

# **Training Guideline for the “Training on Waste Management in Textile and Garment Industry” TA 07**

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

**Program on Promoting Sustainability in the Textile and  
Garment Industry in Asia (FABRIC)**

**Guideline for Trainers and Facilitators**



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<b>Purpose</b> This document has been prepared to guide trainers, facilitators, and service providers in the field of Waste Management in Textile and Garment Industry.	

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## List of abbreviations used

CM	Chemical management
CMS	Chemical management system
DSHC	Digital Solutions for Substitution of Hazardous Chemicals in the Fashion Supply Chain initiative
FABRIC	GIZ Project on Promoting Sustainability in the Textile and Garment Industry in Asia
GHS	Globally Harmonized Systems of Classification and Labelling of chemicals
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
MRSL	Manufacturer restricted substances list
REMC	Resource efficient management of chemicals
ZDHC	Zero Discharge of Hazardous Chemicals initiative

## 1 About this guideline

The objective of this document is to provide guidance to trainers, learning facilitators and service providers which will be in charge to disseminate Chemicals management knowledge. This trainer guideline is focusing on the contents of the training course on waste management in textile and garment industry.

The materials are primarily intended to help the trainer to increase their knowledge on chemical and waste management and to integrate chemical management aspects in their advisory services. The materials refer to international waste and chemical management reference standards, the conformance to national standards and regulations must be checked and eventually adapted.

In order 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 (e.g. DSHC) corresponding guidelines for service providers. You can download the materials 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.

This trainer guide is based on the material developed and used for the Training on waste management in textile and garment industry.

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

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The training course consists of eight 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 waste management in textile and garment industry.

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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 trainers, adviser and service providers which are involved in dissemination training for factory staff concerned with chemical management and cleaner production. However, this training program also aims at those who want to familiarize themselves with the concept, elements, and requirements of sustainable chemical and waste management in line with prevalent expectations in international textile/garment supply chains.

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### 1.3 How to use this guideline

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There are various options regarding how you as a trainer, learning facilitator, or service provider can employ or integrate the training course on waste management in textile and garment industry 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 workshop.

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 (i) an overview of the content of the presentations, (ii) available materials (e.g., presentations, quizzes, assignments), (iii) references to additional training and reference material and (iv) the average estimated time required for completing the presentation.

**Table 1 – presentations on Chemical Reuse, Recycling and Recovery**

Presentations
Presentation 1: Overview of Hazardous substance in textile manufacturing
Presentation 2: Legal requirements & stipulations from international agencies
Presentation 3: Other solid wastes from textile factories: source, characteristics, and disposal
Presentation 4: Hazardous materials in the effluent and its treatment
Presentation 5: Sludge conditioning, volume reduction and stabilisation
Presentation 6: Sludge dewatering
Presentation 7: Sludge disposal
Presentation 8: Sludge disposal through landfill, RE Sustainability LTD.
Presentation 9: Rethinking waste through co-processing, geocycle - LafargeHolcim
Presentation 10: Gaseous emissions and air pollution
Presentation 11: Circularity in the Textile sector

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

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

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

In this section the 8 presentations regarding cleaner production 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 (presentations including the number of slides, quizzes and assignments/exercises) plus links to reference and additional training materials including presentations for use in face-to-face or virtual (follow-up) training.

Presentation 1: Overview of Hazardous substance in textile manufacturing		
Description	Module content	Learning materials
<p>This presentation provides a general introduction to the textile finishing chain, the according needed chemical management and the hazardous chemicals applied.</p> <p>Indication where in the chain of processes are hazardous chemicals are used, waste classification, hazardous substances groups listed in ZDHC MRSL.</p>	<ul style="list-style-type: none"> <li>• Textile processing operations overview.</li> <li>• Areas where hazardous substances are used.</li> <li>• Waste classification</li> <li>• Historical perspective of hazardous substances, how the scenario has improved of late, special mention to azo dyes.</li> <li>• Heavy metals- need for use, process usage &amp; discharge potential.</li> <li>• Non-metal hazardous substances - process usage &amp; discharge potential.</li> <li>• Hazardous substance usage in garment manufacturing.</li> <li>• Hazardous substances in effluent.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation 1 with 30 slides</li> </ul> <p>time required: 45 min</p>
Presentation 2: Legal requirements & stipulations from international agencies		
Description	Module content	Learning materials

