



**ABIONIK**  
AIR WATER LIFE

**ABIONIK Group Presentation**

# Agenda

## ABIONIK Group

MARTIN Systems

LIKUSTA Umwelttechnik

Steinhardt Wassertechnik

# Our vision: Improving Life with Clean Air and Water

## The ABIONIK Idea



**We create an innovative group of companies that share our passion for clean air and water**

- Having German technology at our core
- Combining the specialists of each sector to cover the full value chain
- Being the solution provider of choice for decentralized waste water and air treatment solutions
- Providing a platform for entrepreneurs to participate in and to leverage value

The German specialist for cleantech /  
purification solutions for water, storm- &  
wastewater and air treatment

**ABIONIK improves life**

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**3**

Product brands

**173**

Total workforce (Europe & India)

**EUR 31.2 m**

Total output 2019

# Answering global future key challenges, which are implemented into ABIONIK's strategy



## Urbanization

**1.5 m** people are added to the global urban population **every week**



## Increasing air pollution

**Cities** account for **80%** of global air pollution



## Climate change

**Average temperatures** are predicted to increase by over **2°celcius** in the 21<sup>st</sup> century

### Future key challenges



Water security



Water quality /  
public health



Flooding

# Offering comprehensive expertise, proven technology and high-value added services

## Technologies



Manufacturer of water purification solutions based on **membrane technology** and MBRs for wastewater treatment



Manufacturer of customized **facilities, equipment and systems engineering** for wastewater and waste air treatment



Manufacturer of products for **urban flow control** and water treatment solutions

## Services



One-stop-shop with comprehensive **after-sales services** offered 24/7



# Producing service- and application-driven solutions on the specific needs and requirements of three end-sectors



Industry

- Food & Beverage / Breweries
- Paper
- Automotive
- Construction
- Hospitality / Leisure industry



Municipalities

- Drinking water
- Waste management
- Rural communities
- Polar stations
- Disasters areas

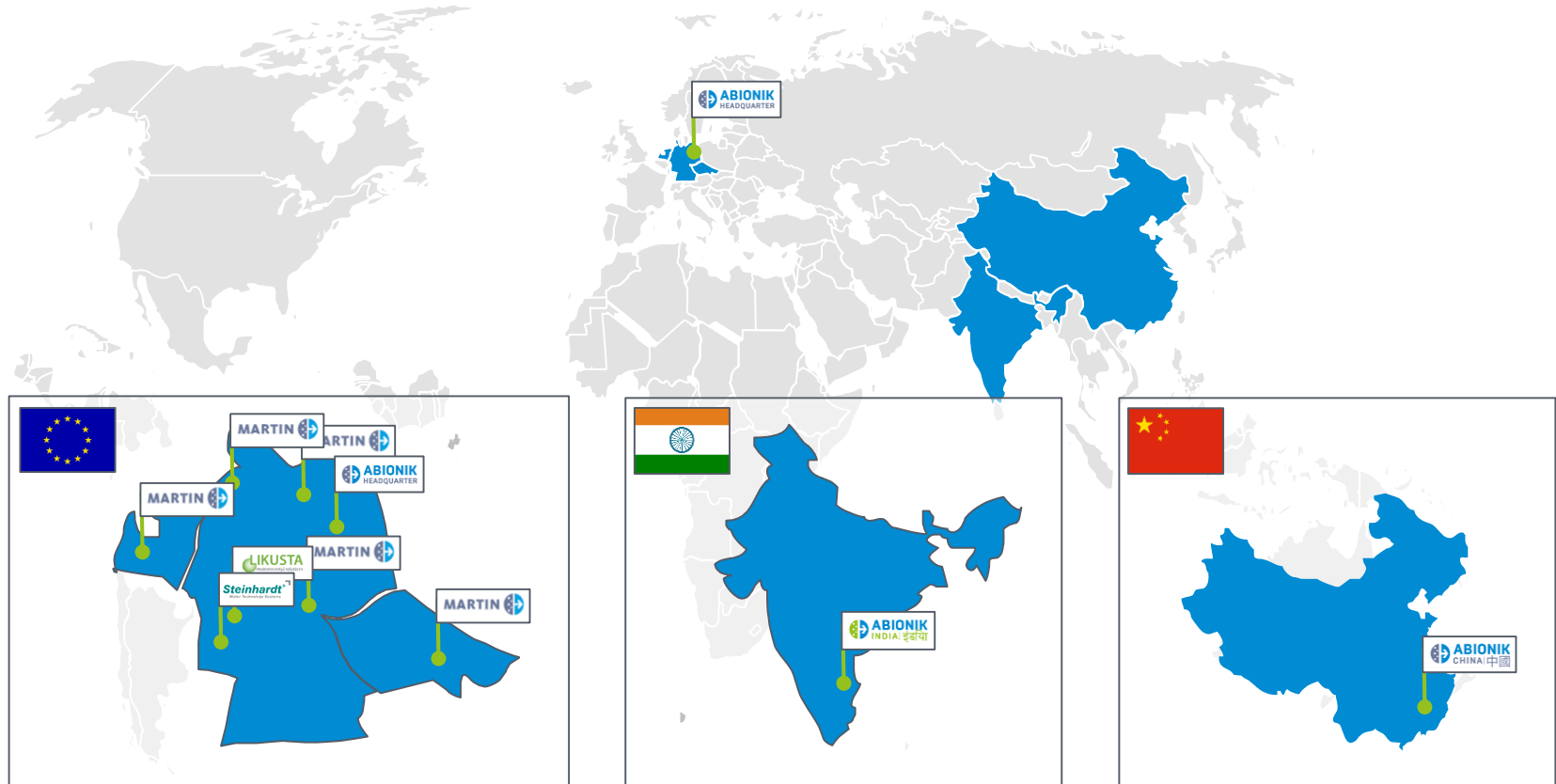


Maritime

- River cruise vessels
- Naval & coast guard vessels
- Yachts
- Special vessel
- Ocean cruise vessels (to come)

