

IMPACT SHEET • SWITCH-ASIA PROJECT
**SUSTAINABLE PRODUCTION THROUGH MARKET
PENETRATION OF CLOSED LOOP TECHNOLOGIES IN THE
METAL FINISHING INDUSTRY (ACIDLOOP)**

Reducing resource consumption and pollution in the Indian metal finishing industry



The project supported SMEs in reducing their resource use by 23-33% which contributes to reduced CO₂ emissions by 2 289 tonnes annually, and implementing technologies to cut liquid waste by 80% and acid consumption by 10–40%



The Challenge

Metal finishing in India are mainly operated by SMEs. Production activities like degreasing, pickling, and galvanic baths use acids which result in highly hazardous wastewater. Due to a lack of material stream and waste management systems, waste and pollution become major concerns leading to reduced profits. SMEs and their business associations needed to be convinced that resource efficiency (RE) measures would be financially viable, and to be introduced to consulting services, technologies, and financing models to implement the measures. Relevant policy issues such as a framework which promote technology transfer from research organisations to SMEs, and the expanded role of pollution control boards as facilitators for the adoption of RE measures were also crucial to be addressed.

Objective

The project sought to demonstrate and implement resource efficiency (RE) and technology innovation for acid and rinse water recovery among Indian metal finishing SMEs in order to improve environmental quality and combat pollution. The activities took place in locations in north, south and west India.



TARGET GROUPS

Target SMEs supplied parts to manufacturers who, either directly or through one more tier, delivered to the end-product (e.g. automobile) manufacturer. The SMEs were usually at Tier 3 or Tier 4 of the supply chain.

Target industries

- Electroplating of metallic parts
- Painting/powder coating of metallic parts
- Anodising of metallic parts
- Any surface treatment industry using acid

Beneficiaries

- Metal finishing SMEs and their associations
- Auto manufacturers/fabricators
- Technology suppliers
- Policy makers

Activities / Strategy

Following introductory workshops in 11 locations, 106 Indian metal finishing SMEs in the north (Faridabad, Gurgaon, Chandigarh-Mohali), the west (Pune, Aurangabad, Ahmedabad, Vadodara) and the south (Chennai) were selected and offered both RE training and on-site consultancy, and technology demonstrations for acid and rinse water recovery.



Building the Capacity of Local Teams

Overall, 42 days of training were held covering Training of Trainers (ToT) in Austria and Germany and additional training in India to reinforce the concepts, exchange experience between locations and evolve approaches to facilitate RE implementation.



Providing RE Training for SMEs

Over 50 training workshops covering theoretical concepts, exercises and case studies on various topics were held. Workers were also trained.



On-site Consulting Support for Implementation of RE Options

In each participating SME, resource consumption was assessed, potential RE options identified and intense on-site engagement continued to facilitate implementation. Impacts and resource savings were assessed in the final year.



Establishing Demonstration Systems for Acid and Rinse Water Recovery

Three specialised plants, constructed and tested in Europe, demonstrated retardation and diffusion dialysis (both for acid recovery) and nano-filtration for rinse water recovery in seven SMEs. Three workshops were held and the feasibility of recycling the recovered acid/water was proven.



Supporting Technology, Customer, Finance and Policy Interventions

To create and strengthen linkages between SMEs and technology suppliers, customers, financial institutions and policy making bodies, policy dialogues, and customer and technology roundtables were held.

PROJECT STRATEGIES

- RE training workshops for SMEs (owners and workers) in targeted locations;
- On-site consulting support on implementation of low or no cost RE options;
- Acid and rinse water recovery technology demonstrations;
- Financial and other support to SMEs, through policy dialogues, customer roundtables, and technology roundtables;
- Dissemination activities throughout the project.

Scaling-up Strategy



Working with Industry Associations

Reaching out to SMEs in the initial stages was effected via local industry associations in all target locations, sometimes via multiple associations. Subsequent interaction was continued through the industry associations.



