

Sponsored by the



Federal Ministry  
of Education  
and Research



Integrated  
**Wastewater Concept for Industrial Zones**



Tra Noc IZ  
Can Tho City

## Project coordination



**Institute of Environmental Engineering and Management  
at the University of Witten/Herdecke gGmbH (IEEM)  
Alfred-Herrhausen-Straße 44, 58455 Witten, Germany  
[www.uni-wh-utm.de](http://www.uni-wh-utm.de)**

**Project leader: Prof. Dr.-Ing. rer. Dr. pol. Karl-Ulrich Rudolph  
Coordinator: Ms. Sandra Kreuter, Mr. Nguyen Van Long  
Phone: +49 2302 91401-0  
E-mail: [mail@uni-wh-utm.de](mailto:mail@uni-wh-utm.de)**



**Hanoi University of Science (HUS), Faculty of Chemistry  
19 Le Thanh Tong St, Hanoi, Vietnam  
[www.hus.edu.vn](http://www.hus.edu.vn)**

**Coordinator: Assoc. Prof. Dr. Đỗ Quang Trung  
Phone: +84 4 824 5527  
E-mail: [doquangtrung@hus.edu.vn](mailto:doquangtrung@hus.edu.vn)**



**AKIZ-Project Office  
Lot 12A, Tra Noc Waterplant  
Industrial Zone Tra Noc II, Can Tho City, Vietnam  
Local coordinator: Mr. René Heinrich  
Phone: +84 912 462 966  
E-mail: [akiz.cantho2@gmail.com](mailto:akiz.cantho2@gmail.com)**

### Publisher:

**Institute of Environmental Engineering and Management  
at the University of Witten/Herdecke gGmbH  
© by IEEM 02.2012**

<b>Short description of the project</b> .....	4
<b>Timeline</b> .....	6
<b>Subprojects</b> .....	7
<b>TP 1</b> Coordination and management concept.....	8
<b>TP 2</b> Elimination of toxic substances by chemical and physical treatment .....	10
<b>TP 3</b> Anaerobic industrial wastewater treatment with energy recovery .....	12
<b>TP 4</b> Recovery of valuable materials by membrane filtration .....	14
<b>TP 5</b> Development and operation of a containerized laboratory and monitoring concept.....	16
<b>TP 6</b> Sewage sludge management concept .....	18
<b>Contact details of project partners</b> .....	20
<b>Map of Vietnam</b> .....	23

## Short description of the project



### The AKIZ project

Over the past years the economic growth in Vietnam has risen significantly. As a result Vietnam has an increasing number of more than 200 registered industrial zones without sustainable wastewater treatment. To approach this challenge, a "Flagship Project" is planned for Tra Noc Industrial Zone in Can Tho City, located in the Mekong-Delta. Accomplishing activities for the central sewage treatment plant of the industrial zone, the German-Vietnamese joint research project develops an integrated wastewater concept for industrial zones ("AKIZ" = "Integriertes Abwasserkonzept für Industriezonen") to secure the efficiency and sustainable operation of the whole wastewater system including all its technical components. In addition to the combination of centralized and decentralized wastewater treatment solutions, the close connection of technical and financial planning is an important part of the integrative approach. This also includes adequate structures for wastewater tariffing and cost allocation.

### Objectives and tasks

Using containerized pilot plants for different branches in Tra Noc Industrial Zone, high-tech solutions for pre-treatment of wastewater, generation of energy from wastewater and recuperation of valuable substances are adapted and verified by on-site pilot systems, taking into consideration the local conditions. Concepts for the management of sewage sludge are investigated. Monitoring surveys create the database for control



mechanisms especially in terms of toxic wastewaters. Furthermore, sociological and ecological aspects are researched. The sustainable implementation of AKIZ is supported by capacity building of stakeholders and local partners.

### Applied science and close cooperation

Within the frame of six sub-projects, German and Vietnamese research and industrial partners jointly perform the research work and practical application of the pilot systems in Tra Noc together with relevant local authorities. Furthermore, the project is conducted in cooperation with the KfW Development Bank and other ODA partners.

### Best practice guides

The results of the project will be condensed into two guidelines:

- "Guideline on integrated wastewater concepts for industrial zones" as decision support tool for the implementation of wastewater disposal infrastructure";
- "Financial modelling of wastewater solutions for industrial zones as prerequisite for sustainable investment and operation".