# Having a global footprint with sales and production facilities across Europe and Asia

## ABIONIK Locations





# Life is good - with clean water

## Selected R&D-projects and innovation partners



- SINO WATER - Good water governance and German water technology for 2 large Chinese water bodies, China pharmaceutical waste water treatment
- WavE - Sustainable technology and concepts for increased water availability and reuse, REMEMBER - MBR technology for efficient use of energy and resources using dielectrophoresis
- KEYS: Smart technologies for sustainable management in urban catchments, China Sponge city concept
- EARNINGS – low-energy grey water treatment, ground filter with AQUA CUBE post-filtration
- MBR 4.0 – platform for process online control and predictive maintenance

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# Since 1996, MARTIN successfully provides water treatment solutions based on membrane technology

## Company Overview

### Proven and robust technology



### Technology and Products

- Specialized in MBR water treatment\*
  - Producer of state-of-the-art membrane water treatment systems
- Small-footprint solutions
  - Navy and cruise ships, yachts, remote locations
  - Municipal or industrial applications
- Reliable and proven technology
  - > 65,000 membrane modules installed
  - Exclusive Supplier of German Navy

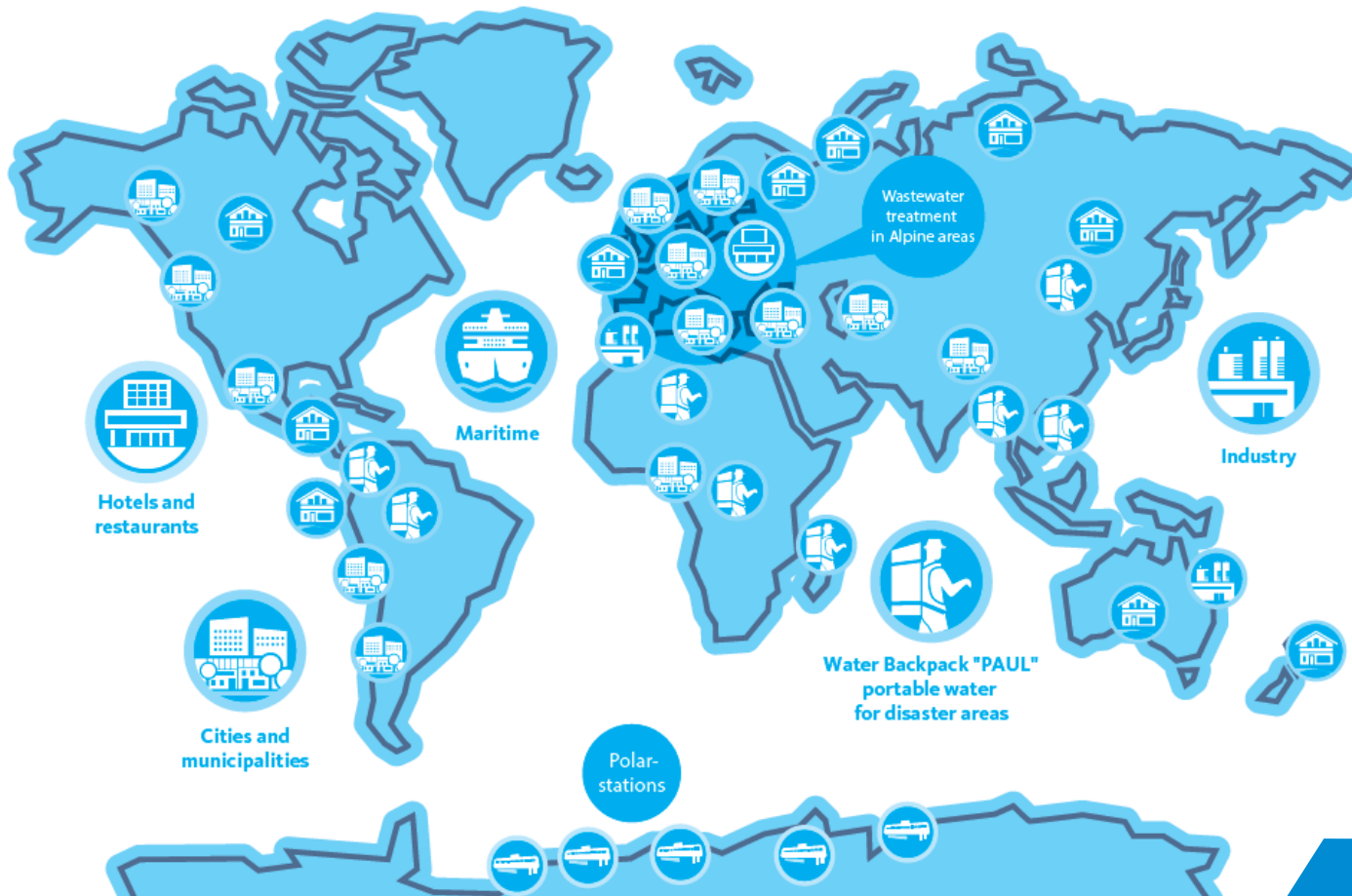
### State-of-the-art processes

- High quality, certified production
  - All processes ISO 9001-2015 certified
- One-stop-shop - the whole value chain
  - Design, Development, Production and Service of Water/ Wastewater Treatment Systems