Engaging with Technology Suppliers through Marketing Events

Suppliers providing technologies for implementing RE measures (e.g. energy efficient devices, solar water heaters) and for measuring/monitoring process performance (e.g. plating bath temperature, conductivity) were linked with the SMEs during marketing events and technology roundtables. Three different demonstration units from European companies were customised for small enterprises and were equipped with instrumentation for detailed monitoring.



Adopting a Participative and Consultative Process

The Indian consultants continuously engaged with individual metal finishing units through the stages of baseline study, providing RE recommendations, supporting implementation, and measuring impact. The policy dialogues, technology roundtables and fairs, customer roundtables and financing events were consultative, allowing different points of view from various actors (associations, government bodies,

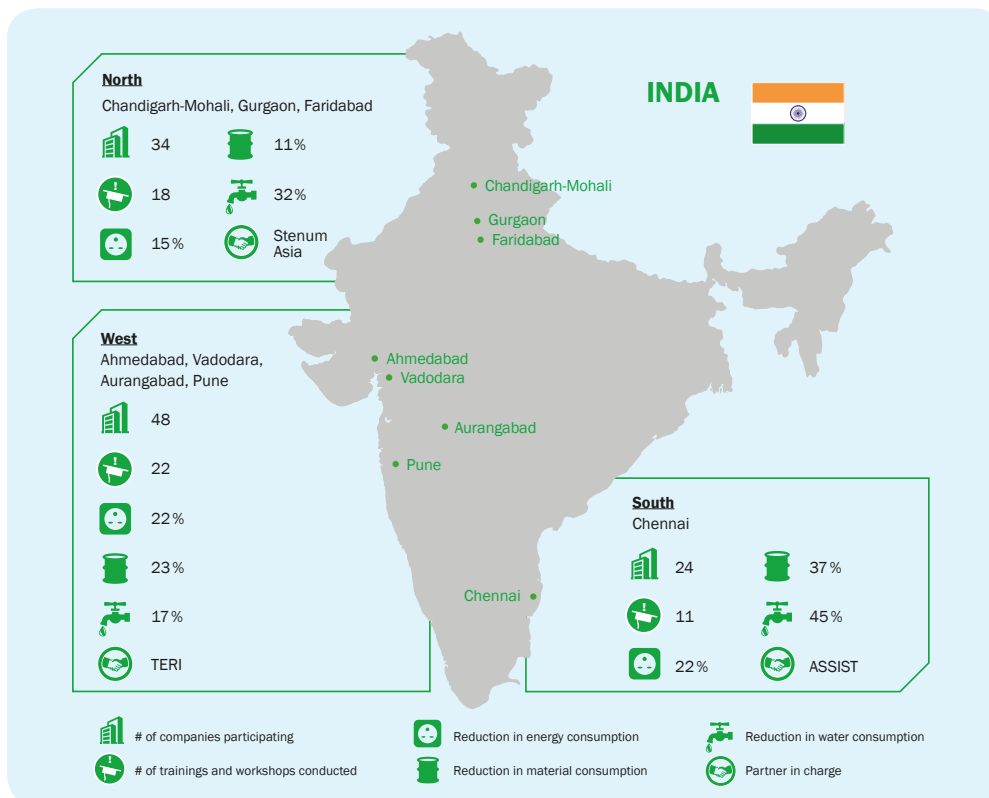


Metal finishing operations in India are carried out by a large number of SMEs, across a wide geographical area, and are highly polluting. It is therefore essential to equip these SMEs with the necessary tools and to build capacity to move towards more sustainable practices. As the project ends, we are leaving behind practical examples and identified good and best-practice – seeds from which the idea of resource efficient and cleaner production may spread.

*Dr. Malini Balakrishnan,
Project Coordinator, TERI*



financial institutions, customers of metal finishing products, etc.) to be presented. Feedback on the training topics and mode of delivery was also sought from the selected SMEs for fine-tuning the content and approach (for example, training of workers was based on the need expressed by SMEs).