### Support by research ministries and industry

The joint project is sponsored by the German Federal Ministry of Education and Research (BMBF) and the Ministry of Science and Technology of the Socialist Republic of Vietnam (MOST) as well as the participating German industrial partners.



### Four main project phases

The project is implemented in four main phases between 2010 and 2014: basic and conceptual studies, adaption to local situation and set-up, optimization and evaluation, and, finally, verification and transfer of results.

### General timeline of AKIZ project sponsored by the BMBF

Work phase	2009	2010	2011	2012	2013	2014
Project initialization	■					
Basic and conceptual studies		■				
Set-up and adaption			■			
Optimization and evaluation				■		
Verification and transfer					■	
Wrap-up						■
Evaluation milestones			MS 1		MS 2	
Project conferences				■		■

#### Milestones:

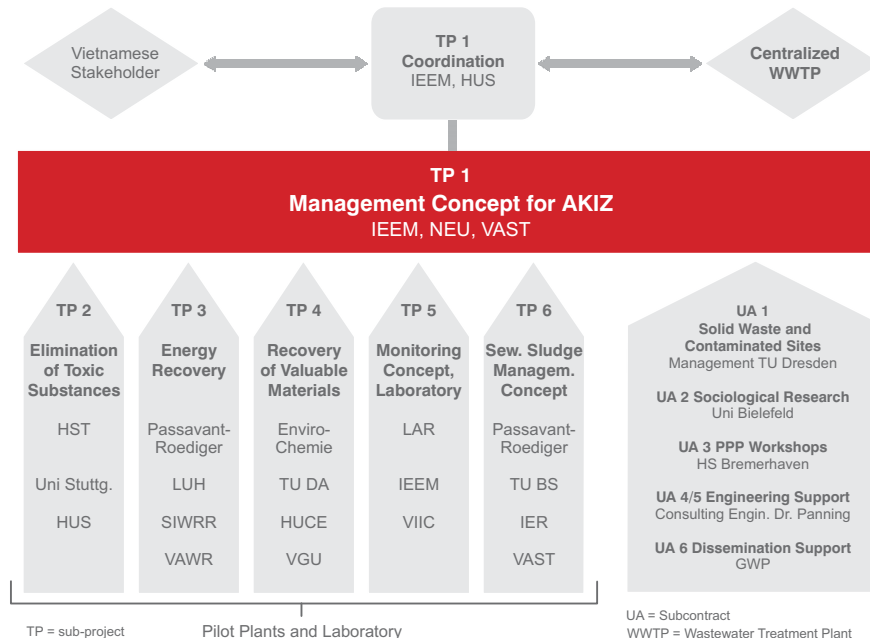
Two intermediate assessments of the project will be conducted by the BMBF, including the analyses of the technical, financial and organizational feasibility of the work schedule for the pilot plants and other investigations as well as the general viability of the overall AKIZ management concept.

## Six sub-projects

The joint project consists of six main sub projects (TPs), each executed together by both Vietnamese and German partners:

- TP 1:** Coordination of the joint research project and development of an integrated management concept,
- TP 2:** Elimination of toxic substances by chemical and physical treatment,
- TP 3:** Anaerobic industrial wastewater treatment with energy recovery,
- TP 4:** Recovery of valuable materials by membrane filtration,
- TP 5:** Development and operation of a containerized laboratory and monitoring concept,
- TP 6:** Sewage sludge management concept.

Additionally, contiguous research fields like sociological and ecological aspects as well as the implementation of capacity building measures are conducted by sub-contracts within the coordination activities of TP 1.



Including the sub-contractors, eight universities and four industrial partners are involved on the German side, sponsored by BMBF. On the Vietnamese side nine academic institutions take part in the joint project, supported by MOST.



## Coordination of the joint research project and development of an Integrated Management Concept

- Institute of Environmental Engineering and Management at the University of Witten/Herdecke gGmbH (IEEM)
- Hanoi University of Science (HUS)
- National Economics University (NEU)



## Need for wastewater concepts of industrial zones

Wastewater treatment in Vietnamese industrial zones has often suffered from poor governance, management and chronic under-investment. The AKIZ integrated management concept shows the most appropriate technologies and operational measures and explains their successful application by adopted solutions. Especially operators, investors, financing institutions (e.g. donor banks) as well as legislative and supervisory authorities may benefit from the project.



