

## German Solutions in Drinking Water for Indian Utilities Indo German Alliance for Water Efficiency (IGAWE)



# Content

## About IGAWE

- Indo German Alliance for Water Efficiency (IGAWE)
- IGAWE Concept: A Holistic Concept of Joint German Competences in Drinking Water
- IGAWE Partners: Overview

3

## IGAWE Partners

### PUMPS

**Wilo India and Wilo Financial Services**

- Company History
- Products for Waste Water Management
- Products for Clean Water Utility
- Capabilities
- Business Partners: Government Customers in Water Segment
- Business Partners: Contractors for Government Projects
- References of Installation

6

### DISINFECTION

**REDO Water Systems  
Germany**

- Chlorination is phasing out
- Disinfection Byproducts
- Hypochlorite and Corrosion
- REDO Solution: Multi Oxidants Disinfection Technology
- The Power of Six Oxidants
- Summary of Advantages
- References in 31 Countries

16

### FINANCE & BUSINESS MODELS

**Grasshopper Investments and INWASOL**

- The Finance Gap in the Water Sector
- Overview Grasshopper Investments and INWASOL
- Finance Solutions and Grasshopper Investments
- Innovative Business Models and INWASOL

31

### OPERATION

**Global Water Franchise Agency (GWFA)**

- Shareholders REMONDIS and CEEM
- Competences
- Concept and Projects

38

### THINK TANK WATER

**Institute of Environmental Engineering &  
Management, Germany**

- Private University of Witten Herdecke and IEEM Institute
- The Focus of IEEM
- High Brain and Lean Tech
- International Projects

44

## INDO-GERMAN ALLIANCE FOR WATER EFFICIENCY (IGAWE)



By 2050, India will host more people than any other country in the world. There is a huge demand for better water and sanitation infrastructure, for appropriate water supply services and safe wastewater treatment. All this has to be done with limited natural water resources and within financial budget restrictions. What India needs is better water efficiency - coming along with better energy efficiency and better cost efficiency, with solutions ready to be implemented and operated on the local level.

A large number of municipalities, water and wastewater utilities, private and industrial water consumers are desperate for professional technologies and service providers which are capable and willingly to solve their specific water problems and shortfalls on site.

The Indo-German Alliance for Water Efficiency (IGAWE) has been founded by professional companies with outstanding capacities and references to cover all relevant sectors in water efficiency.

IGAWE is ready to provide sustainable and affordable solutions with premium quality machines (like energy-efficient pumps), with high-tech plants for water production (like decentralized units for safe drinking water disinfection), with highly skilled facility operations (like for complex water and wastewater processing plants), all based on engineering and management at the best level of science and technology.

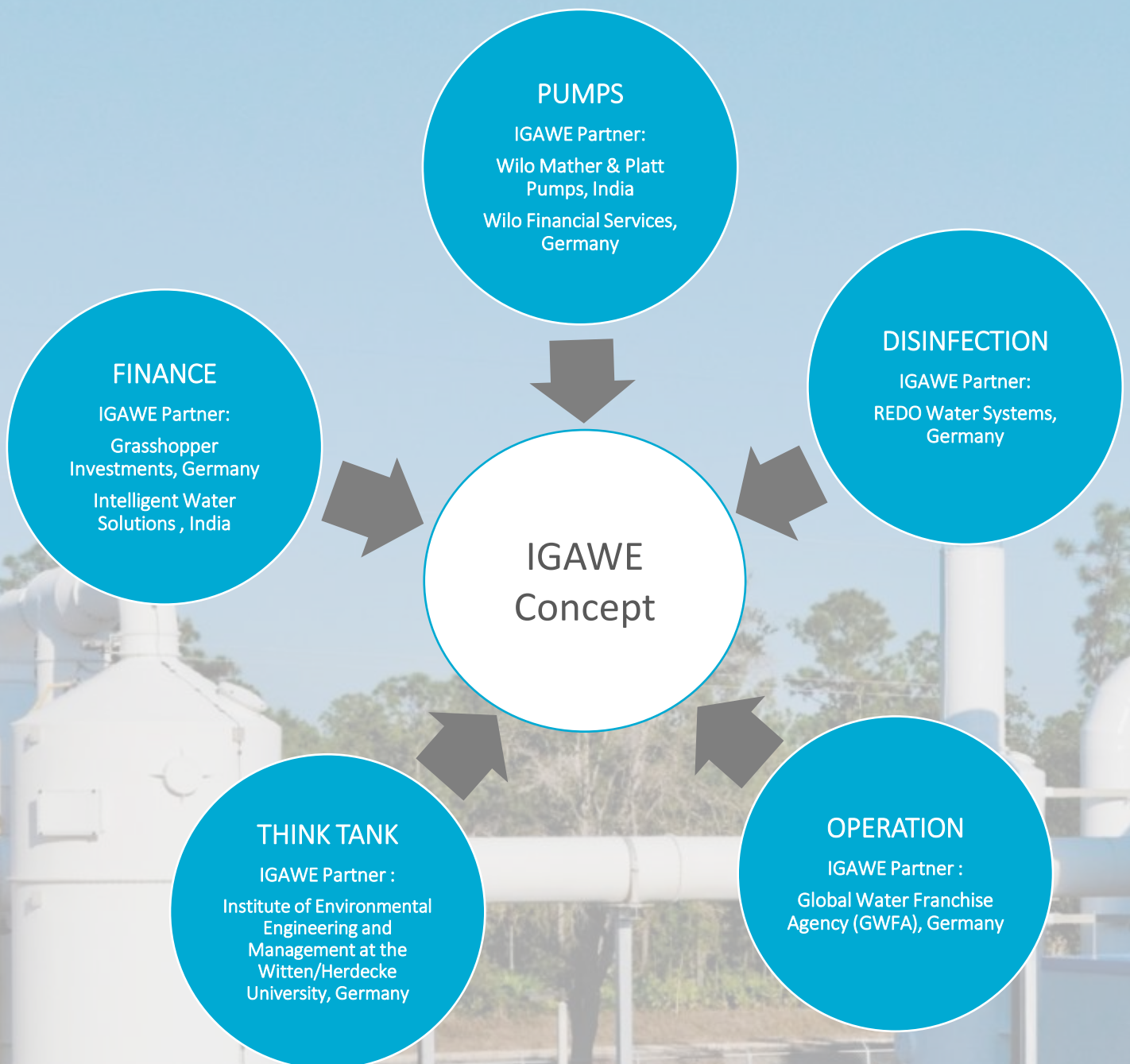
The aim of IGAWE is to make water efficiency solutions come true and to generate win-win benefit for all stakeholders which includes specific profitability for the companies and advantages for the customers (and voters). To guarantee a holistic solution, IGAWE has been founded under the umbrella of a private investment fund. Therefore IGAWE is not limited to provide technologies and operational support, but offers financial engineering services to its clients as well.

IGAWE is not just importing goods and services from abroad to India and exporting values from India to abroad. Instead, IGAWE is built for trustful cooperation, to implement sustainable and profitable solutions in water efficiency, creating added values for all stakeholders and the people involved. If talking about water efficiency, IGAWE can serve it, in collaboration with local partners for local business development.