# More than 3,000 projects successfully completed: worldwide, in various industries and applications



## International references



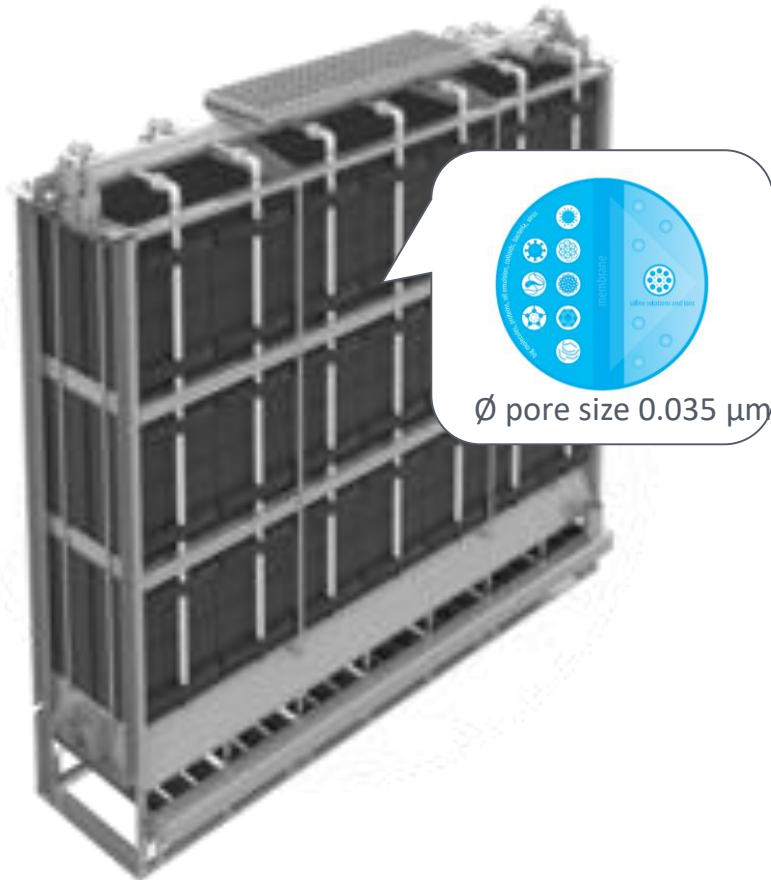
## Strong customer base

- Maritime
  - Navy vessels
  - River cruise ships
  - Mega yachts
- Remote locations
  - Polar stations
  - Construction sites
  - Resorts
- Cities/ municipalities
  - Waste water
  - Drinking water
- Various industries
- Disaster relief

# All MARTIN Systems' products are built around the company's extensive membrane competence



## Membrane Technology



### MBR - Principle of operation

- Separation of smallest particles from liquids using the membrane's defined pore size

### Advantages

- Excellent effluent quality: Colloids and bacteria are retained
- Robust design and reliable operation\*
- Compact size with a small footprint; secondary clarifiers not necessary

### Membrane characteristics

- PES-Membranes welded in flow-optimized 3D-molded panels; design prevents clogging
- Defined pore size for Ultrafiltration
  - MWCO 150 kDalton\*\*
  - Pore size nominal 0.035 µm, max. 0.1 µm\*\*\*

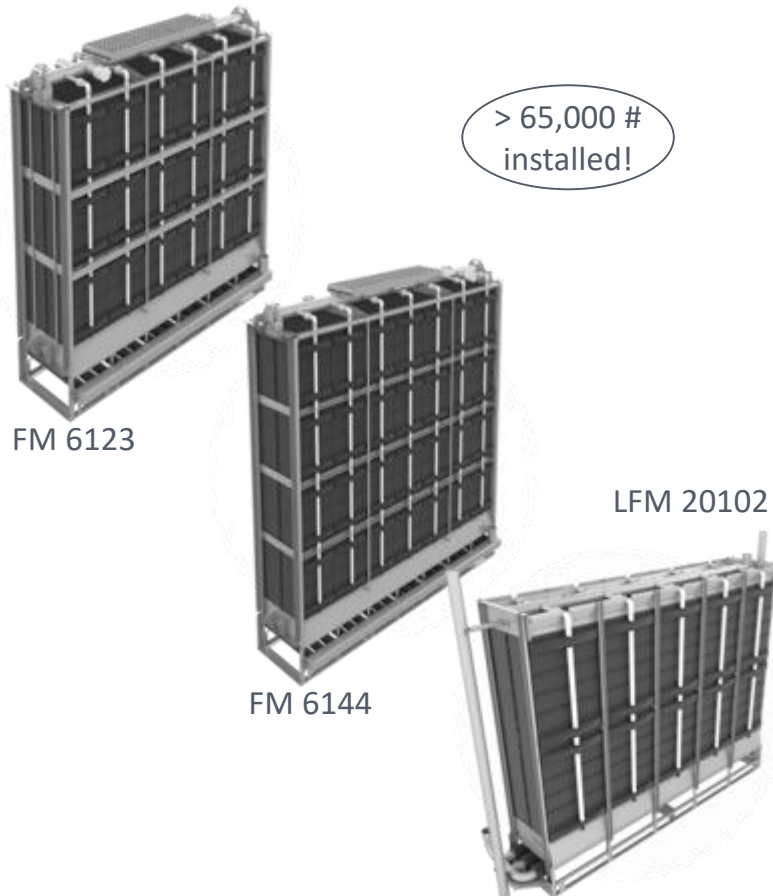
\* membrane service life of up to 10 years (depending on use case);

13 \*\* Molecular Weight Cut Off; \*\*\* 35 millionths of a millimeter

# Membrane technology economically accessible for various applications world-wide



## Wastewater treatment: MBR filter modules



### Modular platform strategy

- Modules form 6-960 m<sup>2</sup> filter surface area
- Scalable by combining different numbers and sizes of modules according to the specific use case

### Application

- Membranes are installed directly in the aeration tank or downstream filtration chamber
- A secondary settling tank is not needed

### High-quality materials

- Membrane modules are directly plunged into waste water basin
- High-grade plastics (PP) and stainless-steel components (SS 304, SS 316 optional) guarantee highest quality and long service life



# Likusta & MARTIN Systems providing clean water from MBR container sewage plant



Third largest artificial island in Bahrain consisting of a series of 15 large artificial islands, covering an area of about 5 km<sup>2</sup>



**MBR container sewage plant**



**Odor control**

- Transfer of sewage into clean water for construction and first residents
- MBR technology is provided in a modular containerized system
- System is capable to be extended and relocated on demand

**Purification of sewage to water for the largest artificial island in the Kingdom of Bahrain by combining specific know-how from Likusta & MARTIN Systems**



# MBR sewage treatment plants

For industry and municipalities



## Case study

- National Institute for Animal Health of Germany, Island Riems, Baltic Sea
- 3,000 EW
- 3,300 m<sup>2</sup> membrane surface area
- Commissioned 2011, extension 2019/20
- Thermal treated wastewater from laboratories and stables
- Municipal wastewater
- Effluent is discharged into the Baltic Sea

# MARTIN MBR systems for vessels: The reliable and proven solution



Wastewater treatment: Plants for ships and offshore installations



BMA 10-75 standard



Flotation systems for  
galley water treatment



BMA Yacht Line for  
Super Yachts



BMA R for river cruiser

## The Challenge

- Compliance with stringent sewage standards\*
- Fit in confined places while reliable operation