In most cases, any reasonable wastewater concept for industrial zones has to be a combination of centralized and decentralized wastewater treatment systems as well as of technological and economical measures. Centralized wastewater treatment plants will not work without decentralized pre-treatment facilities, wherever toxic or inhibiting contaminants are discharged. The (re)use of water, valuables and energy from wastewater can often be more profitable in decentralized plants, near-to-source at the factories, where the integration for water- and energy-efficient production is possible.

An important part of the integrated management concept is the financial model, which indicates required investments, budgets for operations (incl. sustainable maintenance and monitoring), plus expected cash-flows with debt-repayment potential.

## Objectives

In addition to the coordination of the joint research project, TP 1 covers the development and proving of an overall, integrated management concept for wastewater disposal in tropical industrial zones in Vietnam and emerging countries with similar conditions.



## Development of the overall, integrated concept

Based on the results of the other sub projects, the AKIZ management concept has to integrate centralized and decentralized, near-to-source solutions for the treatment of industrial wastewater, on the one hand, and technological and economic aspects, on the other hand. The concept shall cover all relevant functions for the sustainable operation of the wastewater infrastructure within the industrial zone, taking into consideration the local conditions.

The concept will be based on a comprehensive monitoring and control system, also taking into consideration reliable quality control of the day-to-day operation, and creating the basis for cost calculation and re-financing of all facilities and organizations within the industrial zone.

## Contiguous aspects and capacity building

To complete the management concept, contiguous fields with relevance for the AKIZ application, like waste, contaminated sites and as well as sociological and ecological aspects, have to be investigated. The sustainable implementation of AKIZ is supported by capacity building for stakeholders and local partners.

For these issues additional partners are involved through sub-contracts:

- Technical University of Dresden, Institute for Waste Management and Contaminated Sites
- University of Bielefeld, Department of Sociology
- Bremerhaven University of Applied Sciences, Chair for Public-Private-Partnership (PPP)
- German Water Partnership (GWP)





SYSTEMTECHNIK

Universität

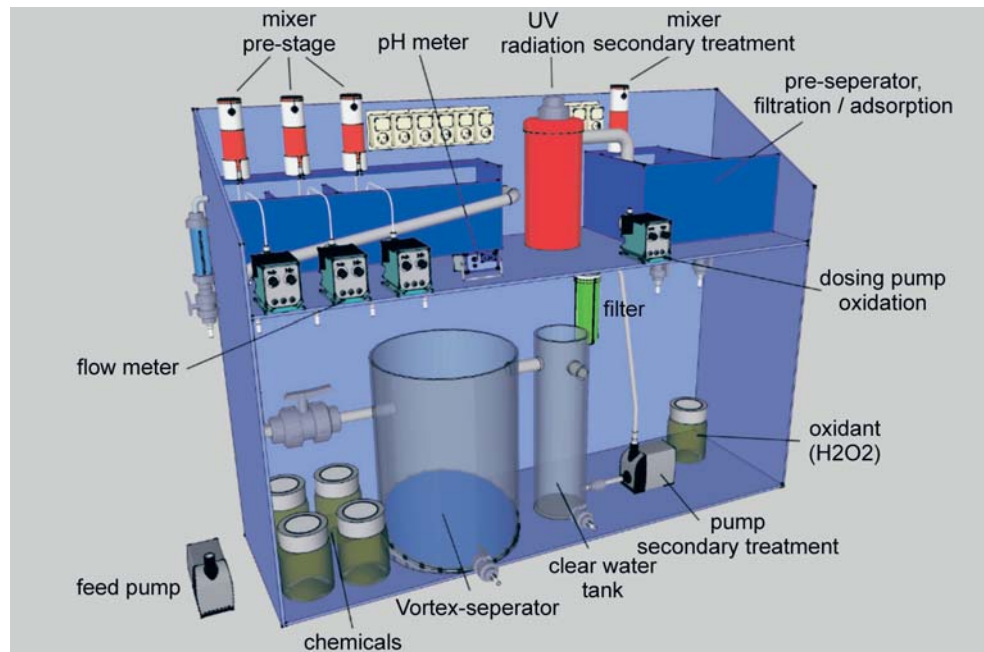


Stuttgart



## Elimination of toxic substances by chemical and physical treatment

- HST Hydro-Systemtechnik GmbH
- Stuttgart University, Institute of Sanitary Engineering, Water Quality and Solid Waste Management (ISWA)
- Hanoi University of Science (HUS)



