

**Deutsche Gesellschaft für Internationale Zusammenarbeit  
(GIZ) GmbH**

**Training Program for Sustainability and Curriculum  
Development in Sustainability in Textiles**

Guideline for Professors, Assistant Professors, Lecturers, Trainers  
and Facilitators



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<p><b>Purpose</b>                  This document has been prepared to guide professors, assistant professors, lecturers, trainers, and service providers in the field of Sustainability in the Textile Chain.</p>	

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## List of abbreviations used

<b>FABRIC</b>	Promotion of Sustainability in the Textile and Garment Industry in Asia
<b>GIZ</b>	The Deutsche Gesellschaft für Internationale Zusammenarbeit
<b>HCMC</b>	Ho Chi Minh City
<b>HCMUT</b>	Ho Chi Minh City University of Technology
<b>HUST</b>	Hanoi University of Science and Technology
<b>HAUI</b>	Hanoi University of Industry
<b>HTU</b>	Hanoi Textile Garment University
<b>HCMUTE</b>	Ho chi Minh City University of Technical Education
<b>UIH</b>	University of Industry Ho Chi Minh City
<b>TNA</b>	Training Need and Demand Assessment (TNA)
<b>ToT</b>	Training of Trainer
<b>VNM</b>	Vietnamese

## 1 About this guideline

The training aims to equip senior and experienced professors, assistant professor and lecturers from universities with advanced knowledge about Best Available Technologies (BAT) in selected fields with reference to sustainability topics in the textile and fashion industry. It also gives guidance for the process of curriculum development integrating sustainability topics into exiting bachelor, post graduate courses and/or master study programmes meeting the demand of universities and the textile industry.

After the training completion, participants are able:

- to improve content of existing subjects or integrate relevant topics regarding environmental sustainability in teaching materials of those subjects offered in universities
- to develop a curricula integrating sustainability topics into textiles courses and programmes following modular approach

The training course can also be extended to experts/professionals from industries who can share the practical applications in sustainability in textiles at the factory level.

The objective of this document is to provide guidance to professors, assistant professors, lecturers, learning facilitators and service providers which will be in charge to disseminate knowledge on sustainability topics in the textile industry. This trainer guideline is focusing on the contents of the Training program for Sustainability and Curriculum Development on Sustainability in Textiles.

The materials are primarily intended to help the lectures to increase their knowledge on sustainable environmental and chemical management in order to integrate environmental as well as chemical management aspects in their curricula. The materials refer to international reference standards, the conformance to national standards and regulations must be checked and eventually adapted.

To ensure good use of the materials available, it is suggested that users of this trainer guideline also familiarize themselves with the REMC toolkit and additional training materials corresponding guidelines for service providers. These materials can be download here:

[www.sia-toolbox.net/solution/resource-efficient-management-chemicals-textile-and-leather-sector-companies](http://www.sia-toolbox.net/solution/resource-efficient-management-chemicals-textile-and-leather-sector-companies)

The GIZ Chemical Management Self-Learning course and links to REMC materials are available via the GIZ administered “atingi” learning platform. The CM self-learning master materials are managed by the GIZ, which also looks after the review and updating of learning materials.

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### 1.1 Overview of the presentations and related learning materials

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The training course consists of eighteen topic-specific presentations.

Section 2 of this trainer guideline provides an overview of the available presentations used and made available during the special training on Chemical Reuse, Recycling and Recovery for Service Providers.

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### 1.2 Target groups of this trainer guide

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The primary target group of this trainer guide are professors, assistant professors, lecturers, trainers, adviser and service providers which are involved in curriculum development for sustainable environmental and chemical management as well as cleaner production. However, this training program also aims at those who want to familiarize themselves with the concept, elements, and requirements of Environmental management, Chemical reuse, recycling, and recovery in line with prevalent expectations in international textile/garment supply chains.

### 1.3 How to use this guideline

There are various options regarding how you as a professor, assistant professor, lecturer, trainer, learning facilitator or service provider can employ or integrate the training course for Sustainability and Curriculum Development in Sustainability in Textiles and its presentations into own training or advisory activities. It is possible to integrate the presentations directly into virtual or face-to-face workshops with the learners and use these instead of presentations and training materials such as your own. In this setting, your role would be to directly reflect on the content of the entire learning unit presentations (or parts of them) together with the participants of your workshops.