## MARTIN MBR systems for vessels - the solution

- MARTIN MBR systems combine the relevant features
  - Small footprint, no secondary tank required
  - High reliability: robust design, MBR service life 10 yrs.
  - Excellent effluent quality
- Black/ grey water treatment, sludge/ dry waste treatment, vacuum pumps and toilets
- All MARTIN Systems and are bespoke solutions, tailored to individual requirement of each ship\*\*
- Average daily flow from 2-200 nom. m<sup>3</sup>/d

## References

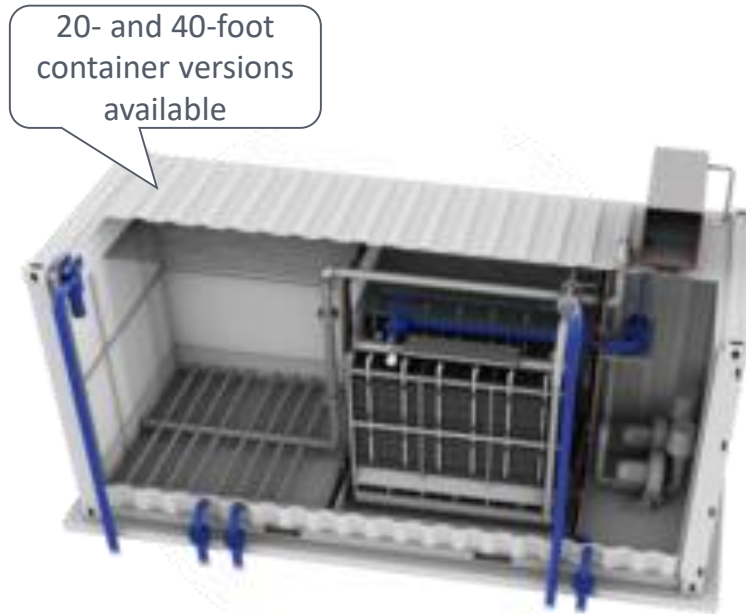
- Commissioned in >290 ships and 9 polar stations
- Exclusive supplier of the German Navy

\*e.g. 2009 Helsinki Rules, IMO MARPOL, MEPC.227(64);

# Systems are highly scalable and customizable - treatment capacity of up to 1,000 m<sup>3</sup>/ day



## Wastewater treatment: Compact Treatment Plants



20-foot ISO container with MARTIN MBR-system

### Containerized systems as a plug-and-play solution

- Speed
  - Fast delivery and start-up
  - Min. construction work on site, easy to relocate
- Value
  - German quality equipment and compact design
  - Very good price-performance ratio
- Convenience
  - Low maintenance and operation requirement
  - Effluent with irrigation water quality

### Applications in various industries

- Municipal and industrial wastewater
- Educational institutions and healthcare applications
- Remote locations:
  - Hotels, refugee camps, parks and military bases
- Building complexes: Offices, shopping malls, villages

# Cost effective, compact and mobile water treatment for rural areas

## Drinking water treatment: AQUA CUBE



### Purify available water sources

- With the AQUA CUBE, available water resources can be used as service water or drinkable water
- Ultrafiltration removes up to 99.99 % of bacteria and other pathogens out of polluted water
- Scalable design from 3 - 20 m<sup>3</sup>/d

### The AQUA CUBE is a plug and play device

- Compact design with high packing density
- Easy to install and operate - high flexibility for the relocation via basic transport vehicles
- Very low energy consumption - operation is possible without electrical energy or other consumables

### Applications

- Drinking water or process water for
  - Communities, schools or building complexes
  - Special events/ temporary solutions





# PAUL- the easy drinking water solution for disaster relief and remote locations



## Drinking Water Treatment: PAUL\*



Mozambique in  
April 2015



### Mobile backpack for water treatment

- Creating >1,200 liters drinkable water per day - enough for 400 people
- Award-winning easy and robust design
  - No moving parts - reliable operation for years
  - No energy consumption, chemicals or additives
  - Very easy to use - pictograms manual for illiterates
  - Low weight, less than 20 kg

### Application: Disaster relief and remote locations

- Systems provided by charities and aid organizations
- In use in >80 countries worldwide, including
  - 2010 Pakistan flooding, Haiti earthquake
  - 2011 Indonesia, Thailand flooding
  - 2012 Myanmar
  - 2013 Philippines typhoon ...
- More than 3.000 PAULs in operation:  
Drinking water for more than 1.000.000 people

# MARTIN Systems' drinking water projects



## Drinking Water Treatment: AQUA CUBE and PAUL



Mozambique in  
April 2015



Colombia in  
December 2014

AQUA CUBE for  
schools in Uganda



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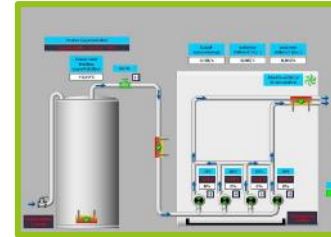
**Steinhardt Wassertechnik**



# Entire Product Range in Waste Air Treatment and Water Purification from a Single Source



## Likusta Business Segments



### Waste Air Treatment Water Treatment

- Bio filters
  - Bio scrubbers/ bio trickling filters
  - Gas scrubbers
  - Activated carbon filters
  - Chlorine gas neutralization
- Dosing technology
  - Strip desorption systems
  - Deacidification systems
  - Ground water and soil decontamination

### Plastics/ Containers

- Devices
- Tanks
  - Certified tanks
  - Storage tanks
  - Accessories and equipment
- Pipes and fittings

### Switch Cabinets

- Switch cabinets
- Systems control and operation
- Sensor technology
- Remote maintenance

### Services

- Installation and commissioning
- Technical customer service
- Systems audit, optimization and modernization
- Service modules

# Microorganisms Decompose Organic Pollutants in an Environmentally Safe Process



## Waste Air Treatment: Bio Filters



### Proven cost-effective processes

- Pollutants and odorous components from waste air and waste gas flows are decomposed to non-poisonous, odour-neutral, low-molecular weight substances
- Biochemical decomposition through micro-organismal metabolic activity