Plan view

## Objectives

Toxic wastewaters are a danger to humans and the environment. Within TP 2 approved chemical and physical treatment technologies for decentralized, near-to-source detoxification of industrial wastewater are adopted to the specific constraints in Vietnam and demonstrated by a containerized pilot system. In addition the test of



some innovative approaches under local conditions is planned.

## Several treatment options

The variation of substances in industrial wastewaters allows no general decision for only one or two treatment methods; in most cases different methods have to be combined. Within the project, the most efficient combination of technologies and methods has to be found out. The following state of the art treatment methods for detoxification have been taken into consideration: mechanical separation, precipitation and flocculation, adsorption with activated carbon, filtration with e. g. membrane, biological treatment (e.g. SBR or moving carriers), chemical and advanced oxidation with  $H_2O_2$  etc.

## Pilot system for detoxification

Based on the identification of relevant industries and toxic wastewater flows, a concept for an adopted pilot system is developed and designed. Constructed by industrial partner HST, the pilot system will be in-stalled and operated on site of a pesticide processing company. By optimization and evaluation, general concepts with focus on chemical and physical treatment methods for the detoxification of highly loaded industrial wastewater are elaborated.



### Anaerobic industrial wastewater treatment with energy recovery

- Passavant-Roediger GmbH
- Leibniz University of Hanover, Institute for Water Quality and Waste Management (ISAH)
- Southern Institute of Water Resources Research (SIWRR)

PASSAVANT ROEDIGER

11  
102  
1004

Leibniz  
Universität  
Hannover



### High organic loads in tropical regions are suitable for anaerobic treatment

Recent research and applications show that decentralized anaerobic systems are suitable for industrial and domestic wastewater treatment in tropical regions due to high temperatures. Especially for wastewater containing a high concentration of organic compounds, these treatment systems are relevant, like in fish and seafood processing industries.

The anaerobic treatment offers additional advantages by producing biogas which can be used for energy production, making the process ecologically as well as economically interesting. Moreover, excess sludge production of anaerobic treatment is very low, while the dewatering characteristics of the sludge are excellent.

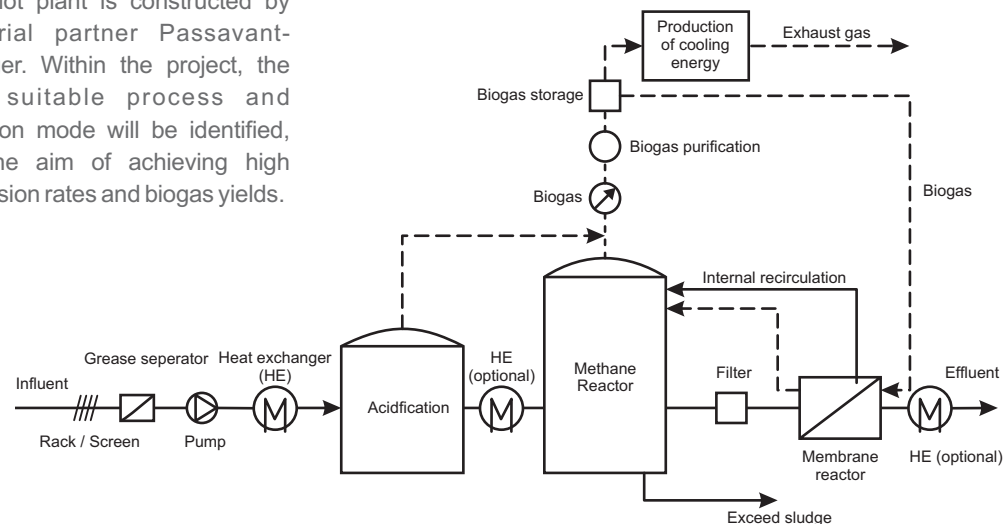
## Objectives

In order to show the applicability under real conditions, within TP 3 an anaerobic wastewater treatment system with energy recovery is adopted and applied on pilot-scale at a fish and seafood processing factory with highly organic loaded wastewater.