Section 2 of this guideline provides a more detailed description of all the available presentations. Apart from stating the purpose of the respective presentation, you will also find an overview of the content of the presentations, available presentations, and the average estimated time required for completing the presentation.

**Table 1 – presentations on Training program for Sustainability and Curriculum Development in Sustainability in Textiles**

Presentations and Group Works
Presentation 1: Overview of Sustainability in Textiles being offered in Vietnam Universities
Presentation 2: Industry Demand and Current Trends in Sustainability in Textiles
Presentation 3: Legal requirements & stipulations from international agencies, global standards, and regulations
Presentation 4: Textile production waste management - State of the knowledge in Vietnam
Presentation 5: Textile production waste management, effluent, and its treatment
Presentation 6: Circularity in the textile sector
Presentation 7: Recycling Technologies in Textile Industry
Presentation 8: Pollution load in Textile wastewater
Presentation 9: Sludge treatment and disposal
Presentation 10: Gaseous emissions and air pollution
Presentation 11: Chemical Management in Textile Factories
Presentation 12: Water Efficiency in Textile Factories
Presentation 13: Best Available Techniques, Best Environmental Practices
Presentation 14: Curriculum Development
Presentation 15: Training Need and Demand Assessment (TNA) for sustainability in the textile manufacturing
Presentation 16: Modular concept, with all elements and requirements (modular handbook examples)
Presentation 17: Modern higher education - Modern education methods, Training of Trainers (ToT)

## Presentations and Group Works

### Presentation 18: Modern Engineering education - Development of dual study formats

Experience shows that the learning process may be more effective if the participants already possess a basic level of understanding regarding environmental management, Cleaner Production as well as chemical management.

The trainers, learning facilitators can decide whether all presentations or only certain units or parts of it would be of relevance for the respective participants.

## 2 Content and structure of the Cleaner Production learning materials

In this section the 18 presentations regarding Sustainability and Curriculum Development in Sustainability in Textiles are described below in some detail. First, in the column on the left, the topics covered in each presentation is stated together with the presentations expected learning objectives. The middle column provides a detailed overview of the content coverage of the presentation plus potential applications of the newly gained knowledge. In the column on the right, the learning materials of the module are listed including the number of slides and time required.

You can refer to these materials to develop your own presentations and curriculum for use in your tailored course or your blended learning events.

Presentation 1: Overview of Sustainability in Textiles being offered in Vietnam Universities		
Description	Module content	Learning materials
<p>This presentation provides a general overview about the universities teaching textile-clothing engineering in their programs. The focus is laid on the perception and standpoints on sustainable development in textile-clothing in Vietnam</p> <p>The urgency of building sustainable development syllabus in textile/clothing program at Vietnamese universities is described and elaborated.</p>	<ul style="list-style-type: none"> <li>• Introduction about the universities teaching in Textile-Clothing engineering program.</li> <li>• Perceptions and standpoints on sustainable development in Textile-Clothing in Vietnam.</li> <li>• Urgency of developing a sustainable development syllabus in Textiles/Clothing Industry at Vietnamese universities.</li> </ul>	<p>Presentation 1 with 30 slides</p> <p>time required: 30 min</p> <ul style="list-style-type: none"> <li>- Syllabuses in the websites of six universities</li> <li>- Study report training capacity need assessment in Sustainable development for Universities in Vietnam</li> <li>- Research about demand/expected curriculum in Sustainable development for Universities in Vietnam</li> </ul>
Presentation 2: Industry Demand and Current Trends in Sustainability in Textiles		
Description	Module content	Learning materials