ACIDLOOP project locations and the respective key results. Source: ACIDLOOP Project Final Brochure (2016)



Workshop



Practice on power analyser



Demonstration of acid recovery

Results



Self-reliant RE Local Consultants

The technical training and use of tools like “Whole Person Process Facilitation” (WPPF) methodology capacitated nine local project team members to become self-reliant RE consultants who can conduct RE projects successfully with a strong and clear objective orientation.



Enabled SMEs to Adopt Resource Efficiency

Overall, 1 112 participants attended six rounds of major workshops, two additional worker training events and the project closing conference. A total of 45 training sessions were conducted as major workshops, in addition to 13 introductory workshops in the first year. The 366 feedback forms mostly indicated that the workshop topics were very useful. These training workshops have equipped SMEs to carryout in-house RE improvements.



13 RE Recommendations Implemented by SME

Company specific RE improvement options were identified, technical support for the implementation provided and resource (energy, water, chemicals, etc.) savings quantified. The overall reduction in specific energy consumption was 23%; specific resource consumption 27% and specific water consumption 33%. On an average, 13 RE recommendations were implemented per SME.



Established Demonstration Plants for Acid and Rinse Water Recovery

Demonstration plants and three workshops proved the feasibility of recycling the recovered acid/water as well as disseminating the technologies to SMEs. Nano-filtration recovered 80% of rinsing water. The application of diffusion dialysis and retardation reduced acid consumption by 10%–40%, depending on the pickling practice.



We are very thankful to the entire ACIDLOOP team. We have saved a great deal of money by saving water and chemicals. After implementing the ACIDLOOP team's recommendations, we now consume 30% less water, and 20 – 25% less chemicals which significantly increases our profits.

*Mr. Anil Patil,
from Shriram Engineers, a metal
finishing company in Aurangabad*



Facilitated Technology, Customer, Finance and Policy Interventions

Two technology roundtables facilitated SMEs and technology suppliers to identify measures to improve SMEs' access to RE technologies. Two technology fairs exposed the SMEs to specific technologies and the suppliers to potential customers. For financial institutions, three dialogue events were held. Based on financing needs indicated by SMEs, eight local bank branches in different locations were visited and informed about the potential RE technology investments. Information on financing options was shared with SMEs. Three dialogue events were held to discuss how auto manufacturing customers could encourage SMEs in implementing RE practices. 22 original equipment manufacturers (OEMs) were made aware of RE initiatives taken and successes achieved by 51 metal finishing SMEs who were part of their supply chain. To identify policy recommendations to increase the uptake of RE measures among Indian metal finishing SMEs, three regional and two national policy dialogues were held. Policy recommendations on technology transfer were shared with relevant stakeholders.













Certificate for good performing company



Detailed information on ACIDLOOP project's results is available at www.switch-asia.eu/projects/acidloop