HIGH QUALITY  
MADE IN GERMANY



## IGAWE: A holistic concept of joint German competences for Indian drinking water utilities

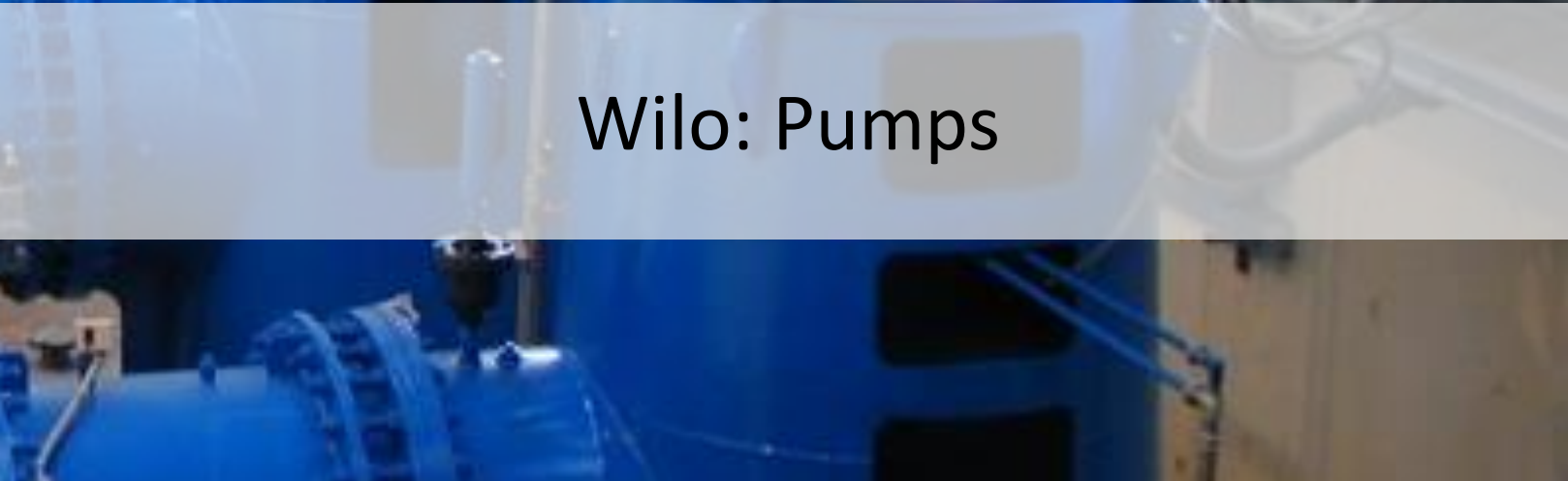


## IGawe: Overview Partners





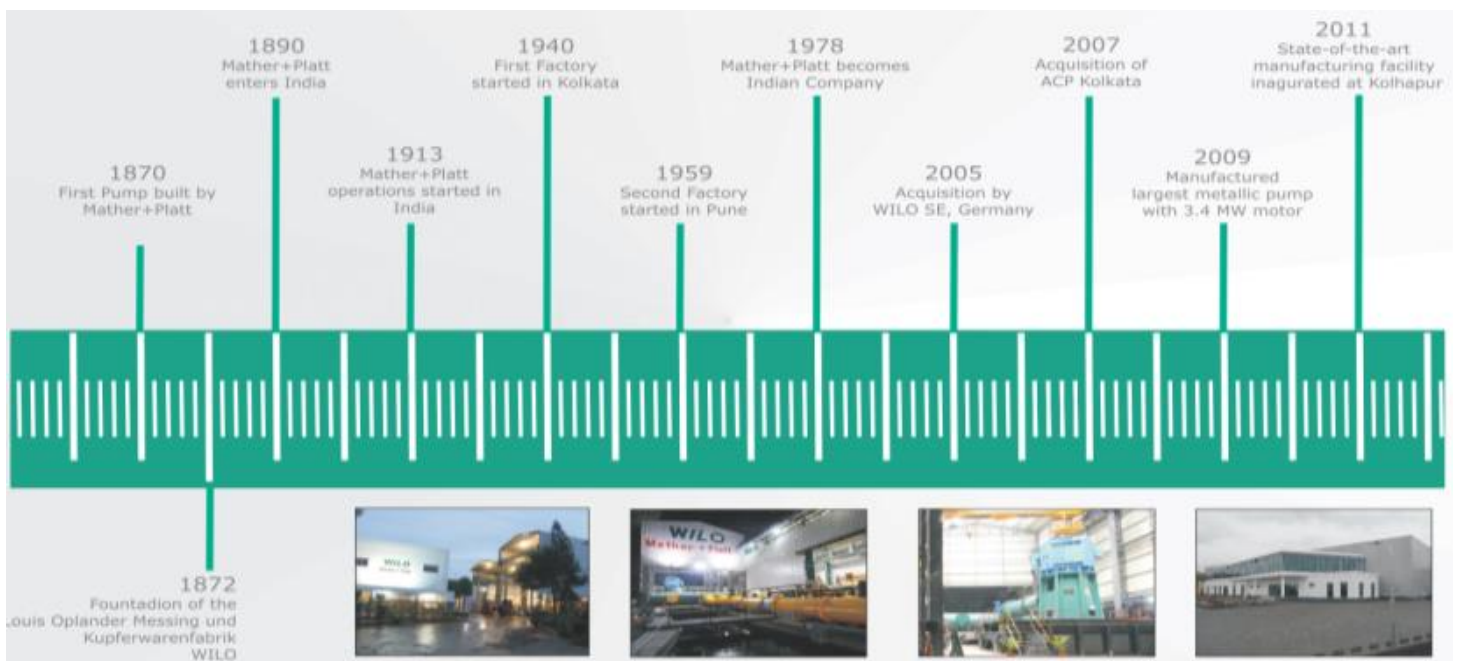
Wilo: Pumps



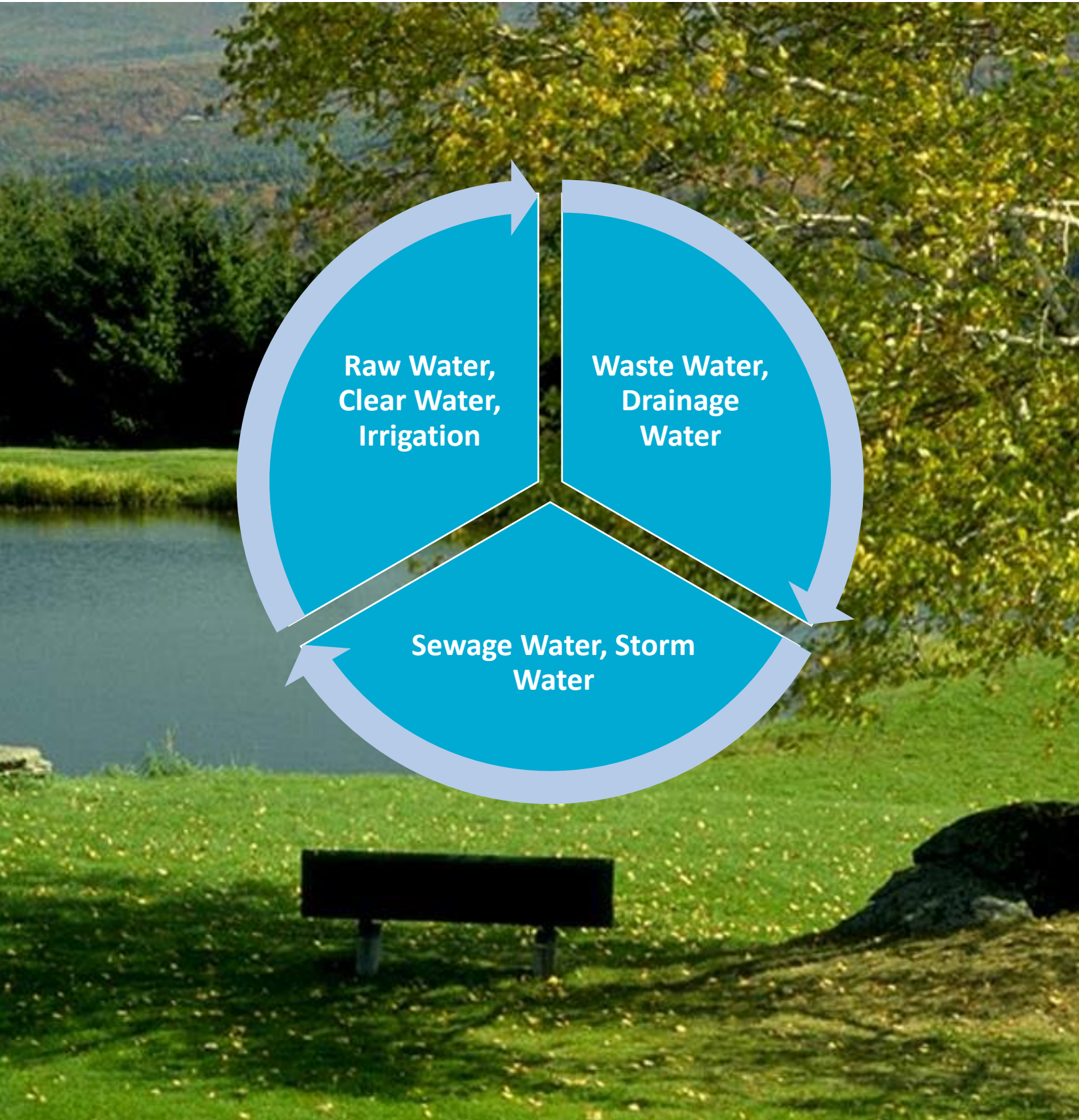
## Company History

- 1870 First pump built by Mather + Platt
- 1913 Mather + Platt operations started in India
- 1940 First factory started in Kolkata
- 1959 Second factory started in Pune
- 1978 Mather + Platt becomes Indian company
- 2005 Acquisition by WILO SE**
- 2007 Acquisition of ACP Kolkata
- 2009 Manufactured largest Vertical Turbine pump with 3.4 MW motor
- 2011 State-of-the-art manufacturing facility inaugurated in Kolhapur
- 2014 Name changed to WILO Mather and Platt Pumps Pvt. Ltd.

WILO SE Germany is having 99.87 % shares







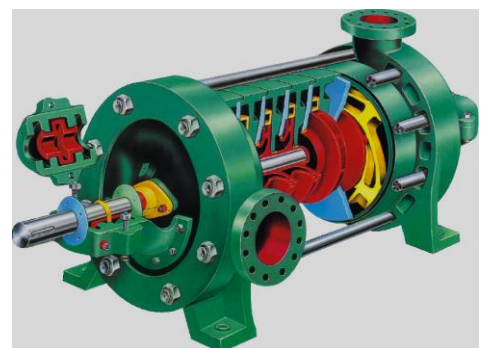
**Raw Water,  
Clear Water,  
Irrigation**

**Waste Water,  
Drainage  
Water**

**Sewage Water, Storm  
Water**



## Products for Clean Water Utility



## Products for Waste Water Management



## Capabilities of Wilo India

- Large Pump Test Bed – Flow up to 60,000 m<sup>3</sup>/hr
- Maximum head up to 1,500m
- Full speed test up to 4.2 MW
- Ansys CFX: For Hydraulic Design & Analysis
- Ansys Structural: For Mechanical Analysis
- Pro – E: 3 Dimensional design & Modelling
- Sump & Pump Model Study
- In house Control Panel Division
- Surge Analysis
- Energy audit & Retrofit Jobs





## Business Partners: Contractors for Government Projects



## Business Partners: Government Customers Industry



## Business Partners: Government Customers in Water Segment



**INDORE**  
MUNICIPAL CORPORATION



**MAHARASHTRA JEEVAN PRADHIKARAN**  
WATER SUPPLY AND SANITATION DEPARTMENT MAHARASHTRA



சென்னைக் குடிநீர் வாரியம்  
**CHENNAI METRO WATER**



**KARNATAKA NEERAVARI NIGAM LIMITED**

(A Government of Karnataka Enterprise)



Wilo Pumps