## Sustainability and Curriculum Development in Sustainability in Textiles

<p>This presentation unit introduces explains the sustainability in textile issue from the perspective and experience of an important service provider organization (TÜV).</p> <p>The mayor actual sustainability issues and trends of the textile chain are addressed. The important commitments and plans of the brands and retailer sector are listed and with linked with the key actions in the textiles strategy.</p>	<ul style="list-style-type: none"> <li>- The Impact</li> <li>- Stakeholder Response</li> <li>- Managing Emissions</li> <li>- Microplastics: Developments and Expectations</li> <li>- Valuing Water</li> <li>- Putting Textile Waste to Work</li> <li>- Chemicals Management: Developments and Expectations</li> <li>- PFAS: Needs for Chemicals Elimination and Substitution</li> <li>- Social/Labour Welfare: Developments and Expectations</li> <li>- Identifying and managing synergies, dependencies and trade-offs</li> </ul>	<p>Presentation with 43 slides</p> <p>Time 45 min</p>
<p><b>Presentation 3: Legal requirements &amp; stipulations from international agencies, global standards, and regulations</b></p>		
Description	Module content	Learning materials
<p>The presentation gives an overview about international regulations, waste and pollution conventions, BAT. Develops a link according to national regulations and emphasizes the importance of hazardous waste management. Extended producers' responsibility and OECD Due Diligence Guideline are explained.</p>	<ul style="list-style-type: none"> <li>- International regulations as per EU guidelines and US EPA regulations</li> <li>- Waste and pollutant related conventions</li> <li>- Best available techniques to manage hazardous waste</li> <li>- National regulations and gaps</li> <li>- Importance of hazardous waste management</li> </ul>	<p>Presentation with 46 slides</p> <p>time required: 60 min</p>
<p><b>Presentation 4: Textile production waste management - State of the knowledge in Vietnam</b></p>		
Description	Module content	Learning materials



<p>This presentation summarizes the actual state of the development of textile production waste management on company level as well in textile universities curricula. Air pollution, water and wastewater as well solid waste are addressed.</p>	<ul style="list-style-type: none"> <li>- Impact of textile production on the environment and improvement measures</li> <li>- Effects of textile production on human health</li> <li>- Wastes from spinning, weaving, finishing and sewing</li> <li>- Cleaner production in the textile industry</li> </ul>	<p>Presentation 4 Presentation with 20 slides time required: 45 min presentation</p>
<p><b>Presentation 5: Textile production waste management, effluent, and its treatment</b></p>		
Description	Module content	Learning materials
<p>The presentation addresses the magnitude and importance of the waste management problems within the textile production chain. The circularity approach which follows the reuse, recycling and recovery logic is explained, with focus on solid waste and wastewater management.</p>	<ul style="list-style-type: none"> <li>- Textile waste management</li> <li>- Impact of hazardous substance</li> <li>- Reuse, recycle and recovery</li> <li>- Chemicals and waste inventories</li> <li>- Wastewater management</li> <li>- Wastewater treatment</li> </ul>	<p>Presentation 5. with 83 slides time required: 45 min</p>
<p><b>Presentation 6: Circularity in the textile sector</b></p>		
Description	Module content	Learning materials
<p>The presentation explains the circular textiles economy which produces neither waste nor pollution by redesigning fibres to circulate at a high quality within the production and consumption system for as long as possible and/or feeding them back into the bio- or Technosphere to restore natural capital or providing secondary resources at the end of use.</p>	<ul style="list-style-type: none"> <li>- Conceptual consideration on a circular textile industry</li> <li>- Transitioning towards a circular textile industry</li> <li>- Recycling technology</li> <li>- Challenges and barriers - Solutions and best practices</li> </ul>	<p>Presentation 6 with 29 slides time required: 45 min</p>

Presentation 7: Recycling Technologies in Textile Industry		
Description	Module content	Learning materials
Introduction of the sustainability concept in the textile chain, Recycling of textile materials, curricula elements of HCMUT	<ul style="list-style-type: none"> <li>- Introduction</li> <li>- Recycling in textile materials</li> <li>- Ho Chi Minh City University of Technology – Current status and future perspective</li> </ul>	<p>Presentation 7 with 31 slides</p> <p>Total time required: 30 min</p>
Presentation 8: Pollution load in Textile wastewater		
Description	Module content	Learning materials
Presentation of sources of hazardous materials in textile wastewater. Overview about treatment technologies, effluent standards and international guidelines. Wastewater sludge treatment and disposal.	<ul style="list-style-type: none"> <li>- Sources of hazardous materials the general effluent, hazardous pollutants in textile wastewater.</li> <li>- Overview of textile waste water treatment techniques.</li> <li>- Concentration of different pollutants including heavy metals, content Vs discharge standards.</li> <li>- Treatment techniques for heavy metals.</li> <li>- Chemical precipitation technique and chemicals used.</li> <li>- Need to generate &amp; removal of excess sludge from biological treatment.</li> <li>- Sludge characteristics from different type of ETPs.</li> </ul>	<p>Presentation 8 with 41 slides</p> <p>Total time required: 60 min.</p>
Presentation 9: Sludge treatment and disposal		
Description	Module content	Learning materials

