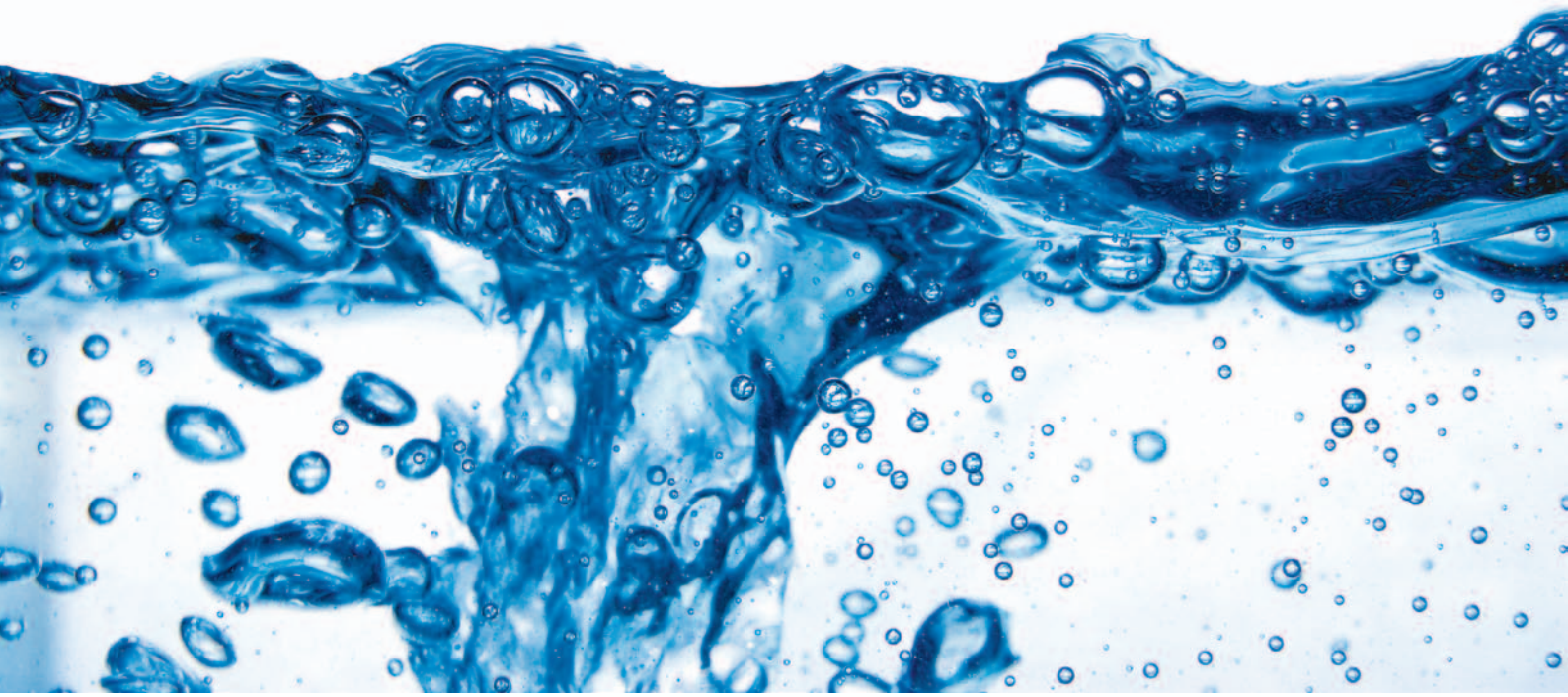

Water Purification

More than 1.5 billion people lack access to good and safe drinking water. Simple techniques for treating water could save many lives each year. Normally, the water emerging from deep underground water may have fallen as rain many thousand years ago. Soil and rock layers naturally filter the ground water to a high degree of clarity. But the springs and rivers are constantly being depleted and polluted and such natural resources are just not adequate in catering to the increasing world population. Water purification is the process of removing undesirable chemicals, materials, and biological contaminants from polluted waters.

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Water purification can be classified into three treatment processes. The first type is the physical or mechanical process, commonly used in water purification plants. Upon filtration, water moves vertically through many different layers of coarse gravel on the surface that remove organic compounds to the bottom layer of grid sand particles. The drawback is that, if the top layer of gravel were to block all the particles, the filter would quickly clog. To clean the filter, water is passed quickly upward through the filter, in the opposite direction (called backflushing or backwashing) to remove embedded particles.