## References of Installation







## REDO Water Systems: Disinfection

## Disinfection – Chlorination is phasing out

### The Clean Water Challenge

#### The Clean Water Challenge

Water is one of the most valuable commodities on planet earth.

Death, serious illness and despair are inevitable consequences without a supply of clean drinking water.

In July 2010, the UN general assembly declared clean water a “**fundamental human right**”.

In an economic perspective, investments in drinking water quality, particularly disinfection, are extremely profitable, especially if the **benefits on health of every human** and the **productivity of a national economy** are accounted for.

**Protection and Disinfection of Drinking Water** evoked various different Treatment Technologies over the decades – but only few are safe, simple and without negative side effects.





## Disinfection – Chlorination is phasing out Health Concerns

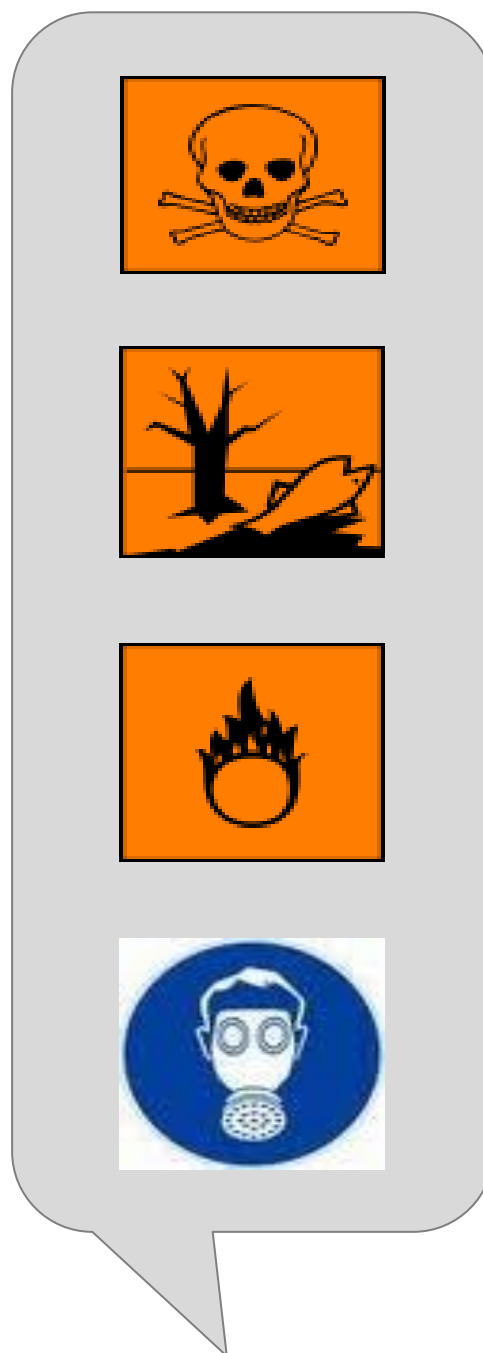
The quality of drinking water in India is basically bad. There's a high part of heavy metals, bacteria, algae and germs in the water. Its recommended to boil the water before drinking. The public water plants use mainly chlorine gas for disinfection, which causes a bad taste in the water and doesn't work effectively at all.

Over the years, various carcinogenic, mutagenic and toxic and environmentally harmful effects of many organic chlorine compounds have been proven in scientific studies.

Many safety measures need to be installed, to avoid chlorine gas accidents. Appropriate training of personnel for the handling of hazardous substances is mandatory – and expensive.

Water production plant managers worldwide become increasingly aware of the health hazards of various chlorination byproducts.

Particularly, trihalomethanes (THMs) have been identified as carcinogenic, toxic and environmental pollutants. However, similar effects are attributed to various other chlorination byproducts, e.g. Haloacetic acids, chlorite and bromates.