## Pilot system

The pilot plant consists of anaerobic reactors, optionally equipped with a membrane module, biogas collecting and purification system, sampling and control units. The biogas will be used as an energy source for cooling systems.

The pilot plant is constructed by industrial partner Passavant-Roediger. Within the project, the most suitable process and operation mode will be identified, with the aim of achieving high conversion rates and biogas yields.





## Recovery of valuable materials by membrane filtration

- EnviroChemie GmbH
- Technische Universität Darmstadt, Institute IWAR
- Hanoi University of Civil Engineering (HUCE)



### Objectives

Based on the identification and assessment of relevant industries in Tra Noc Industrial Zone, which allow economically reasonable recovery of valuable materials, an adopted process-integrated recovery system using membrane technology is developed and demonstrated.

### Application of membrane technology

Polluted process water from industrial production processes often contains high concentrations of valuable materials that could still be (re)used. Membrane filtration technology can be used as a treatment step to recover these valuable materials by separating them from other impurities or by increasing their concentration. Membrane technology is based on physical separation leading to unchanged properties of substances. Therefore, the reuse of separated materials is possible with only limited post-treatment.

The recovery of wastewater constituents by membrane technology may result in positive economic outcomes through reduced consumption of resources and operating costs for the plant operators on the one hand, and through reduction of investment and operating costs for the downstream central wastewater treatment plant on the other hand.

Nevertheless, different membrane materials and their differences in selectivity and application ranges make a detailed pre-investigation necessary to reduce possible drawbacks. Because economic benefits are usually the main criteria for using these techniques, a careful pre-selection and investigation of capabilities is needed before installing membrane technology plants.



### **Pilot system**

By means of preparatory laboratory tests in Germany and Tra Noc, suitable membrane processes will be selected. Based on these results a pilot system will be designed and constructed by industrial partner EnviroChemie and installed at a brewery and a chitin production site in Tra Noc.

During the operation of the pilot plant different settings will be tested in order to achieve the optimum performance. Investigations on site will cover relevant aspects like fouling and scaling potential under consideration of local climate conditions, quality and stability of recovered materials, integration of re-use concepts for valuable materials (recyclables) as well as reduction of operating costs.

### **Dissemination of results**

In addition to the transfer and dissemination of the elaborated project results by TP 4 partners, the Vietnamese-German University (VGU) is involved in the project for further support related to knowledge transfer measures.

Vietnamese-German University





## Monitoring concept and development and operation of a containerised laboratory

- LAR Process Analysers AG
- Institute of Environmental Engineering and Management at the University of Witten/Herdecke gGmbH (IEEM)
- Vietnam Institute of Industrial Chemistry (VIIC)



### Monitoring concept

For technological and economical planning of wastewater treatment solutions a reliable database of wastewater analyses is necessary. So far this database and regular measurement programmes are of only limited scope and size for Tra Noc and other similar industrial zones. Therefore an adopted monitoring and control concept for industrial zones under the specific conditions in Vietnam and similar emerging countries will be developed.

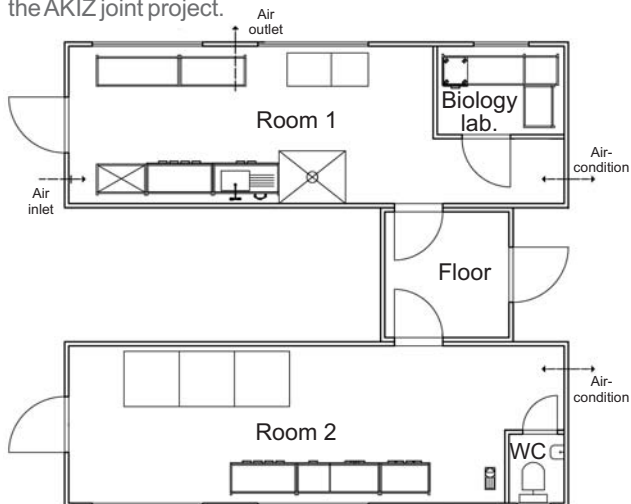
The monitoring concept has to take into consideration the local and regional situation in terms of environmental, legal, organisational and institutional as well economic circumstances with regard to monitoring tasks

## Sampling programmes

Starting with the identification of relevant monitoring points and parameters, sampling programmes are defined and practically conducted in Tra Noc. Main focus will be on toxic contaminants and constituents which are able to inhibit or even stop the biological treatment process of wastewater treatment plants.

