Background:
The Clean by Design program provides a comprehensive system for improving energy, water, and chemical use in textile mills, the apparel and footwear industry’s most resource-intensive production segment. Since 2007, the approach has provided results for more than 200 global manufacturers of all shapes and sizes. Clean by Design Chemistry is a program for wet processing facilities designed to establish best practices and procedures for improving inputs, reducing chemical use, conducting careful oversight and operations of wastewater treatment, and enabling recovery and reuse of chemicals whenever possible.

Overview:
Oversight of global deployment for Clean by Design is provided by the Apparel Impact Institute (Aii). Aii is a U.S.-based non-profit organization that identifies, validates, funds, and scales proven quality solutions to accelerate positive impact in the apparel and footwear industry. Aii has partnered with Sustainable Textile Solutions, a brand of BluWin Limited; NimkarTek; and The BHive to bring the program to China, Bangladesh, India, Turkey, and Europe.

Results:
Despite the COVID-19 pandemic, the Clean by Design Chemistry pilot project participants in India achieved impressive results with relatively low upfront costs, including:

• Average of 12 improvement opportunities per facility
• 92% of the improvement opportunities taken in action
• Identification and substitution of several hazardous chemicals
• Up to 29% reduction of commodity chemicals
• Up to 43% operational time and 64% chemical savings from recipe optimization
CLEAN by DESIGN
Chemistry and Wastewater Management Program

How it works:
The cornerstone of the Clean by Design Chemistry Program is a set of Ten Best Practices for textile mills that are practical, low cost, and easy to implement.

TEN BEST PRACTICES FOR CHEMISTRY & WASTEWATER MANAGEMENT:

<table>
<thead>
<tr>
<th>BP</th>
<th>Name</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chemical Inventory Management</td>
<td>Establish a complete chemical inventory that is available digitally and updated regularly.</td>
</tr>
<tr>
<td>2</td>
<td>Improve Chemical Selection</td>
<td>Procure chemicals and formulations that are: 1) cleaner: with lower levels of unintentional, unwanted, harmful contaminants (according to ZDHC MRSL). 2) reduce effluent load: in terms of COD, Nitrogen, Phosphorus</td>
</tr>
<tr>
<td>3</td>
<td>Match Recipes with Usage</td>
<td>Increase ‘right first time’ and recipe consistency to reduce chemical consumption.</td>
</tr>
<tr>
<td>4</td>
<td>Optimize Equipment Size and Capacity</td>
<td>Reduce chemical consumption trough by improving production planning and equipment utilization.</td>
</tr>
<tr>
<td>5</td>
<td>Recover and Reuse Chemical Inputs</td>
<td>Reduce chemical consumption through chemical input recovery and/or reuse practices.</td>
</tr>
<tr>
<td>6</td>
<td>Enhance Communication Between Key Personnel</td>
<td>Avoid effluent nonconformities by ensuring ETP management is fully informed about effluent load from production.</td>
</tr>
<tr>
<td>7</td>
<td>Manage Key Process Waste Streams</td>
<td>Actively monitor and manage all waste streams to ensure they do not exceed ETP capacity or design.</td>
</tr>
<tr>
<td>8</td>
<td>Manage Wastewater Influent Temperature</td>
<td>Reduce chemical consumption and waste through managing the influent temperature.</td>
</tr>
<tr>
<td>9</td>
<td>Monitor Wastewater Influent &amp; Effluent</td>
<td>Establish internal monitoring system for wastewater influent and effluent to meet legal ZDHC conventional, and MRSL parameters.</td>
</tr>
<tr>
<td>10</td>
<td>Ensure Effluent Treatment Plant Emergency Preparedness</td>
<td>Establish an ETP Emergency Management System that includes preventive and predictive maintenance along with identification of key back-up equipment and power for critical functions.</td>
</tr>
</tbody>
</table>
Industry Alignment:
The Sustainable Apparel Coalition (SAC) is a founding member of the Apparel Impact Institute and accelerates Aii’s impact programs through its member requirements.

To drive results, Aii worked with ZDHC to gain endorsement of the Clean by Design Chemistry Program.

SAC Tools and Resources
The Clean by Design Chemistry and Wastewater Management Program is mapped to the Higg Brand and Retailer Module and the Higg Facility Environmental Module.

Through the Clean by Design Chemistry Program, facilities extend their capacity to improve their chemical management system and wastewater management operations, which potentially improves their Higg FEM scoring.

ZDHC Tools & Resources
Mill achievements of the Clean by Design Program count towards the ZDHC Brands to Zero Program, which is designed to fully integrate the following ZDHC resources: ZDHC MRSL, ZDHC Wastewater Guideline, and ZDHC Technical Industry Guideline.

Participating mills benefit from the following tools: Gateway, Performance InCheck, ZDHC Technical Industry Guideline Training, ZDHC Wastewater Training, Supplier to Zero Foundational Level, and Verified Performance InCheck Report.
The Process:
The program is planned for a period of 13 months:

1. Kick-off
   - Attain Commitment
2. Pre-Visit
   - Questionnaire & WW Test Report
3. On-site Visit
   - Baseline Setting & Opportunity Identification
4. 1:1 Consultancy
   - Engagement (Off-site)
5. Mid-Term
   - Progress Report
6. Implementation
   - Validation & ZDHC InCheck
7. Recognition
   - Closing Meeting With All Stakeholders To Share & Celebrate Results; Awards For Top Performers

1:1 Factory Top Management & Expert Discussion
- Introduction
- Chemical Inventory Digitalization
- Training & Data Collection
- ZDHC TIG and WW Trainings
- Training

Action Plan Preparation & Finalization
- Getting ready for implementation
- ZDHC Performance InCheck
- Getting Ready For Implementation

1:1 Consultancy Engagement (Off-site)
- Implementation
- StZ Foundational Level
- Implementation
- Chemical Inventory update
- Implementation

Validation & ZDHC InCheck Validation
- Impact Measurement

Chemical Inventory update
- Implementation

Final Report
- Results

ZDHC Performance InCheck
- Getting Ready For implementation
1. **Kickoff:** Each program cycle begins once we’ve secured commitments. At an online meeting, participants are briefed on the program process and connected to consulting experts.

2. **Preparation:** The experts prepare mills through several program activities. Data is gathered, and the first training conducted to set a solid basis for opportunity identification and develop critical know-how for determining an action plan.

3. **Baselining, Opportunity Identification & Action Plan Creation:** Mills go through an on-site evaluation led by industry experts and establish baselines where possible. Insights from these assessments are used to set improvement targets. An action plan is set by the mill, and each plan is approved by the experts.

4. **Implementation:** With the support of experts through trainings and ongoing coaching, mills implement their plan of action.

5. **Impact Measurement:** The progress of actions is monitored throughout the program. During a final validation, the impact is measured.

**Participant Responsibilities:**
Contributions expected from participating facilities to achieve maximum benefits include:

- Ensure top management support.
- Create a project committee led by an executive team member.
- Provide Clean by Design experts access to facility and supply reliable information in a timely manner.
- Participate in all workshops and project meetings; complete e-training course.
- Develop and submit an action plan; implement at least seven projects from the action plan.
- Submit a final report with comprehensive results, detailed calculations, and achievements.

**Contact:**
For more information about Clean by Design Chemistry & Wastewater Management Program:
tamara@apparelimpact.org