From the product data sheet  
for chlorine based substances

## Disinfection – Chlorination is phasing out

### Safety & Health Concerns



Before: disinfection with chlorine gas

#### Chlorine gas

Discovered and first produced in the 19th century, chlorine gas was first used as industrial bleach and later as a poison gas in the first world war.

Today, the same substance – stored and distributed in pressurized gas cylinders – is mainly used for water disinfection purposes. Chlorine gas accidents with casualties or severe injuries occur regularly in every nation, when transporting or handling chlorine gas.

Unfortunately, disinfection uses of chlorine gas, e.g. in water production plants, often take place in densely populated areas.

#### Chlorination is phasing out

To prevent danger from poison gas or explosions (in the case of chlorine dioxide), hypochlorite or chlorine dioxide can be produced on site. However, health concerns of the use of chlorine substances remain.

Over the years, various carcinogenic, mutagenic and toxic and environmentally harmful effects of many organic chlorine compounds have been proven in scientific studies. Many safety measures have been introduced – appropriate training of personnel for the handling of hazardous substances is mandatory – and expensive.

Many people do not like the taste and smell of chlorinated water. The only reason for the continued use of chlorine based disinfection: It certainly is the less harmful alternative in comparison to not disinfecting at all.

**Many nations have programs to phase out and replace the use of chlorine**



After: disinfection with REDO Technology

# Disinfection Byproducts (DBP)

## Traditional reduction approaches

### Total THM limits

- **1979**, United States Environmental Protection Agency: limit 0.08mg/L
- **1998**, European Union guideline: limit 0.1 mg/L plus additional national reduction efforts required
- **2003**, German Drinking Water ordinance: limit 0.05 mg/L at consumer, limit 0.01 mg/L at water production plant
- **2004**, World Health Organization: Further specification of limit values for all four THMs

Water production plant managers worldwide become increasingly aware of the health hazards of various chlorination byproducts.

Particularly, trihalomethanes (THMs) have been identified as carcinogenic, toxic and environmental pollutants. However, similar effects are attributed to various other chlorination byproducts, e.g. Haloacetic acids, chlorite and bromates.

There is already clear statistical evidence on the adverse effect of chlorination byproducts. As further research on the precise biological mechanisms and individual medical impact is published, scientists expect an increasing amount of pressure towards a tighter DBP and THM regulation.

The international regulation shows a tendency towards stricter and more sophisticated guidelines.



Transport of chlorine gas as an hazardous substance



# Disinfection Byproducts (DBP)

## Health Hazards

THMs and other DBP are created by reactions between chlorine gas and organic materials found in the water.

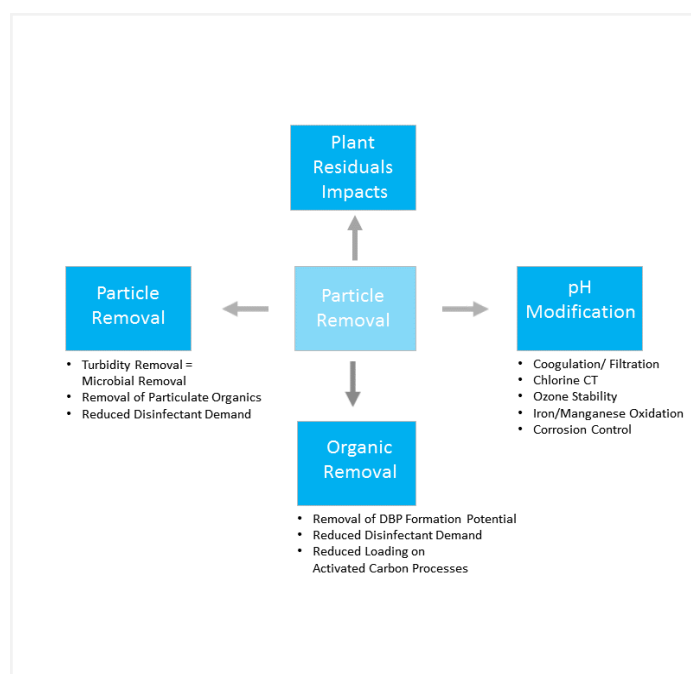
Newer legislation takes into account that organic materials can also be introduced in the water system AFTER the water production plant, so THMs can increase after the water production plant.

Therefore, reduction of THMs often requires a very complex bundle of measures in all stages of water production, in order to get below the limits even at peak times, e.g. flooding situations.

Other types of disinfectants produce different byproducts. E.g., ozone disinfection produces formaldehyde and other aldehydes, chlorine dioxide disinfection produces chlorite which affects red blood cells and may be toxic to DNA.

An example for complex THM reduction efforts is the Article [“Strategies for Attaining DBP Rule Compliance”](#) by George C. Budd, published [www.waterworld.com](http://www.waterworld.com)

Coagulation – A multidimensional / Multigoal Process



Potential for Effects on Lead Corrosion due to Chloride to Sulfate Changes

**DBP reduction is a challenging task with traditional disinfection methods – but easy with REDO**

## Corrosion and Hypochlorite

### Danger of high damages in water distribution networks

A major factor for corrosion in water distribution networks is the pH value.

Water disinfection based on chemical additions often changes the pH value.

Chlorine addition in the gaseous form will tend to lower the pH while adding chlorine in the hypochlorite form will tend to raise the pH.

Even though chlorine gas and hypochlorite seem to be cheap at first sight, cost analyses completely change if damages in the water distribution network through corrosion are taken into account.

In recent years chlorine gas has often been replaced through hypochlorite in order to reduce the danger potential in disinfection.

But after short time it appeared that the highly corrosive nature of hypochlorite results in out of scale corrosion damages to the distribution network, water pipes and other installations.

**Disinfection with REDO technology avoids these problems. REDO disinfection, based on 6 oxidants, is pH neutral and has no corrosive effects.**



# Innovative Water Disinfection with REDO Technology

The German way for safe, healthy and effective disinfection

There is a solution:

## MULTI OXIDANTS



Safe and effective disinfection technology based on six oxidants, that avoids disadvantages of common technologies. Developed with German University of Bremen.

## AWARDED



REDO Water Systems has been awarded by the German Ministry of Economics and Labor with the Federal Award for an outstanding innovative product.

## REFERENCES



Market proven technology with more than 500 installations in 31 countries – mainly in waterworks, buildings, different industries and livestock breeding.



## The Power of Six Multi Oxidants Disinfection Technology

REDO Water Systems' award winning technology is the answer to drinking water disinfection and hygiene challenges.

REDO Disinfection Systems use

- Water
- pure common salt
- and energy

to produce the **six strongest disinfection agents** on site within the customer premises.

The **unique combination** of the advantages of ozone, chlorine dioxide, chlorine and oxygen supported through dihydrogene dioxide and sodium hydroxyde results into an insuperable 'multi-barrier disinfection process' – the final removal of bacteria, germs, spores and other harmful vermins.

The disinfection solution is biodegradable, nonhazardous in operation and without dangerous side effects or byproducts.

REDO Disinfection Technology combines and accumulates the power of six disinfection agents to exceptional short contact time with an outstanding long-term effectiveness.

Different disinfection agents fight different microorganisms - the REDO combination of disinfection agents is **most effective** and **avoids the disadvantages** of high dosing of a single active ingredient.