## Development and operation of a containerized laboratory

A containerized laboratory unit, adopted to the specific working and climate conditions, will be implemented in Tra Noc. The project tasks include the definition and evaluation of analytical concepts for the laboratory in terms of monitoring tasks as well as the practical operation and optimisation of the laboratory unit. The laboratory also offers analysis capacities for measurement programmes of the other sub- projects within the AKIZ joint project.





### Sewage sludge management concept

- Braunschweig Institute of Technology, Institute of Sanitary and Environmental Engineering (ISWW)
- Passavant-Roediger GmbH
- Vietnam National University, Institute for Environment and Resources (IER)
- Vietnamese Academy of Science and Technology (VAST)



PASSAVANT ROEDIGER



### Concepts for sewage sludge management

Since the number of wastewater treatment plants in Vietnam has increased rapidly during the last years, a need for sustainable solutions in sewage sludge management has occurred

## Objectives

An adequate sewage sludge management concept which particularly considers the interaction between wastewater (pre-)treatment and sludge quality is developed for industrial zones in tropical climates. For that purpose Tra Noc Industrial Zone in Can Tho is used as an example. Recommendations on sludge treatment, reuse and disposal are determined not only for sludge produced at the central wastewater treatment plant but also for sludge produced by decentralized wastewater pre-treatment at selected industries (see TP 2–4).

## Survey on sludge situation and practical sludge treatment tests

So far no data is available about sludge qualities and quantities produced from industries in Tra Noc Industrial Zone. In the first phase of the project basic data about wastewater quality and corresponding sludge production has to be collected.

Using laboratory scale sedimentation and biological treatment experiments, primary and secondary sludge will be generated from different wastewaters, representing the wastewater characteristics of different industries and of mixed inflow to the central wastewater treatment plant. This will enable a prognosis of sludge amounts and qualities taking into account different sources of industrial wastewater.

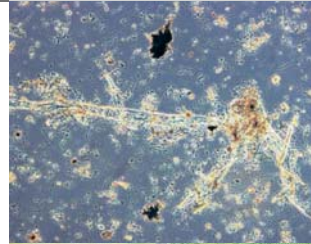
For laboratory and pilot plant scale examinations in Tra Noc, industrial partner Passavant Roediger will supply the specific test equipment.

## Relevant sludge treatment technologies

The following treatment technologies are chosen as relevant for the project:

- Anaerobic digestion with and without chemical disintegration,
- Co-composting with organic waste,
- Natural dewatering and drying,
- Reed bed treatment.

The determination of the sludge management concept includes experiments regarding adequate treatment technologies on site in Tra Noc. Among others the effect of possible inhibiting wastewater and sludge substances, which can be hazardous to biological sludge treatment, will be investigated.



**AKIZ project partners and stakeholders****TP 1a  
Coordination**

Institute of Environmental Engineering and Management  
at the University of Witten/Herdecke gGmbH (IEEM)  
Alfred-Herrhausen-Straße 44, 58455 Witten  
www.uni-wh-utm.de  
Project leader: Prof. Dr. Dr. Karl-Ulrich Rudolph  
Phone: +49 2302 91401-0, E-mail: mail@uni-wh-utm.de

AKIZ Project Office in Can Tho  
Lot 12A, Tra Noc Waterplant,  
Industrial Zone Tra Noc II, Can Tho City  
Local coordinator: Dipl.-Ing. René Heinrich  
Phone: +84 7103 744 003  
E-mail: heinrich@uni-wh-utm.de

Hanoi University of Science (HUS)  
Faculty of Chemistry  
19 Le Thanh Tong St, Hanoi  
www.hus.edu.vn  
Project leader: Assoc. Prof. Dr. Đỗ Quang Trung  
Phone: +84 4 824 5527  
E-mail: doquangtrung@hus.edu.vn