### Customer specific design possible

- Panel/ round/ stage filters
- Container/ compact/ mobile bio filter installations
- Closed bio filters for targeted waste air flow conductance

### Application specific selection of filter materials

- Bark mulch, wood chips, torn burl wood
- Coconut fibre, heather

# Two-stage Adsorption Process for Odor Elimination and Waste Air Purification



## Waste Air Treatment: Bio Scrubbers and Bio Trickling Filters



### Proven, cost-effective process

- Absorption of organic emission components, hydrogen sulphide and ammonia
- Biochemical decomposition by microorganisms
- For waste air with high input concentrations

### Variety of possible process combinations

- Combined with subsequent waste air treatment systems, e.g. activated carbon filters, chemical scrubbers or bio filter systems

### Successful application in various industries

- Sewage treatment and composting installations
- Beverage, food, and animal feed
- Chemicals/ pharmaceuticals, coatings/ paints
- Textiles

# Odor Elimination and Waste Air Purification according to the Absorption Principle

## Waste Air Treatment: Gas Scrubbers



### Scrubbing process

- Dissolution of water-soluble substances by physical-chemical means from waste gas into liquid
- Transition of solid, liquid or gaseous substances
- High purity of waste gas without pollutants or unpleasant odors

### Large number of various scrubber types

- Counter-current/ cross-current/ parallel flow scrubbers
- Single/ multi stage
- Inside/ outside installation
- Compact, experimental, temporary scrubbers

### Application in various industries

- Sewage treatment plants, composting, rendering
- Food, paper, metal, textiles, chemicals



# Likusta Activated Carbon Filters Remove 99.9% of Unwanted Substances



## Waste Air Treatment: Activated Carbon Filters



### Microporous structure permits high adsorption rates

- Fine-grained carbon with high porosity structure and a very large surface
- Binding of substances by adsorption
- Elimination of pollutants and odorous substances from gases, vapours, and liquids or for recovery of residues
- Wide range of application (0 to 60° C or 40 up to over 90% humidity); various pollutants or odorous substances, e.g. hydrogen sulphide, indoles and scatoles, methylmercaptane, methylamine, ammonia, VOC

### Application-specific Likucarb active

- Likucarb active is treated with chemicals or metal salts to optimize individual applications\*
- Regeneration and reuse possible up to 10 times\*

# Likusta Tanks: Manufactured Customer-specific in a Multitude of Designs



## Plastic and Tank Production: Process and Storage Tanks



### Certified Tanks

- Plastic storage tanks with general building approval\*
- Compliance with regulations of VAWs or AWSV through approval as specialized company according to WHG\*\*
- Indoor or outdoor installation; On-site welding possible
- Standard sizes from 5 to 50 m<sup>3</sup>; Special sizes possible



### Round and Square Tanks

- Single-walled plastic tanks without style of construction approval
- Static calculation and planning
- Individual approval possible
- For indoor and outdoor installation
- Open/ closed versions; On-site welding possible
- Customer specific sizes



### Equipment/ Special Equipment

- Pipes and fittings
- Earthquake-proof construction
- Equipment for filling, extraction and ventilation
- Filling level displays
- Insulation, heating units
- Agitators, safety equipment
- Ladders, operator platforms, railings, ...

# Dosing Systems Provide Substances in Precisely Defined Quantity and Mixture



## Water Treatment: Dosing Technology



### Process

- Online measurement of nominal values
- Continuous or discontinuous dosing of the respective chemical\*

### Likusta waste water purification systems

- Phosphate elimination: Precipitation and removal of dissolved phosphates
- Denitrification: C-source dosage to optimize metabolic activity of microorganisms
- Goals: prevent eutrophication of water bodies - lower operating costs

### Applications in various industries

- Deacidification, decarbonization (softening), denitrification, deferrization and manganese removal
- Sterilization, de-foaming, industrial manufacturing processes



# You Take Care of Your Core Business – We Take Care of the Rest



**Services: Installation, Commissioning, Modernization and System Optimization**



## **Installation + commissioning by Likusta specialists**

- Start successfully with your new system: We offer
  - Disassembly of old installations
  - Installation, function tests and commissioning
  - Operator training

## **System audits for safety + availability\***

- Regular checks and load-dependent maintenance work instead of downtime, unplanned repairs and expensive crisis management
- Choose the service module tailored to your needs

## **Modernization and optimization**

- Assessment of the situation
- Development of an individual action plan
  - Expansion, refurbishment and renewal
  - Improved control and remote service
  - Cost reductions and energy savings



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# 30 years of experience in stormwater treatment

## Company Overview



- Located in Taunusstein (Frankfurt area)
- Manufacturing of high-quality stainless-steel parts



# Innovative Solutions for sustainable protection of environment and water bodies

## Product Range



- Flow control systems
- Flushing systems
- Screening systems
- Stormwater treatment systems
- Process water systems
- Flood protection systems
- Sewage network management



## IKT Product Test Award

### IKT Product Test „Flow regulators“ (2018)

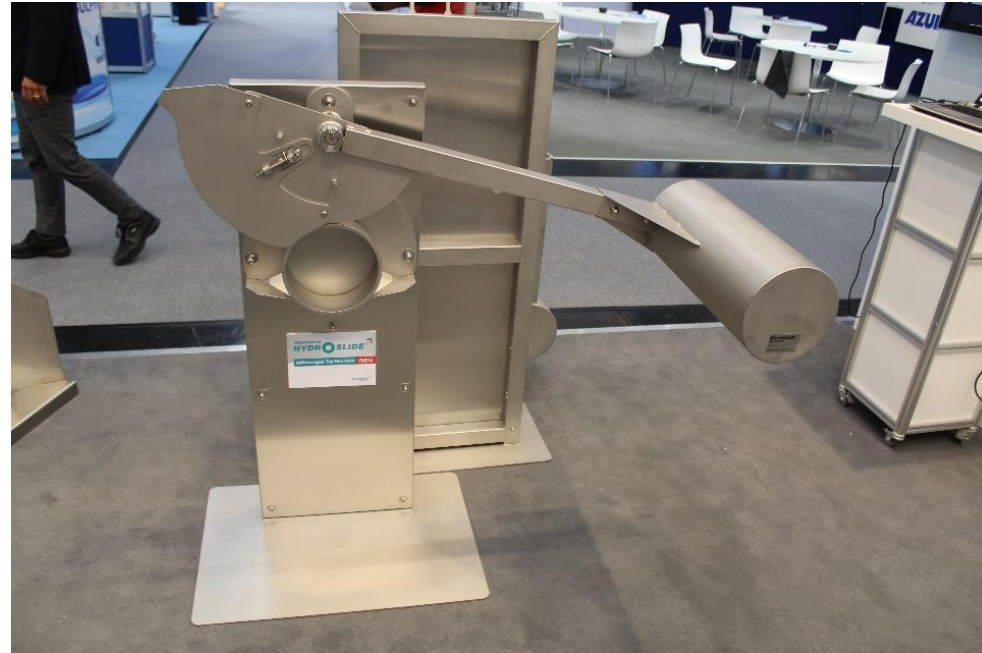
HydroSlide GM automatic regulator with best score (2,1)