<p>The presentation includes sludge characterization and the parameters, sludge handling, treatment, dewatering, storage, transportation, and options of disposal.</p>	<ul style="list-style-type: none"> <li>- Background and Importance of Sludge Management</li> <li>- Stages of Sludge Handling and Pretreatment</li> <li>- Sludge Storage, Sampling and Preservation</li> <li>- Transportation of Sludge</li> <li>- Sludge management plan</li> </ul>	<p>Presentation 9 with 66 slides Total time required: 60 min.</p>
<b>Presentation 10: Gaseous emissions and air pollution</b>		
Description	Module content	Learning materials
<p>The presentation provides an overview about the different forms of air pollution caused by the textile production, the technical options to reduce air pollution and possible solutions to avoid it.</p>	<ul style="list-style-type: none"> <li>- Air emissions from textile processes</li> <li>- Stack gas emissions -power generation and boilers</li> <li>- Emission from volatile chemicals</li> <li>- CO<sub>2</sub> and greenhouse gas emissions, climate change, CO<sub>2</sub> footprint of the textile industry</li> <li>- Heat setting, dimension stabilization by thermal treatment</li> <li>- Stentors, final finishing by impregnation and subsequent thermal fixation</li> </ul>	<p>Presentation 10 with 44 slides Total time required: 45 min.</p>
<b>Presentation 11: Chemical Management in Textile Factories</b>		
Description	Module content	Learning materials Description
<p>Introduction to the elements of sustainable chemical management in the textile production, the international standards like GHS, Safety Data Sheets (SDS), Chemical inventories, Eco Mapping, Process Flow Mapping, Chemical Storage, Safe transport of chemicals as well handling of chemical waste.</p>	<ul style="list-style-type: none"> <li>- Importance of chemical management</li> <li>- Understanding standard labels and their implications</li> <li>- Key aspects of chemical management system</li> <li>- Storage and transportation of different hazardous chemicals</li> <li>- Handling of unused/expired chemicals</li> </ul>	<p>Presentation 11 with 50 slides Total time required: 60 min.</p>

	<ul style="list-style-type: none"> <li>- Documentation for the storage, incidents, and mitigation (with templates)</li> </ul>	
<b>Presentation 12: Water Efficiency in Textile Factories</b>		
Description	Module content	Learning materials Description
<p>The presentation treats the issue of water scarcity and water footprint of the wet processes of textile finishing. Strategies and areas of improvement and water efficient processes. Possibilities how to avoid, reuse or recycle water and wastewater in textile production are presented.</p>	<ul style="list-style-type: none"> <li>- <b>Lack of knowledge and awareness (skills and training)</b></li> <li>- Nonrealization of importance of water (knowledge)</li> <li>- WATER IS FREE - resource consciousness (wasteful attitude)</li> <li>- No metering, No monitoring, No management (management system)</li> <li>- Old and inefficient machines (investment)</li> <li>- Lack of maintenance (operation and maintenance)</li> </ul>	<p>Presentation 12 with 46 slides</p> <p>Total time required: 45 min.</p>
<b>Presentation 13: Best Available Techniques, Best Environmental Practices</b>		
Description	Module content	Learning materials Description
<p>The presentation introduces the BAT / BREF process to avoid and reduce industrial pollution load. Gives an overview the EU REACH regulation and the air and water emissions of textile industry. Control and remediation techniques are addressed.</p>	<ul style="list-style-type: none"> <li>- Description of BAT / BREF</li> <li>- Pollution Load of Textile industry</li> <li>- EU REACH Regulation</li> <li>- Emissions to water, air</li> <li>- Waste generation and management</li> <li>- Techniques to consider in the determination of BAT</li> </ul>	<p>Presentation 12 with 38 slides</p> <p>Total time required: 45 min</p>

