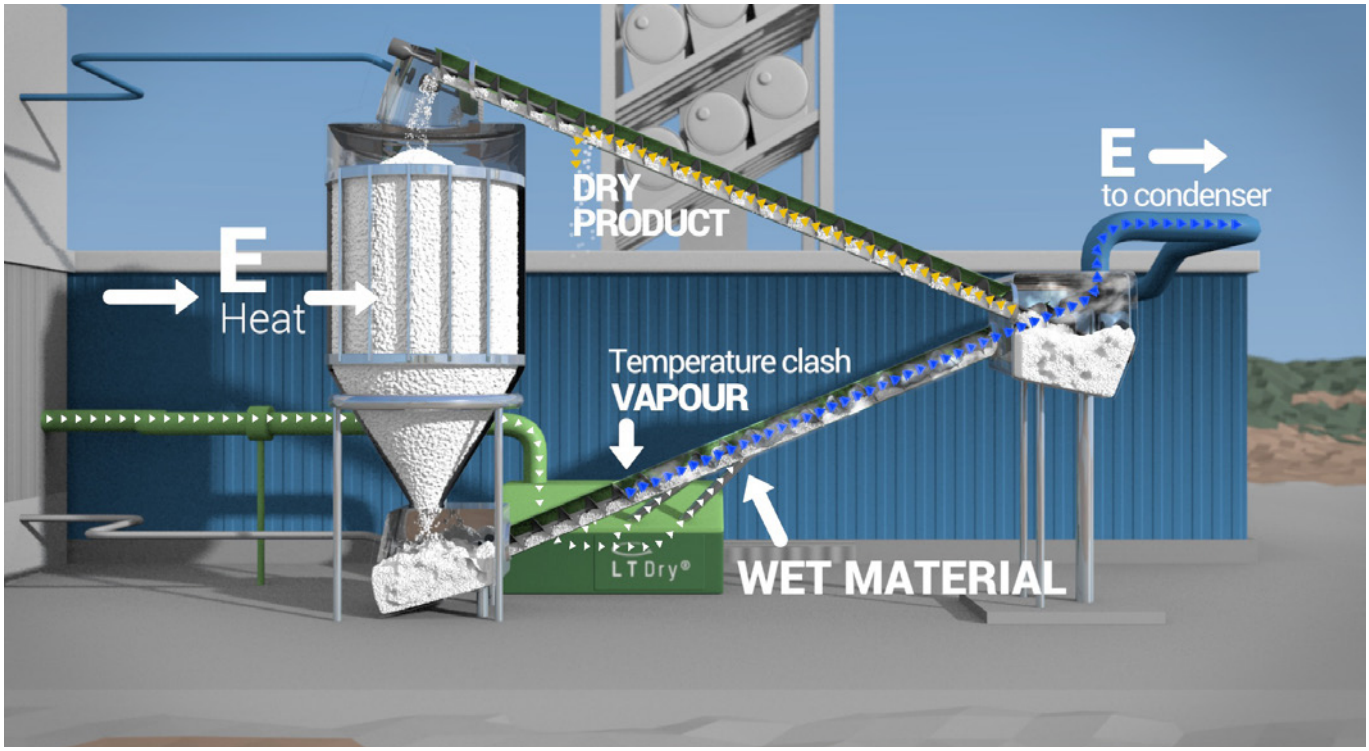
THE PROCESS

The innovative patented drying process is based on a low-pressure and low temperature system which allows the use of different heat sources (e.g. waste heat) with heat recovery. The wet feed material is mixed with preheated dry material. This ensures a safe and non-adhesive operation, even in case of varying conditions of the feed material. Horizontal heated screw conveyors transport and heat up the material in the drying module.

At the end of the drying process most of the dried material (dry matter 90-97%) is lead again to the circulation and the mixer.

A lower amount is conveyed from evaporator to the sieve, where, depending on quality requirements, material is separated into a bad fraction, which is mixed again with the wet feed material, and a good fraction which can be removed from the system for disposal.





Schematic process of a typical LTDry plant following a LTDis plant

PASSIONATE ABOUT
INNOVATIVE TECHNOLOGIES

Established in 2014, Thermal Purification Technologies (TPTec) is focusing on developing new, clean and efficient technologies for multiple applications in the water sector.

TPTec is focused on providing complete solutions for cleaning seawater, brine and polluted water including separation of pure water and valuable solids.

We use advanced thermodynamics to build simple, robust and efficient plants that can use existing waste or low value streams to purify challenging feeds with a minimum of residual effluents.

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The LTDry technology is provided in cooperation with LTDry GmbH.