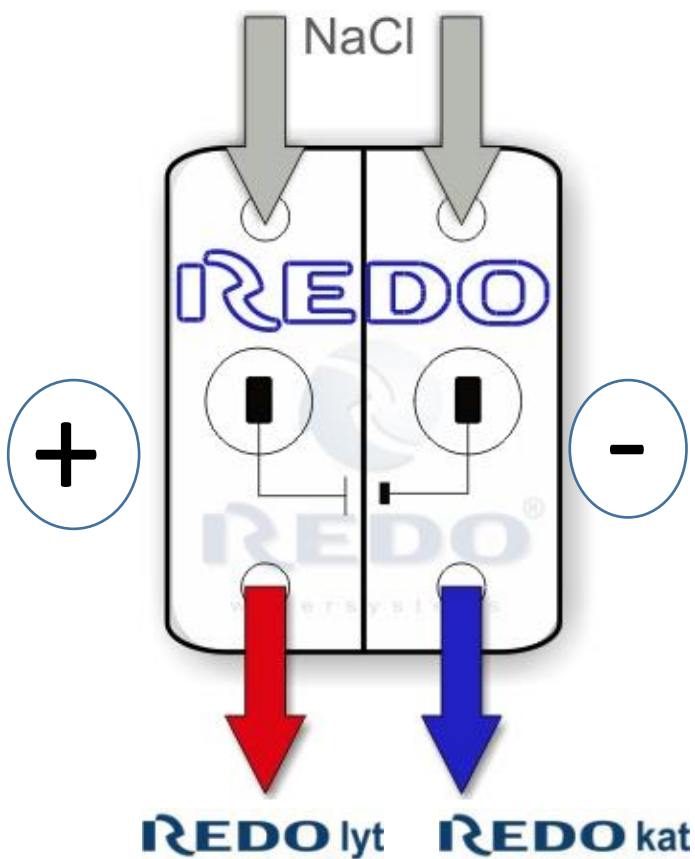
REDO installations fit any size of water production plant from small, decentral wells with only hundreds of cubic metres of water per day to large central plants with more than 100,000 cubic metres of water per day.

# REDO Technology

## Electrolysis of an aqueous & saline solution

### The Key Step | The Innovation

- Diaphragma Electrolysis
- High-Tech Electrodes made of special alloys and coatings
- Basic Materials: Saturated NaCl-Water („Brine“) + Electricity



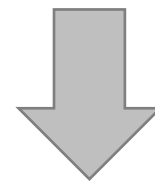
### The combination of two disinfection liquids produced on site:

#### REDOlyt:

- Oxygen ( $O_2^{\text{Singlet}}$ )
  - Ozone ( $O_3$ )
  - Chlorine ( $Cl_2$ )
  - Chlorine dioxyde ( $ClO_2$ )
- } acidic

#### REDOkat:

- Dihydrogene dioxyde ( $H_2O_2$ )
  - Sodium hydroxyde ( $NaOH$ )
- } alkaline



**REDO neutral**

to a harmless, ph-neutral and powerful disinfection product...

# REDO Technology





## Success Factors of REDO Technology

Extremely broad and intensive disinfection Instantly and with long term effectiveness and minimal DBP

**The success factor is the mix of six disinfecting agents:** E.g., the ozone component of REDO<sup>®</sup>lyt immediately and effectively kills all germs.

Chlorine and chlorine dioxide concentration are not used up for immediate disinfection, their concentration, needed for long term disinfection of contamination in the water distribution network, can be kept at relatively low levels.

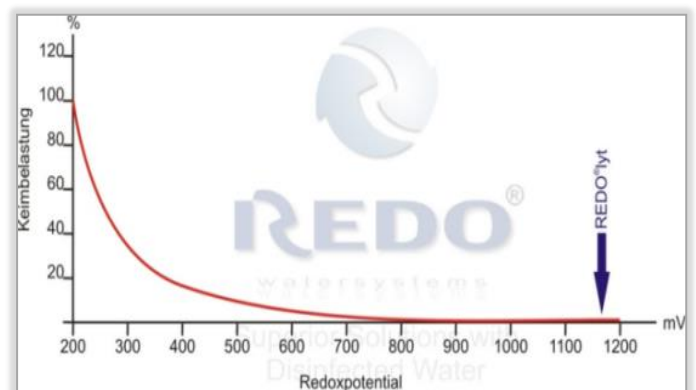
The interplay of different oxidizing and disinfecting agents with different ranges of efficacy provides a particularly broad disinfection. The intensity of REDO<sup>®</sup>lyt, e.g. measured by an excellent Redox potential of more than 1180mV, guarantees a very effective disinfection even at relatively low overall concentrations.

With the REDO mix of six disinfecting agents, each of the disinfecting agents is used in very low concentrations, so that even the strictest limits for disinfection byproducts are easily met.

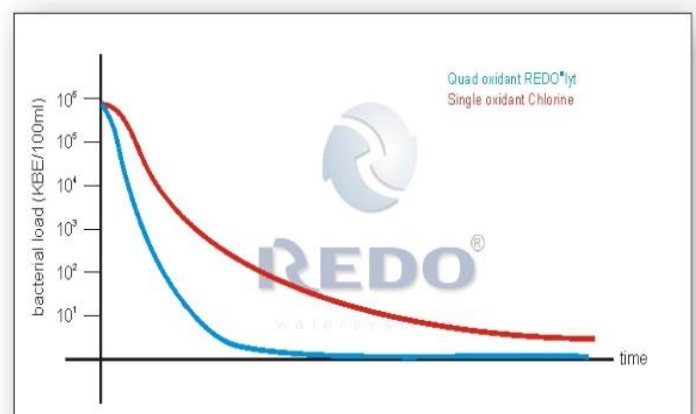
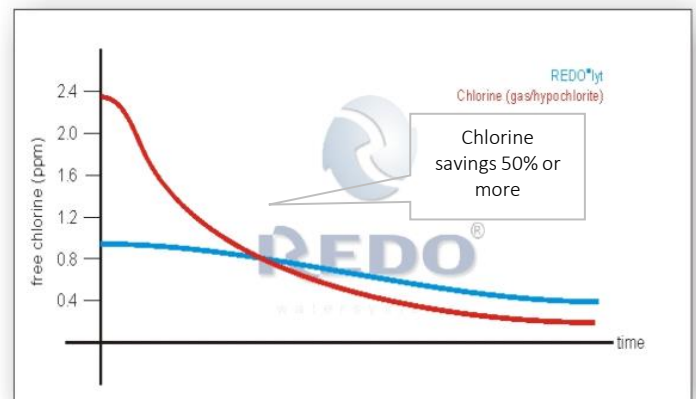
Disinfection with REDO is

- ✓ extremely broad
- ✓ intensive
- ✓ instantly
- ✓ with long term effectiveness
- ✓ minimal DBP
- ✓ pH neutral

**Extremely high Redox potential immediately kills all germs:**



### REDO<sup>®</sup>lyt: Comparison with Chlorine





Waterwork with REDO disinfection, Oman

## Essential REDO advantages

- ✓ Safe
- ✓ Effective
- ✓ Environmental friendly
- ✓ Easy to handle
- ✓ Low maintenance

- No chemical additives used
- Totally safe treatment process
- No health risks – minimization of disinfection byproducts
- No corrosion due to pH neutral water disinfection
- Very long lifetime
- Most effective, quick disinfection with long depot effect
- Water treatment meeting highest international standards
- Best energy efficiency – very low electricity consumption
- Base product salt is a natural resource with low cost
- Low operating costs
- Agents 100% biodegradable and environmentally friendly
- Easy to handle – no expert stuff needed
- Low maintenance





## Worldwide REDO installations in waterworks



Waterwork Oman with REDO Installation



Waterwork Ukraine with REDO Installation



Waterwork Hungary with REDO Installation



Waterwork Egypt with REDO Installation



Waterwork Iran with REDO Installation



Waterwork Nigeria with REDO Installation



## Grasshopper Investments & INWASOL: Finance and Business Models



## The Finance Gap in the Water Sector

### Private Financing of Waterprojects

Worldwide exists a growing demand for investments in the water sector. To date the financing of water projects has been primarily driven by government programs and development banks .