Presentation 14: Curriculum Development at the Berlin University of Applied Sciences		
Description	Module content	Learning materials
<p>The process of curriculum development at Berlin University for Applied Science is presented in detail including training need and demand assessment, formal processes and needed resources. The formal approval process and the external accreditation are presented.</p>	<ul style="list-style-type: none"> <li>- Success Factors</li> <li>- Training Need and Demand Assessment (next presentation today)</li> <li>- Curriculum Development Process (flow chart)</li> <li>- Curriculum Development Team (management set-up)</li> <li>- Formalities within the Curriculum Commission (rules and regulations)</li> <li>- Formal Approvals of a Curriculum (putting the curriculum into operation)</li> <li>- External Accreditation</li> </ul>	<p>Presentation 14 with 18 slides</p> <p>Total time required: 30 min</p>
Presentation 15: Training Need and Demand Assessment for sustainability in the textile manufacturing		
Description	Module content	Learning materials
<p>Before a new curriculum or a new study program is set up, the training needs and the demand for new topics and/or qualified professional staff (engineers) must be assessed.</p> <p>It has to be clarified which learning format is appropriate, the training subjects and fields of interest must be identified. Two Examples of Training Need and Demand Assessments are presented.</p>	<ul style="list-style-type: none"> <li>- Introduction / Questionnaires for Demand assessment</li> <li>- Example 1: for Training Need and Demand Assessment</li> <li>- Evaluations / TNA / Teaching Formats (Presence / Blended / Online)</li> <li>- Training Subjects – Preferences by Industry</li> <li>- Regional Studies / Ranking Studies</li> <li>- Example 2: Training Need Assessment and Demand Survey</li> </ul>	<p>Presentation 15 with 30 slides</p> <p>Total time required: 45 min</p>
Presentation 16: Modular concept, with all elements and requirements (modular handbook examples)		

## Sustainability and Curriculum Development in Sustainability in Textiles

Description	Module content	Learning materials
<p>These units serve for preparation of curriculum development group work. Two groups were set up:</p> <p>Group 1: Sustainable Development in the textile industry</p> <p>Group 2: Sustainable development in Garment technology and Fashion design</p>	<p>The modular handbook prescribes a structure which will be followed by all modules (topics) in the same manner.</p> <p>This concept contains all the required elements.</p> <p>Modular = clear structure with "exchangeable modules "</p> <p>Modules can be combined integrated partly or used as complete modules in a study program.</p>	<p>Presentation 16 with 16 slides</p> <p>Total time required: 30 min</p>
<b>Presentation 17: Modern higher education - Modern education methods, Training of Trainers (ToT)</b>		
Description	Module content	Learning materials
<p>Modern higher education considers sustainability in its totality, on sustainability is not a one-shot learning approach. It is a lifelong process encompassing all levels of education. It s a challenging area requiring both disciplinary and interdisciplinary approach.</p>	<ul style="list-style-type: none"> <li>- Introduction to Modern Higher Education</li> <li>- Modern Education Methods</li> <li>- Training of Trainers (ToT)</li> <li>- Example 1: Chemical Management in the Textile and Garment Industry</li> <li>- Example 2: Learning with (in) Augmented Reality / Virtual Reality = AR/VR</li> </ul>	<p>Presentation 17 with 26 slides</p> <p>Total time required: 45 min</p>
<b>Presentation 18: Modern Engineering education - Development of dual study formats</b>		
Description	Module content	Learning materials
<p>The dual study format combines a vocational training with a twostep training. 1. Step vocational training (2 to 2,5 years), 2. step bachelor training (four semester).</p>	<ul style="list-style-type: none"> <li>- Introduction of dual study formats</li> <li>- Dual creates a "Win-Win" situation = double Benefit</li> <li>- Dual Programme Example (Electric Engineering)</li> </ul>	<p>Presentation 18 with 17 slides</p> <p>Total time required: 30 min</p>