<p>This unit introduces regulatory requirements of the national and international legislation which have to be complied to assure a sustainable textile production, like chemical and waste inventories, the compliance with international chemicals and waste conventions, extended producer responsibility.</p> <p>It also serves as orientation and a primer for selected target groups such as representatives of authorities and company executives, who want to attain a quick understanding of legal requirements and stipulations from international agencies.</p>	<ul style="list-style-type: none"> <li>• Impact of hazardous substances on environment &amp; health.</li> <li>• Waste management policy by Government.</li> <li>• Standards stipulated by DoE for solids waste: Category A, B and C wastes.</li> <li>• Upcoming restrictions and stipulations.</li> <li>• Guidelines and requirements of ZDHC.</li> <li>• Other stipulations from international agencies &amp; buyers regarding hazardous waste discharge.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation with 49 slides</li> </ul> <p>time required: 45 min</p>
<p><b>Presentation 3: Other solid wastes from textile factories: source, characteristics, and disposal</b></p>		
<p><b>Presentation 3: Other solid wastes from textile factories: source, characteristics, and disposal</b></p>		
Description	Module content	Learning materials
<p>The presentation introduces inventorying the possible sources of waste and hazardous waste. Presentation of the integrated waste management model.</p> <p>A group exercise on practical action to reduce solid waste in textile and RMG industry is getting the participants deeper exposed to the subject.</p>	<ul style="list-style-type: none"> <li>• Waste vs hazardous waste</li> <li>• Production wastes from manufacturing - dyeing factories &amp; garment manufacturing.</li> <li>• Environmental &amp; health risks due to empty chemical containers.</li> <li>• Present practice of disposal vis-à-vis requirements.</li> <li>• Steps to prevent, reduce &amp; recycle miscellaneous solid wastes.</li> </ul>	<p>Presentation with 27 slides</p> <p>time required: 45 min</p> <p>Group exercise: practical action to reduce solid waste in textile and RMG industry.</p>
<p><b>Presentation 4: Hazardous materials in the effluent and its treatment</b></p>		
<p><b>Presentation 4: Hazardous materials in the effluent and its treatment</b></p>		
Description	Module content	Learning materials
<p>This presentation gives an overview of textile wastewater issues and the appropriate treatment techniques necessary to apply for the avoidance and reduction of environmental and health risks.</p>	<ul style="list-style-type: none"> <li>• Sources of hazardous materials the general effluent, hazardous pollutants in garment washing effluent.</li> <li>• Overview of textile wastewater 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 4 Presentation with 41 slides</p> <p>time required: 50 min presentation</p> <p>BAT/BREF doc: <a href="http://eippcb.jrc.ec.europa.eu/reference/">http://eippcb.jrc.ec.europa.eu/reference/</a></p>