Alternative private financing models in the water sector are still scarce. There are numerous reasons for this. To start with, the water supply in most countries is in the hand of the public sector and business models open to private investors are hardly available.

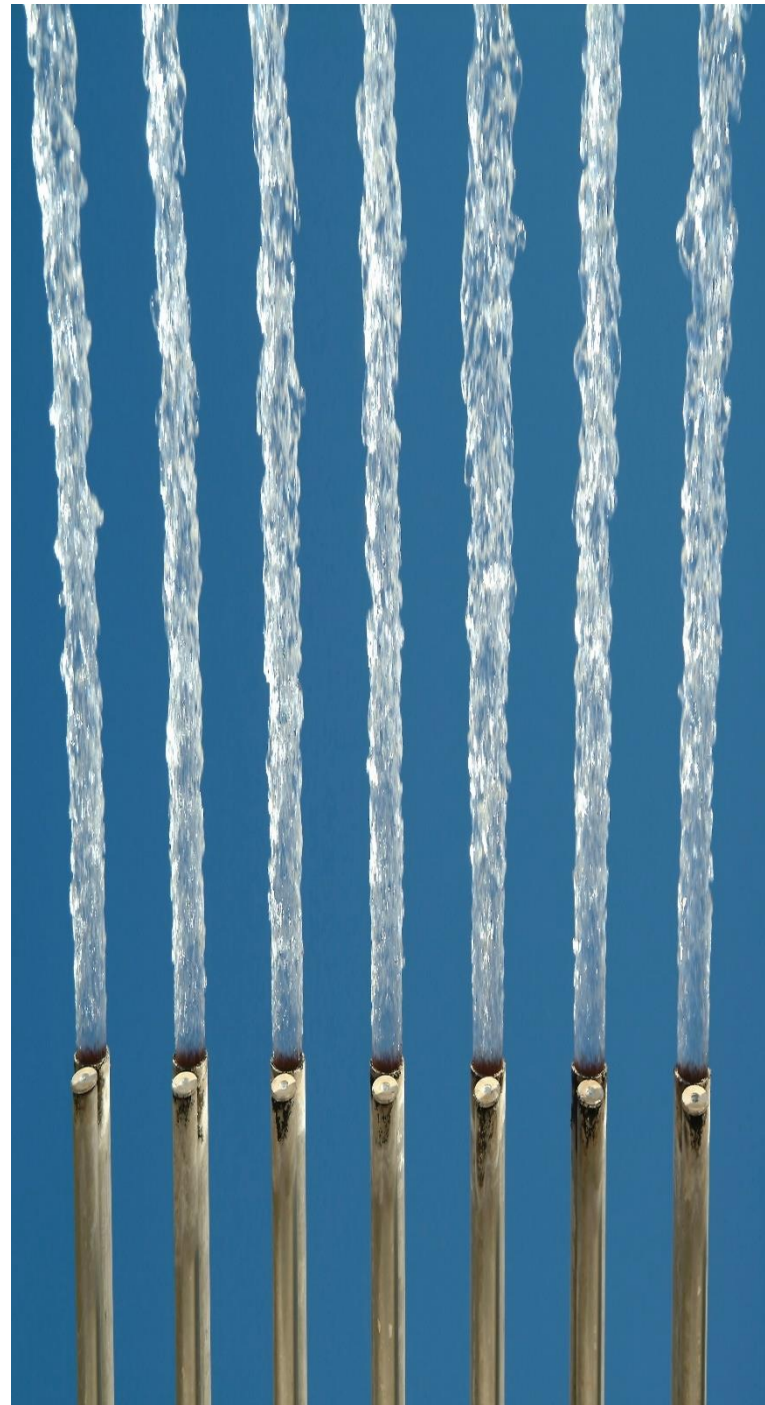
Grasshopper Investments and INWASOL have it made their mission to provide innovative financing models for private capital to invest in water projects.

Grasshopper Investments develops finance concepts and new business models for such water projects.

The subsidiary INWASOL in turn is involved in the project development and execution.

The projects emphasize a sustainable approach using private capital and business models based on market mechanisms to improve the water supply in developing countries - because the availability of clean water is one of the pre-conditions of any economic and social development.

Through private funding and innovative concepts Grasshopper Investments and INWASOL aim to close the finance gap and promote sustainable development in the water sector of emerging countries.







## Grasshopper Investments and INWASOL: Holistic solutions for sustainable water projects

### Grasshopper Investments

Grasshopper Investments is a German company designing private financing concepts and innovative business models in the water sector. Grasshopper Investments develops structured investment models to enable private investors the funding of sustainable water projects.

Grasshopper Investments focus are emerging markets, where lack of financing is a major obstacle to realize water projects, particularly in Asia, South America, Eastern Europe and the Middle East.



### Intelligent Water Solutions GmbH (INWASOL)

INWASOL is a 100 % subsidiary of Grasshopper Investments. The company is responsible for the implementation of Grasshopper projects and operational tasks such as project development and maintenance.

INWASOL aims to develop and implement solutions, which are geared towards the specific requirements of emerging markets. To meet these goals INWASOL deploys technologies and develops solutions adapted to specifically meet the local conditions in emerging countries.



# Overview Grasshopper Investments & INWASOL

Flexible solutions for individual water projects

## Private Financing



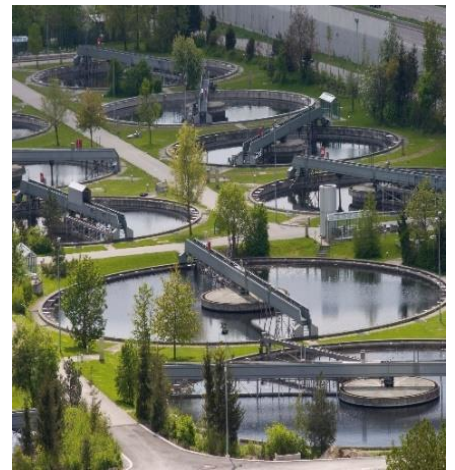
- Individual funding models for water projects
- On the basis of full or partial private financing

## Business Models



- Innovative water concepts and business models
- Involvement of private and public project partners

## Project Development



- Project development and technology solutions
- Optional with operation / continuous maintenance



## Grasshopper Investments:

### Financial concepts and innovative business models for water projects

Since its inception in 2010 Grasshopper Investments is focused on financing structures in the water sector. It is driven by the lack of availability of financing models for water projects, although there is a high demand for financing of urgently needed investment in water infrastructure, especially in emerging markets.

Grasshopper Investments has developed new financing concepts and business models that allow different approaches to private investments in the water sector and, at the same time, promote sustainable development in its target countries.

Grasshopper Investments area of business include:

- Identification of sustainable income opportunities in the water sector
- Development of new financing and business models for water projects
- Design of transparent investment models for private and institutional investors with a focus on emerging economies
- Promoting social and economic development in emerging countries through sustainable overall concepts

#### Investment Models and Structures

##### Closed funds

In 2012/2013 Grasshopper Clean Water Fund I was structured as a mutual fund and placed in Germany. The fund addressed private and institutional investors. The funds concept with maturity at the end of 2019 allows the funding of water projects to improve drinking water quality through initial introduction or modernization of water disinfection.

##### Direct investment for drinking water projects

To enable direct investment opportunities in water projects Grasshopper Investments developed a simple investment model based on water containers in 2013. Investors invest in a specific project and the necessary water treatment applications. The technology is containerized and pre-installed and afterwards rented out over the financing period of the specific water project.