### 3 Useful links and references

giz online learning platform (based on moodle)	<a href="http://www.atingi.org">www.atingi.org</a>
Best Available Techniques (BAT) reference document in the textile industry	<a href="https://eippcb.jrc.ec.europa.eu/reference/textiles-industry">https://eippcb.jrc.ec.europa.eu/reference/textiles-industry</a>
COSHH e-tool	<a href="http://www.hse.gov.uk/coshh/essentials/coshh-tool.htm">www.hse.gov.uk/coshh/essentials/coshh-tool.htm</a>
Easy-to-use Workplace Control Scheme for Hazardous Substances (EMKG) – Federal Institute for Occupational Safety and Health, Germany	<a href="http://www.baua.de/EN/Topics/Work-design/Hazardous-substances/EMKG/Easy-to-use-workplace-control-scheme-EMKG_node.html">www.baua.de/EN/Topics/Work-design/Hazardous-substances/EMKG/Easy-to-use-workplace-control-scheme-EMKG_node.html</a>
Eco-Mapping	<a href="http://www.sia-toolbox.net/solution/eco-mapping">www.sia-toolbox.net/solution/eco-mapping</a>
EMAS "easy" for small and medium enterprises – DG for the Environment	<a href="https://op.europa.eu/en/publication-detail/-/publication/a46da1ae-edee-47aa-b871-d13baa946379">https://op.europa.eu/en/publication-detail/-/publication/a46da1ae-edee-47aa-b871-d13baa946379</a>
Environmental standards in the textile and shoe sector – A Guideline on the Basis of the BREFs – Best Available Techniques Reference Documents of the EU	<a href="https://www.umweltbundesamt.de/sites/default/files/medien/publikation/long/4289.pdf">https://www.umweltbundesamt.de/sites/default/files/medien/publikation/long/4289.pdf</a>
GIZ Advanced Training Module for Chemical Management in textile wet processes	<a href="http://www.sia-toolbox.net/solution/advanced-training-program-chemical-management-textile-wet-processes">www.sia-toolbox.net/solution/advanced-training-program-chemical-management-textile-wet-processes</a>
GIZ Basic Training Module for Chemical Management in textile wet processes	<a href="http://www.sia-toolbox.net/solution/basic-training-module-chemical-management-textile-wet-processes">www.sia-toolbox.net/solution/basic-training-module-chemical-management-textile-wet-processes</a>
GIZ Digital Solutions for Substitution of Hazardous Chemicals in the Fashion Supply Chain initiative materials	Made available in CM master course
GIZ Resource Efficient Management of Chemicals in Textile and Leather Sector Companies, 2017	<a href="http://www.sia-toolbox.net/solution/resource-efficient-management-chemicals-textile-and-leather-sector-companies">www.sia-toolbox.net/solution/resource-efficient-management-chemicals-textile-and-leather-sector-companies</a>
Globally Harmonized System of Classification and Labeling of Chemicals (GHS)	<a href="https://unece.org/about-ghs">https://unece.org/about-ghs</a>

IFA Column Model as an aid to selecting substitute substances	<a href="http://www.dguv.de/ifa/praxishilfen/hazardous-substances/ghs-spaltenmodell-zur-substitutionspruefung/index.jsp">www.dguv.de/ifa/praxishilfen/hazardous-substances/ghs-spaltenmodell-zur-substitutionspruefung/index.jsp</a>
SAC Higg FEM 3.0 – Chemical management	<a href="https://howtohigg.org/fem-landing/chemical-management-2020/">https://howtohigg.org/fem-landing/chemical-management-2020/</a>
Safety in the use of chemicals at work. An ILO code of practice	<a href="https://www.ilo.org/public/libdoc/ilo/1993/93B09_147_engl.pdf">https://www.ilo.org/public/libdoc/ilo/1993/93B09_147_engl.pdf</a>
Substitution Support Portal	<a href="http://www.subsport.eu">www.subsport.eu</a>
ZDHC Chemical Management System	<a href="https://www.roadmaptozero.com/process">https://www.roadmaptozero.com/process</a>
ZDHC Manufacturing Restricted Substances List	<a href="https://www.roadmaptozero.com/input">https://www.roadmaptozero.com/input</a>
ZDHC Sampling and Analysis Plan	<a href="https://www.roadmaptozero.com/output">https://www.roadmaptozero.com/output</a>
ZDHC Technical Industry Guide	<a href="https://www.roadmaptozero.com/process">https://www.roadmaptozero.com/process</a>
ZDHC Wastewater Guidelines	<a href="https://www.roadmaptozero.com/output">https://www.roadmaptozero.com/output</a>