**TP 1b  
Management Concept**

Institute of Environmental Engineering and Management  
at the University of Witten/Herdecke gGmbH (IEEM)  
Contact details see TP 1a

National Economics University (NEU)  
207 Giai Phong Rd., Hanoi  
www.neu.edu.vn  
Project leader: Prof. Nguyễn Văn Phúc  
Phone: +84 927 532 408, E-mail: nvphuc@bsneu.edu.vn

**TP 2  
Elimination of toxic substances by chemical and  
physical treatment**

HST Hydro-Systemtechnik GmbH  
Sophienweg 3, 59872 Meschede  
www.systemtechnik.net  
Project leader: Dipl.-Ing. Günther Müller-Czygan  
Phone: +49 291 9929-44  
E-mail: g.mueller@systemtechnik.net

University of Stuttgart  
Institute of Sanitary Engineering, Water Quality and Solid  
Waste Management (ISWA)  
Bandtäle 2, 70569 Stuttgart  
www.iswa.uni-stuttgart.de  
Project leader: Prof. Dr.-Ing. Heidrun Steinmetz  
Phone: +49 711 685-63723  
E-mail: heidrun.steinmetz@iswa.uni-stuttgart.de

Hanoi University of Science (HUS)  
Faculty of Chemistry  
19 Le Thanh Tong St, Hanoi  
www.hus.edu.vn  
Project leader: Assoc. Prof. Dr. Đỗ Quang Trung  
Phone: +84 4 824 5527  
E-mail: doquangtrung@hus.edu.vn

**TP 3  
Anaerobic industrial wastewater treatment  
with energy recovery**

Passavant-Roediger GmbH  
Kinzigheimer Weg 104-106, 63450 Hanau  
www.passavant-roediger.de  
Project leader: Dipl.-Ing. Thomas Klamp  
Phone: +49 6181 9061-229  
E-mail: thomas.klamp@passavant-roediger.de

Leibniz University of Hannover  
 Institute for Water Quality and Waste Management  
 (ISAH)  
 Welfengarten 1, 30167 Hannover  
 www.isah.uni-hannover.de  
 Project leader: Prof. Dr.-Ing. Karl-Heinz Rosenwinkel  
 Phone: +49 511 762-2276  
 E-mail: rosenwinkel@isah.uni-hannover.de

Southern Institute of Water Resources Research  
 (SIWRR)  
 2A Nguyen Bieu Str., Dist. 5, Ho Chi Minh City  
 www.siwrr.org.vn/  
 Project leader: Ms. Trjnh Thị Long  
 Phone: +84 8 923 8328, 836 6148  
 E-mail: htqt-siwrr@hcm.vnn.vn

#### TP 4

##### **Recovery of valuable materials by membrane filtration**

EnviroChemie GmbH  
 In den Leppsteinswiesen 9, 64380 Rossdorf  
 www.envirochemie.de  
 Project leader: Dr. Markus Engelhart  
 Phone: +49 6154 6998-57  
 E-mail: markus.engelhart@envirochemie.com

Technische Universität Darmstadt  
 Institute of Water Supply and Groundwater Protection,  
 Wastewater Technology, Waste Management, Industrial  
 Material Cycles, Environmental and Spatial Planning  
 (IWAR)  
 Petersenstraße 13, 64287 Darmstadt  
 www.iwar.bauing.tu-darmstadt.de  
 Project leader: Prof. Dr.-Ing. Martin Wagner  
 Phone: +49 6151 16-3759  
 E-mail: m.wagner@iwar.tu-darmstadt.de

Hanoi University of Civil Engineering (HUCE)  
 Institute of Environmental Science & Engineering  
 55 Giai Phong Road, Hai Ba Trung Dist., Hanoi  
 www.dhxd.edu.vn  
 Project leader: Assoc. Prof. Nguyễn Việt Anh  
 Phone: +84 4 3628 4509  
 E-mail: vietanhctn@gmail.com

Vietnamese-German University (VGU)  
 Quarter 6, Linh Trung Ward, Thu Duc District,  
 Ho Chi Minh City  
 www.vgu.edu.vn  
 Project leader: Prof. Dr. Wolf Rieck  
 E-mail: w.rieck.vgu@gmail.com