##### PE funds and water bonds

Specifically to meet the needs and regulatory requirements of institutional investors, Grasshopper Investments develops bonds for the water sector as well as PE structures - with a focus on international investors.

##### Refinancing through tradable permits

Another innovative approach developed by Grasshopper Investments is to generate CO2 Tradable Permits through water projects that can afterwards be utilized to refinance such water projects.



## INWASOL - Intelligent Water Solutions

Project development and technology solutions



**INWASOL** is a 100 % subsidiary of Grasshopper Investments and focuses on:

- Project development and controlling
- Innovative business models for drinking water - like **www.water-projects.com** (rural areas)
- Operations and maintenance of Grasshopper projects

To date, Grasshopper Investments and INWASOL have realized projects in 12 countries in Asia, Eastern Europe, Middle East, South America and Africa.

The projects focus on drinking water in public water infrastructure as well as in rural areas.

Other areas of expertise include projects with the private sector such as financed water solutions for industries, private hospitals or large building complexes.

All projects completed so far are focused on "clean and safe drinking water".

Usually a training program for the local personnel accompanies the projects of INWASOL as well as the establishment of a regional service office to provide maintenance services and operational expertise.





# Global Water Franchise Agency: Operation



## Global Water Franchise Agency (GWFA)

**GWFA is your partner number one when it comes to sustainable water management at your place with your people and for your customers.**

**Our goal** is to combine local strength with international strength; together we can achieve the best knowledge, efficient business capacities and innovative technical systems for the sustainable improvement of water supply, sanitation and wastewater treatment.

**We offer effective solutions and a comprehensive range of services for our clients worldwide.**

**Our business segments** include construction engineering (including EPC and financial arrangements), operation and maintenance of facilities for water supply, wastewater treatment and reclamation, mainly for plants, but also for connected networks. Moreover we provide an integral portfolio of direct consultant services including all technical and administrative tasks related to water project management.





Water supply plant Tiruvannamalai, india



## Global Water Franchise Agency (GWFA)

Joint-venture of two leading German water companies

### Remondis

Remondis is one of the leading service providers worldwide in the water and the recycling sector, the largest enterprise in this sector from Germany. From supplying private households with top quality drinking water, to providing industrial businesses with process water all the way through to treating wastewater and recycling sewage sludge and any other residual materials. Specialising in all aspects of water management and innovative material flow management, Remondis is a sought-after partner – by local authorities, associations and industrial businesses alike.

<http://www.remondis.com/>

### CEEM – Consultants for Environmental Engineering and Management

CEEM is an international experienced consulting company specialised in the water supply and sanitation sector. CEEM's scope of services ranges from general consulting to the technical and financial improvement of water supply systems and wastewater treatment processes. Assigned by private and public clients, CEEM has carried out more than 250 projects internationally and in Germany including cost-optimisation programmes and private sector participation projects. CEEM stands for technical know-how combined with economic expertise.

<http://www.professor-rudolph.de/en>

*“Through GWFA, Remondis Aqua brings huge operational know-how and capacities to create and manage efficient, sustainable and affordable water systems.”*

*“Through GWFA, CEEM brings a deep understanding and long experiences in effective and sustainable water project development and implementation.”*

**REMONDIS®**

WORKING FOR THE FUTURE



**CEEM**





WWTP Groblersdal, South Africa

## Global Water Franchise Agency (GWFA)

With the bundled expertise of these two international players, GWFA provides a wide range of services along the entire value chain in water management.

### GWFA scope of operational services include for example:

- Technical operations and maintenance of water and wastewater facilities
- Management and administration of water services
- Customer relations management
- Water network management
- Material flow management

### GWFA scope of direct consultant services include for example:

- Water project development, preparation and implementation
- Environmental management and sustainability management
- Professional training, education and research
- Water project procurement and tendering
- Technical Engineering
- Investment planning and financial assessment
- Cost and benefit analyses

With our unique business model, **GWFA fosters cooperation with local experts to realise water projects on a regional or local scale.**

**We have built a strong partner network of experts**, local and international, all in charge to serve GWFA clients on a franchise basis. In this way our clients not only benefit from the broad expertise, CEEM and Remondis Aqua have gained over decades, proved in a long track record of successful projects, but also benefit from local market expertise, knowing that inputs and specifications are individually adapted in each case.

By this, **GWFA takes into account that there are no blueprint solutions.** Accordingly our clients receive customized services, assuring that the best suitable and affordable solutions are adapted to regional and local conditions e.g. climatic, environmental, social, cultural, technical as well as economic conditions.

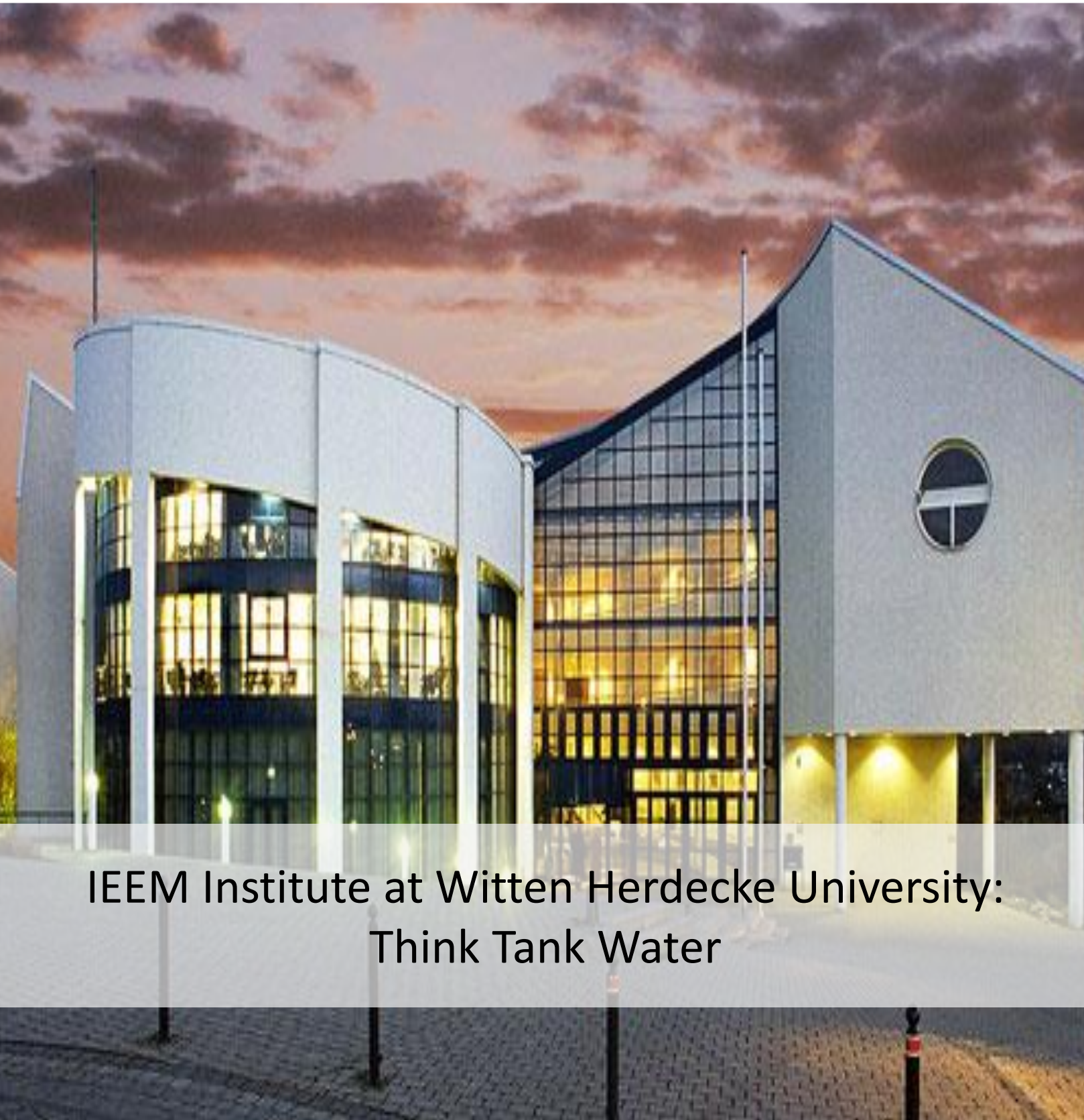
GWFA offers high quality solutions for each specific application as well as efficient, sustainable and cost-effective concepts and services always in line with local requirements.