# Flow Control Systems

## Product innovations

HydroMaxx®, HydroSlide Mini Vario





# Flood Protection

## HydroSWIZZ - Effective flood protection

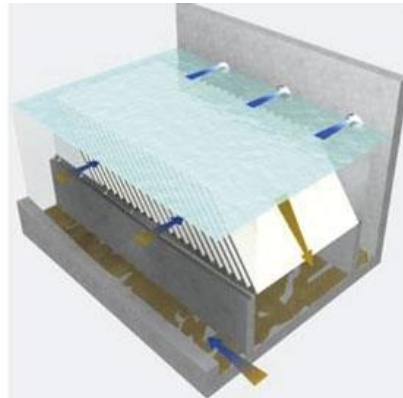
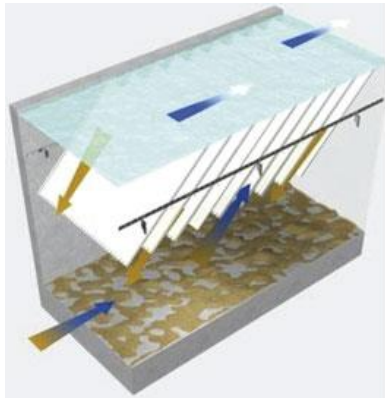
Emergency protection wall in Zick-Zack





# Effective stormwater treatment with moving lamellae

## HydroM.E.S.I.® Particle Separator



- Stormwater inflows and combined sewage systems lead to high hydraulic loads in receiving waters
- Dewatering systems of urban areas are considered as the major path concerning emissions of heavy metal and anthropogenic pollutants (f.i. MKW, PAK) (Fuchs, et al., 2009)
- Highest percentage (ca. 70-80 %) of the pollutants from dewatering systems are bound with solids
- Due to adsorption capacity, especially fine fraction of suspended solids shows high pollutant loading

- Treatment goal → Retention of fine particles

# Effective stormwater treatment with moving lamellae

## HydroM.E.S.I. <sup>®</sup> Particle Separator



### Challenge

- Due to low settling rate, fine fraction is difficult to treat in conventional settling plants
- Flocculants can support sedimentation process effectively (Krauth & Bondareva, 2000)
- Practibility : Dosing, byproducts
- Effective soil retention filter is suitable to remove fine particles. Usage in case of further requirements for rainwater treatment.
- Requirement : sufficient area

- Need to implement practicable methods to improve sedimentation in stormwater tanks

# Effective stormwater treatment with moving lamellae

## HydroM.E.S.I.® Particle Separator

### Specification of Lamella Separator

#### Usage in Rainwater Treatment

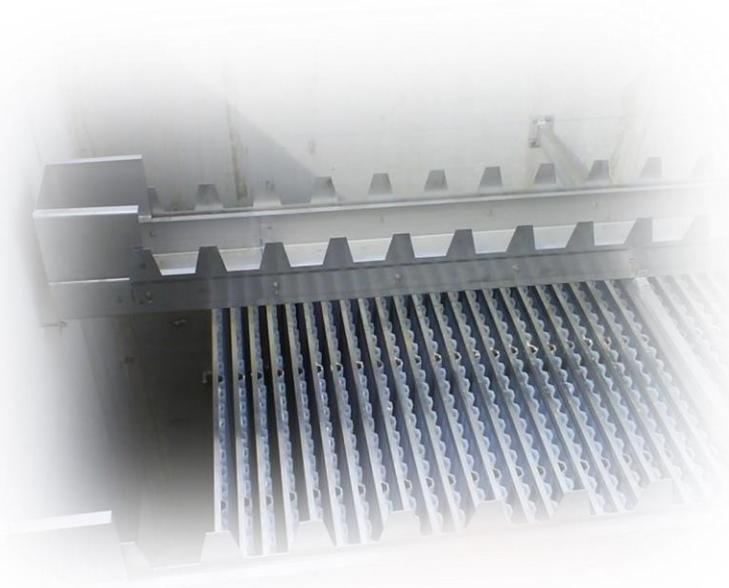
- Separate system: RKB (without continuous storage)
- Combined system: RÜB
- Partial flow treatment
- Presedimentation (soil) filter

#### Types of Lamella Separator

- Plate separator (moving) – CF, XF
- Tube separator

#### Process Advantages

- Increase of sedimentation performance due to increased effective settling area (5-10 times larger than tank footprint)
- More stable flow pattern and shorter settling distances
- Cost effective and space saving compared to tank extension or RBF.