Impact in Numbers

<p>Economic Impact</p> 	<ul style="list-style-type: none"> SMEs achieved the following monetary savings: <ul style="list-style-type: none"> Rerolling mill, Ahmedabad – INR 1 200 000/year (EUR 16 470/year); Plating unit, Aurangabad – INR 600 000/year (EUR 8 200/year) and Mohali INR 300 000/year (EUR 4 100/year); Foundry, Chennai INR 225 000/year (EUR 3 000/year). SMEs obtained new business opportunities from expanded markets for RE products. 		<ul style="list-style-type: none"> 40% of their energy requirements. Measures to reduce energy consumption include insulation of baths, ovens, furnaces, optimisation of compressors, use of process controllers like timers, temperature controllers and use of natural/energy efficient lighting.
<p>Environmental Impact</p> 	<ul style="list-style-type: none"> SMEs achieved average reduction of 27% materials, 23% energy and 33% water per unit of production. The use of a nano-filtration at the demonstration plants led to an 80% recovery of used rinsing water – thus reducing water consumption. The use of diffusion dialysis and acid retardation at the demonstration plants led to a 10–40% reduction in acid consumption, depending on the pickling practice. Reduced acid consumption led to reduced sludge production. SCP measures implemented: insulation of ovens/furnaces to reduce energy consumption; use of polypropylene (PP) balls to insulate hot bath surfaces to save energy; improved use of daylight to save energy for indoor illumination; reducing compressed air leaks to save energy; use of water cascading to reduce water consumption (and thereby wastewater generation) in rinsing step; use of automated dosing and increasing drain time to reduce chemical consumption. 	<p>Green Finance</p> 	<ul style="list-style-type: none"> 8 local bank branches were visited in different project locations, and 3 dialogue events were held with financial institutions. 106 SMEs have been trained on financing options and given information on bank schemes.
<p>Social Impacts</p> 	<ul style="list-style-type: none"> Increased worker salaries (a 100% increase from 2012–2016 in one company and 10–12% annual increase from 2012–2016 in the other company). Companies reported zero accidents in the past four years. Increased health and safety at workplace by implementing measures such as display of safety information, acid proof tiling; proper storage space for chemicals, increased usage of personal protective equipment (PPE), training of workers, fume reduction via suction, and using low fume acids. 	<p>Target Group Engagement</p> 	<ul style="list-style-type: none"> Reached out to 385 SMEs in the initial stage, with 106 SMEs were selected for further participation in the project. Stakeholder engagement: provided training on RE measures and safety to over 400 workers from 40 companies; informed 10 regional banks of RE benefits; received participation of 23 technology suppliers in the first technology fair and 62 in the second fair; contacted 22 customers (OEMs) to share results of the participating SMEs who are part of their supply chains; 9 government bodies participated in project events.
<p>Climate Benefits</p> 	<ul style="list-style-type: none"> Reduced energy use by 23% per unit of production, contributing to reduced CO₂ emissions by 2 289 tonnes annually. The use of renewable energy use has been reported by one company which utilises solar water heating and this covers about 	<p>Women's Empowerment</p> 	<ul style="list-style-type: none"> A total of 94 women (company workers) participated in project events and were introduced to RECP concept.
		<p>Policy Development</p> 	<ul style="list-style-type: none"> Provided recommendation through 5 policy events for improving technology transfer, expanding the role of pollution control boards to act as facilitators for pollution prevention, and building the capacity of SMEs.
		<p>Europe-Asia Cooperation</p> 	<ul style="list-style-type: none"> Facilitated knowledge exchange between Asian and European partners through ToT programmes, major workshops, technology demonstrations and on-site consulting. In the first ToT, Indian consultants visited companies in Europe. Implemented the EcoProfit approach. Continued the cooperation between European and Indian partners in the new SWITCH-Asia project METABUILD implemented from 2016 to 2020 in Bangladesh, Nepal and Sri Lanka, with involvement of local partners.



Legend

- Eligible countries for the SWITCH-Asia Programme
- Non-eligible Asian countries for the SWITCH-Asia Programme

Project implementation area

- City
- Region
- Country

The boundaries shown on this map do not imply on the part of the European Union any judgment on the legal status of any territory or the endorsement or acceptance of such boundaries.

OBJECTIVES

The project sought to introduce resource efficiency and technology innovation for acid and rinse water recovery in the Indian metal finishing SMEs that would result in improved operations as well as combating pollution.

DURATION



PROJECT TOTAL BUDGET

EUR 2 395 069.59
(EU contribution: 80%)

PROJECT CONTACT



The Energy and Resources Institute (TERI)
India Habitat Centre, Lodi Road, New Delhi – 110003, India

Dr. Malini Balakrishnan
Tel: +91-11-2468-2111
Email: malinib@teri.res.in

www.acidloop.in

PARTNERS



VDEh-Betriebsforschungsinstitut GmbH (BFI), Germany



STENUM Asia Sustainable Development Society, India



adelphi, Germany



Society of Indian Automobile Manufacturers (SIAM), India



Asia Society for Social Improvement and Sustainable Transformation (ASSIST), The Philippines



Austria Recycling – Verein zur Förderung von Recycling und Umweltschutz in Österreich (AREC), Austria