- ✓ We combine local and international knowledge
- ✓ We interlink technical and business expertise
- ✓ We focus on our clients' and partners' interests
- ✓ We provide value-for-money solutions



Water pond treatment station Tiruvannamalai, India





IEEM Institute at Witten Herdecke University:  
Think Tank Water



# Institute for Environmental Engineering and Management at the Witten/Herdecke University

The Institute of Environmental Engineering and Management at Witten/Herdecke University unites the academic faculties of "technology" (engineering) and "economics" (including finance) and leads to an applied field of science. Projects of the institute's work today deal with specific aspects of water supply networks, wastewater disinfection, decentralised systems for water reclamation, with integrated process control of collection systems as well as overall strategies for water management using appropriate organisational models. Other projects deal with water efficiency, especially water loss reduction programmes, in research and capacity development

## Applied Science for the water sector

The focus of IEEM lies in the broad field of classical water and sanitation - with a close link to applied environmental economics. Technology and economics are the essential fundamentals of our work and precondition for the development of modern management concepts and organisational schemes, which will allow to realise technical and institutional concepts in an optimised way, efficiency-oriented.



## About us

As independent "At-Institute" connected to the Private University of Witten/Herdecke, our projects are always sponsored by third parties (not depending on guaranteed budgets), and our work has to be near to economic reality and technical practicability. The objective of the institute IEEM is, to elaborate innovative technical and economic solutions, support their implementation and finally contribute to sustainable economy and the protection of environmental resources.



## IEEM's strengths in the water sector:

- to link business with academics
- to integrate economics and technologies
- to combine research and consulting







UASB-Reactor, EXPOVAL, Spain



## High Brain – Lean Tech

### IEEM international orientation

The major part of IEEM's projects is in the international world - as well in the industrial states (Europe, Japan, USA), as in transformation and developing countries (Algeria, Armenia, India, Kenya, Namibia, New Zealand, Nicaragua, Russia, South Africa, Yemen and others).

IEEM is developing, for example, in close co-operation with local small and medium sized enterprises novel concepts for PSP (Private Sector Participation) and methods for technical-economical assessment and evaluation of technologies as well as appropriate measures within IWRM (Integrated Water Resources Management) - always taking into account not only technical, but also economical and ecological aspects.

Under the label "High Brain - Lean Tech", IEEM is researching and developing financially feasible stage-by-stage concepts for water supply networks and wastewater treatment plants, basing on simple and cost-efficient civil design - but with high quality equipment for low life and reduced total production costs - to be realised by local companies with support of experienced companies from elsewhere - often linked to so-called "intelligent" process technologies.



### The Voice of IEEM in the Water Sector

Members of the IEEM-Team are active in the most important associations, like the International Water Association (IWA), the Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall (DWA), the Association of the German Water and Waste Industry (BDE) and the Head-Association of the German Industry (BDI). Assigned by various sponsors, like the EU, federal ministries (the Ministry of Environment, the Foundation of Environment), the Institute elaborates studies for water and waste.

### Exmamples of references

Since 2009 Co-ordinator of the UNW-DPC working group on "Capacity Building in Water Efficiency".

Since 2010 Evaluation Expert to the European Commission, Research Framework Programme 7 and Panel Discussion Member for Country List FP8.

Since 2010 Member of the German Delegation for the Vietnam-German Technological-Scientific Collaboration Negotiations BMBF ./ MoST, Hanoi.

In 2011 nominated as Head of the "VD Office for Water and Sustainability Research" under MoST + BMBF.

Since 2012 Member of the Scientific and Technological Advisory Board for the Joint Water Programming Initiative of the European Commission.

**Since 2013 Member of the Technical Advisory Committee –TAC, National Urban Sanitation Plan, India**





Pilot wastewater treatment plant Centa, Spain

## Fields of Action

### Current Projects

#### India

Water Losses in Urban Environment



- adaption of methods and technologies for reduction of real losses/ business model development and accompanying measures.

#### Vietnam

Integrated Wastewater Concept for Industrial Zones



- solutions for pre-treatment of wastewaters, generation of energy from wastewater and recuperation of valuable substances are adapted and verified by on-site pilot systems, concepts for sewage sludge management and monitoring, control mechanisms especially in terms of toxic wastewaters.

#### South Africa

Integrated Water Resources Management in the "Middle Olifants" river basin



- establishment of an integrated water resource management scheme (IWRM) for the catchment. The approach comprises management and technical solutions that take into account basin specific characteristics including the natural processes of the hydrological cycle and ecosystem integrity, the different competitive uses as well as human induced stressors that put the resource at risk.





Water Supply Plant, Tiruvannamalai, India



# WALUE - Water Losses in Urban Environment

## Solution Concept for Water Loss Reduction, Adapted to the Situation of the Indian Water Supply Sector

### Project Objective

WaLUE's main objective is to deliver an overall solution concept for water loss reduction, adapted to the situation of the Indian water supply sector and exemplarily executed for the municipality of Tiruvannamalai within three years.

For such a solution, it is necessary to adapt existing technologies, and to elaborate a business model for the reliable operation of a WLRP (Water Loss Reduction Programme), which must be profitable (i.e., sustainable in economic terms) and thus allow financing of all WLRP-investments.

A comprehensive technical strategy is required for the reduction of real losses in consideration of the four common methods of water loss reduction: Dynamic Pressure Management, Active Leakage Control, Immediate Leakage Repair and Asset Management with a special component for pump efficiency – all in absence of continuous (24x7) water supply. This strategy will be implemented in a pilot area of the water supply system of Tiruvannamalai (Tamil Nadu) and includes a monitoring concept to control water losses and collect data for the assessment of reduction measures, also to be implemented in the pilot area. Furthermore, it is planned to simplify the monitoring of water losses by developing a web-based visualization and analysis software with remote controlled data and noise loggers. A viable water utility business concept, equipped with a novel financing model for long-term value investment programmes shall be developed, verified and demonstrated. Know-how transfer to the local operators and decision-makers is included.

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### Project coordination:



### Industry and Science partners:



### In cooperation with:



## WALUE - Water Losses in Urban Environment

Solution Concept for Water Loss Reduction, Adapted to the Situation of the Indian Water Supply Sector



### Triple Bottom Line:

**Financial benefits:** surplus revenue from water fees, lower maintenance costs and prolonged lifetime of the water supply network, improved conditions for local business development.

**Social benefits:** include increased water supply, i.e. less working time lost by citizens waiting in line for water. Furthermore, cleaner water equals improved health.

**Ecological benefits:** less contaminated water due to reduced leakage, decreased use of chemicals as less water needs to be filtered once the water losses are minimized as well as saving energy due to the use of more efficient pumps



**WALUE: Development and Demonstration of a Technology-based Business Concept for the Sustainable Management of Water Losses in Urban Environment (WaLUE), executed for the ODA-Financed Water Works Municipality of Tiruvannamalai (Tamil Nadu / India).**





## Contact

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