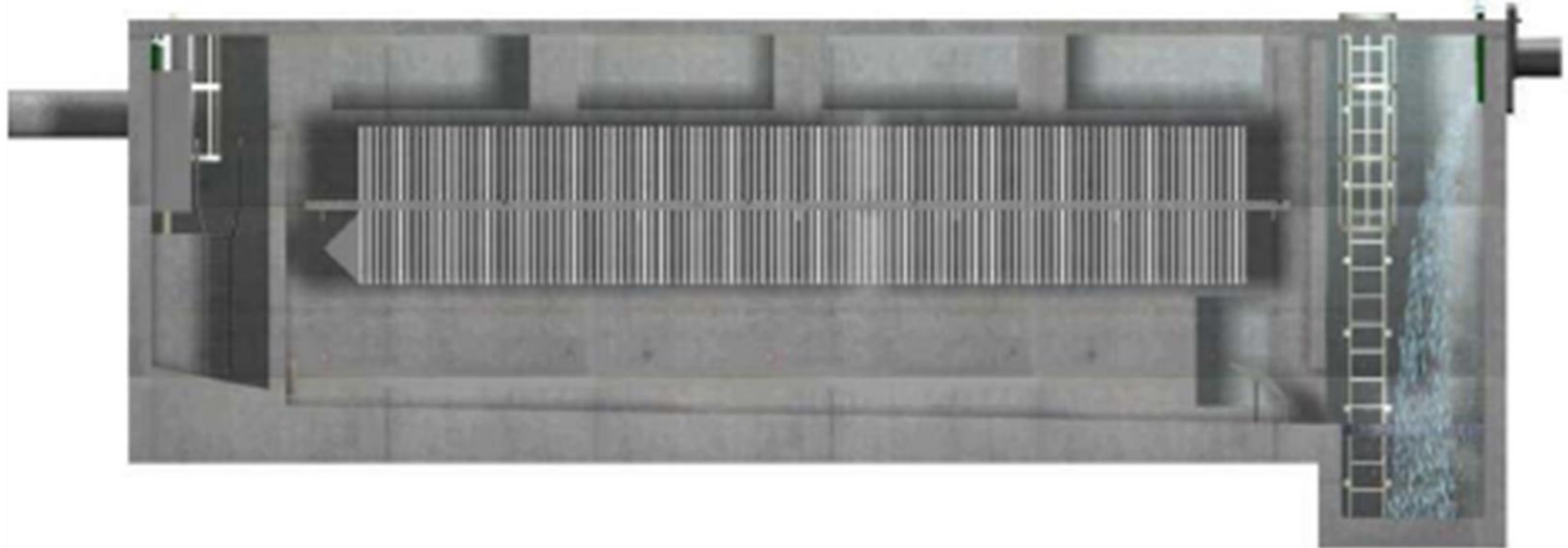


# Effective stormwater treatment with moving lamellae

## HydroM.E.S.I. <sup>®</sup> Particle Separator

Outlet

Inlet



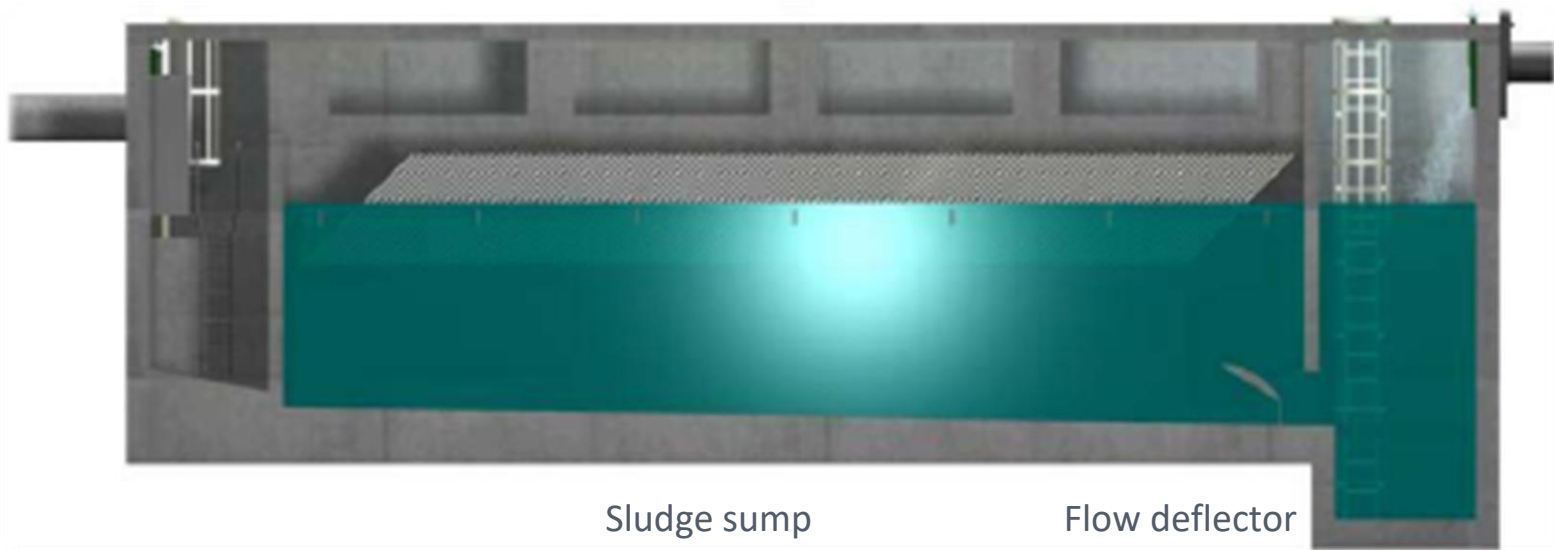
# Effective stormwater treatment with moving lamellae