Flocculation and sedimentation are analogous proceedings. Membrane Filtration has a special place. The biggest desalination plant worldwide works with semi-permeable membranes on the principle of reverse osmosis. Osmosis is natural process. When two liquid of different concentration is separated by a semi-permeable membrane, liquid has the tendency to move from low to high concentration for chemical potential equilibrium. The essential disadvantage on this process is the high power requirement.

Another treatment is the chemical process. Disinfection is accomplished both by filtering out harmful microbes and also by adding disinfectant chemicals in the last step of purifying drinking water. In the majority of cases the process used chlorine, chlorine dioxide, chloramines or ozone.

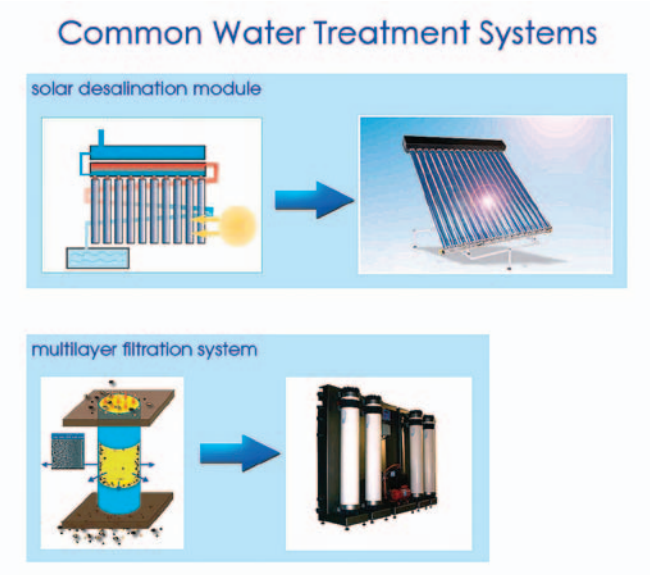
Chlorine is a strong oxidant that rapidly kills many harmful micro-organisms. However, as chlorine is a toxic gas, there is a danger of a leak associated with its use. The chemical process is mainly used to purify sewage water. On top of all the above-mentioned factors, that make the task a daunting one, one should take into consideration the enormous costs and skill sets involved in maintaining such wastewater treatment plants, even if they have been successfully developed.

A special form of disinfection process is "SODIS". Solar disinfection needs the UV-A part of the solar radiation and the heat to destroy almost all microbes that may be present.

The thermal process is the most important. It is the only process that that can purify and desalinate water. Similar to the "SODIS" process, water is heated at high temperatures for a period of time long enough to inactivate or kill micro-organisms that normally live in water at room temperature. Near sea level, a vigorous rolling boil for at least one minute is sufficient. At high altitudes (greater than two kilometres or 5000 feet), three minutes of boiling is recommended. In areas where the water is "hard" (that is, containing significant dissolved calcium salts), boiling decomposes the bicarbonate ions, resulting in partial precipitation as calcium carbonate. This is the "fur" that builds up on kettle elements, etc. in hard water areas. With the exception of calcium, boiling does not remove solutes of higher boiling point than that of water. In fact, boiling increases their concentration (due to some water being lost as vapour). Boiling does not leave a residual disinfectant in the water. Therefore, water that has been boiled and then stored for any length of time may have acquired new pathogens.

In order to reduce the risks of waterborne diseases for the long term, water treatment programmes implemented by research and development teams in developing countries must be sustainable by their own citizens. Thus, ensuring the efficiency and effectiveness of such programmes after the departure of the research team, as monitoring from long distance will be a challenge due to the remoteness of many such locations.

The trend is moving towards decentralized water treatment. In developing countries, about 80 percent of all diseases have their origin in a bad drinking water. Many people have to go a long way to the next watering place, or risk drinking nearby contaminated water. Application of such programmes in rural areas, especially in developing countries, requires a high demand on adaptation relating to the energy supply and the minimization of the maintenance costs. Due to the high energy consumption of water treatment, renewable energies are well-suited for the required energy. The use of wind or sun represents an alternative to conventional power. ▼



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About the company:

The company SaEnergy Systems GmbH (SaE) was founded in 2007 and is engaged in the development, construction, marketing and sales of components and systems for self-sufficient and decentralized energy and water supply with the focus on renewable energies. SaE is a member of the SolidGround – Group and has received support from the German Federal Ministry of Economics and Technology.

Currently, SaE is focusing on the development and the distribution of the "Power&Life Container" (PLC).

Visit www.SolidGround.de