Presentation 5: Sludge conditioning, volume reduction and stabilisation		
Description	Module content	Learning materials
Details how much wastewater treatment sludge is produced in primary and secondary ETPs, the need of sludge conditioning and reduction of volume before discharge as well the different available technical options are presented.	<ul style="list-style-type: none"> <li>Quantity of sludge generation in effluent treatment in primary and secondary ETPs, actual figures in BD.</li> <li>Need and objective of sludge conditioning. Issues with high organics in sludge.</li> <li>Importance of sludge volume reduction.</li> <li>Anaerobic sludge digestion &amp; volume reduction: process, pros &amp; cons, international experience.</li> <li>Aerobic sludge digestion &amp; volume reduction: process, pros &amp; cons, international experience.</li> <li>Recommendations for industry and way forward.</li> </ul>	<p>Presentation 5. With 44 slides</p> <p>time required: 45 min,</p>
Presentation 6: Sludge dewatering		
Description	Module content	Learning materials
This presentation focuses on the issues of sludge dewatering and the available technical options. The techno-economic aspects are discussed and according recommendations presented.	<ul style="list-style-type: none"> <li>Need and objective of sludge dewatering.</li> <li>Sludge dewatering techniques and most popular options, situation in ETPs of BD.</li> <li>Operation of sludge filter press, how to get optimum performance from them.</li> <li>Operation of sludge centrifuge, applicability, pros &amp; cons.</li> <li>Sludge drying beds for small ETPs. How to construct and operate it with optimum efficiency.</li> <li>Recommendations &amp; way forward.</li> </ul>	<p>Presentation 6 with 41. slides</p> <p>time required: 45 min</p>
Presentation 7: Sludge disposal		
Description	Module content	Learning materials
<p>Sludge categories, sludge characterizations and standards as well sludge disposal options are presented.</p> <p>The Bangladesh Standards and Guidelines for Sludge Management, applicable disposal options for various categories of sludge are discussed.</p>	<ul style="list-style-type: none"> <li>Guidelines on disposal of sludge from textile ETPs.</li> <li>Disposal options not permitted at present: composting, brick manufacture, land conditioning/manure.</li> <li>Disposal options allowed at present for all sludge and those within category B: secured landfilling and co-processing.</li> <li>Other options: Incineration, pros &amp; cons, economic viability.</li> <li>Recommendations &amp; way forward.</li> </ul>	<p>Presentation 7 with 27 slides</p> <p>Total time required: 45 min</p>

Presentation 8: Sludge disposal through landfill, RE Sustainability LTD.		
Description	Module content	Learning materials
The presentation gives an overview about wastewater sludge disposal at secured landfills. The roles of stakeholders for a responsible sludge management, the process outline, the criteria for the choice of the different possible disposal methods and technical details of a constructed landfill are described.	<ul style="list-style-type: none"> <li>Why must industry manage sludge?</li> <li>How sludge can be managed?</li> <li>What can be done for the Textile and Garment industry in Bangladesh?</li> </ul>	Presentation with 27 slides  time required: 30 min
Presentation 9: Rethinking Waste through co-processing, geocycle – LafargeHolcim		
Description	Module content	Learning materials
The issues and advantages of coprocessing in cement kilns to treat hazardous and non-hazardous waste in a sustainable and compliant manner are described.	<ul style="list-style-type: none"> <li>Co-processing and incineration</li> <li>Reduction in GHG emissions</li> <li>Co-processing and landfill</li> <li>Prevention of methane emissions</li> </ul>	Presentation with 10 slides  time required: 30 min
Presentation 10: Gaseous emissions and air pollution		
Description	Module content	Learning materials
The presentation 8 deal with aspects of air pollution and stack emissions in the textile wet processing including power generation and boilers. The air emission abatement techniques are presented also substitution and reduction of hazardous chemicals are discussed.	<ul style="list-style-type: none"> <li>Air emissions from textile processes</li> <li>Stack gas emissions from power generation and boilers</li> <li>Emission from volatile chemicals</li> <li>CO2 and greenhouse gas emissions, climate change 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>	Presentation 8 with 34 slides  Total time required: 60 min.
Presentation 11: Circularity in the Textile sector		
Description	Module content	Learning materials

<p>The circular textiles economy describes an industrial system 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 techno sphere to restore natural capital or providing secondary resources at the end of use.</p> <p>4Rs of the circular economy model – Re-design, Reduce, Reuse, Recycle. Textile recycling technologies</p>	<ul style="list-style-type: none"> <li>• Conceptual consideration on a circular textile industry</li> <li>• Actual status of circular economy in the textile sector</li> <li>• Transitioning towards a circular textile industry</li> <li>• Technology assessment: closing material loops through textile recycling</li> <li>• Innovative closed loop recycling technologies</li> <li>• Challenges and barriers</li> <li>• Solutions and best practices</li> </ul>	<p>Presentation 9 with 22 slides</p>
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## 3 Useful links and references

	<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>