## HydroM.E.S.I. <sup>®</sup> Particle Separator

Outlet

moving lamellae structure

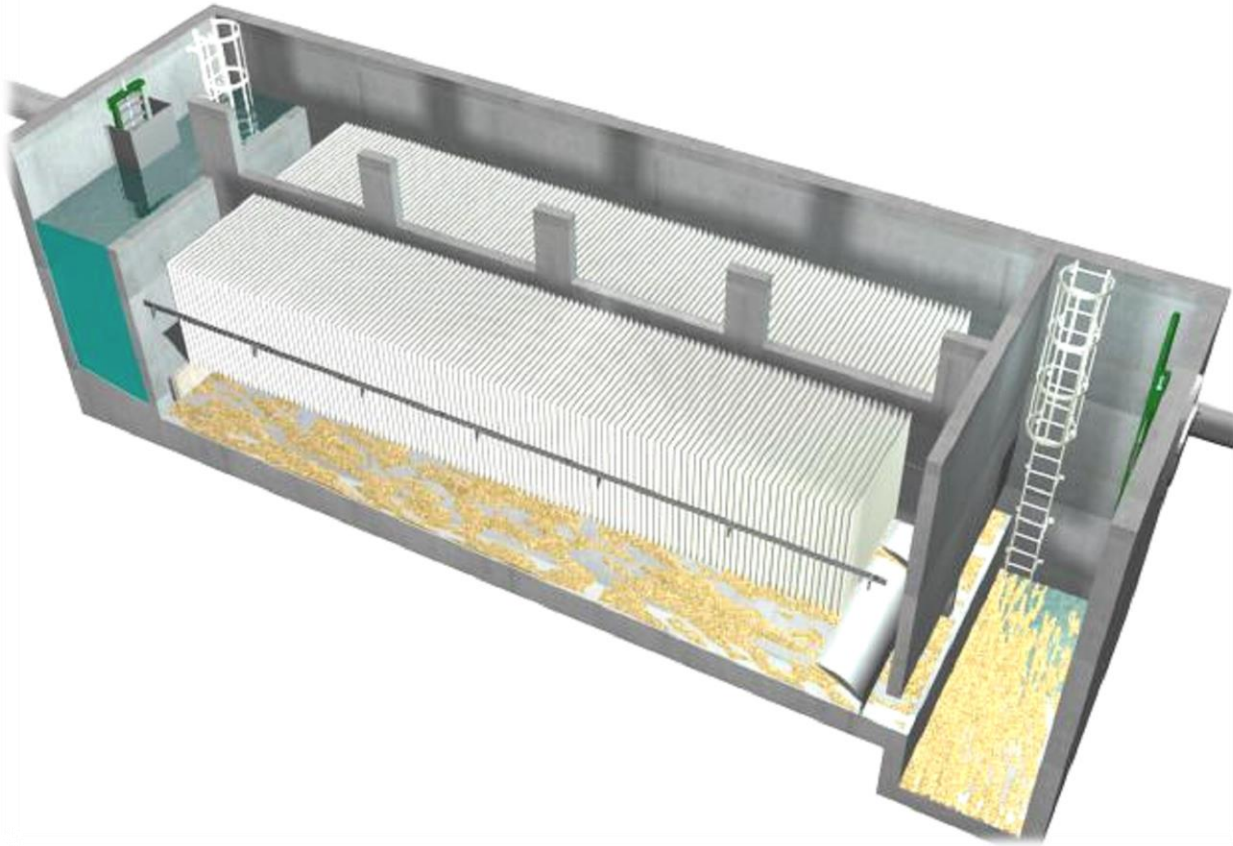
Inlet





# Effective stormwater treatment with moving lamellae

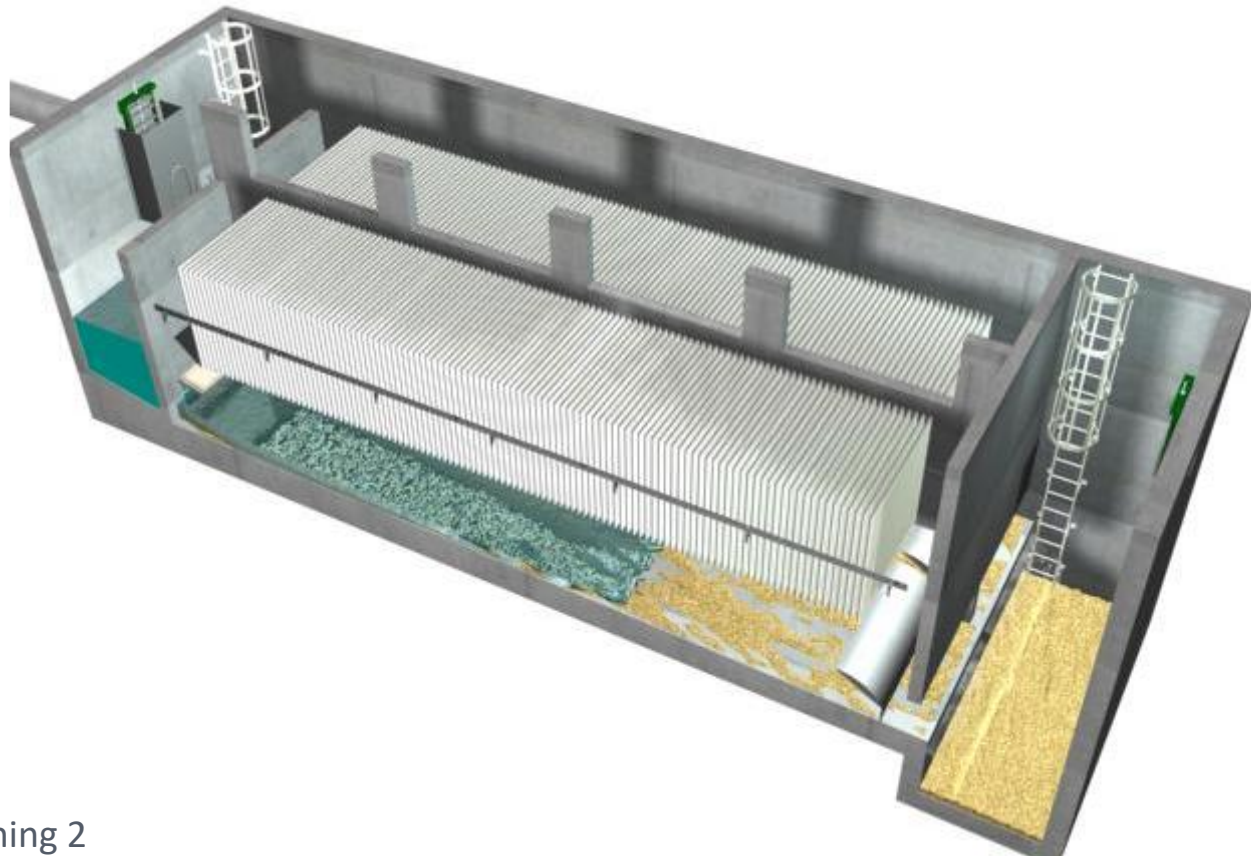
HydroM.E.S.I.® Particle Separator



Flush cleaning 1

# Effective stormwater treatment with moving lamellae

HydroM.E.S.I.® Particle Separator



Flush cleaning 2



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