#### TP 5

##### **Development and operation of a containerized laboratory and monitoring concept**

LAR Process Analysers AG  
 Neukoellnische Allee 134, 12057 Berlin  
 www.lar.com  
 Project leader: Dr. Wolfgang Genthe  
 Phone: +49 30 278958-44  
 E-mail: wgenthe@lar.com

Institute of Environmental Engineering and Management  
 at the University of Witten/Herdecke gGmbH (IEEM)  
 Alfred-Herrhausen-Straße 44, 58455 Witten  
 www.uni-wh-utm.de  
 Project leader: Prof. Dr. Dr. Karl-Ulrich Rudolph  
 Phone: +49 2302 91401-0, E-mail: mail@uni-wh-utm.de

Vietnam Institute of Industrial Chemistry (VIIC)  
 2 Pham Ngu Lao Street, Hoan Kiem Dist., Hanoi  
 www.vinachem.com.vn/english/  
 Project leader: Mr. Phạm Huy Đông  
 Phone: +84 43 8260669  
 E-mail: huydongvh@yahoo.com

**TP 6****Sewage sludge management concept**

Passavant-Roediger GmbH  
Contact details see TP 3

Braunschweig Institute of Technology,  
Institute of Sanitary and Environmental Engineering  
(ISWW)  
Pockelsstr. 2a, 38106 Braunschweig  
[www.tu-braunschweig.de/isww](http://www.tu-braunschweig.de/isww)  
Project leader: Prof. Dr.-Ing. Norbert Dichtl  
Phone: +49 531 391-7935  
E-mail: [n.dichtl@tu-braunschweig.de](mailto:n.dichtl@tu-braunschweig.de)

Institute for Environment and Resources (IER) at the  
Vietnam National University  
142 To Hien thanh St., Dist. 10, Ho Chi Minh City  
[www.hcmier.edu.vn](http://www.hcmier.edu.vn)  
Project leader: Prof. Nguyễn Văn Phýớc  
E-mail: [nvphuoc1960@gmail.com](mailto:nvphuoc1960@gmail.com)

Vietnamese Academy of Science and Technology (VAST)  
18 Hoang Quoc Viet Street, Cau Giay District, Hanoi  
[www.vast.ac.vn](http://www.vast.ac.vn)  
Project leader: Prof. Dr. Lò Văn Cỏt  
E-mail: [levancat123@yahoo.com](mailto:levancat123@yahoo.com)

**Sub contractors within TP 1**

University of Bielefeld  
Institute of Sociology Universitätsstr. 25, 33615 Bielefeld  
[www.uni-bielefeld/soz/index.html](http://www.uni-bielefeld/soz/index.html)

Technical University Dresden  
Institute for Solid Waste Management  
und Existing Waste Deposits  
Pratzschwitzer Str. 15, 01796 Pirna  
[www.tu-dresden.de/fghhiaa](http://www.tu-dresden.de/fghhiaa)

Hochschule Bremerhaven  
Institute of Public-Private-Partnership (PPP)  
An der Karlstadt 8, 27568 Bremerhaven  
[www.hs-bremerhaven.de](http://www.hs-bremerhaven.de)

German Water Partnership e.V. (GWP)  
Reinhardtstraße 32, 10117 Berlin  
[www.germanwaterpartnership.de](http://www.germanwaterpartnership.de)

**ODA partners**

KfW Development Bank  
Palmengartenstr. 5-9, 60325 Frankfurt  
[www.kfw-entwicklungsbank.de](http://www.kfw-entwicklungsbank.de)

**Funding authorities**

German Federal Ministry  
of Education and Research (BMBF)  
Heinemannstraße 2, 53175 Bonn  
[www.bmbf.de](http://www.bmbf.de)

Ministry of Science and Technology of the Socialist  
Republic of Vietnam (MOST)  
Department of International Cooperation  
39 Tran Hung Dao Str., Hoan Kiem, Hanoi  
[www.most.gov.vn](http://www.most.gov.vn)



Hanoi



Da Nang



Ho Chi Minh City



Tra Noc Industrial Zone  
in Can Tho



VIETNAM

[www.akiz.de](http://www.akiz.de)



Sponsored by the German Federal Ministry of Education and Research (BMBF), ref. no. 02WA1060 - 02WA1069, and the Ministry of Science and Technology of the Socialist Republic of Vietnam (MOST)