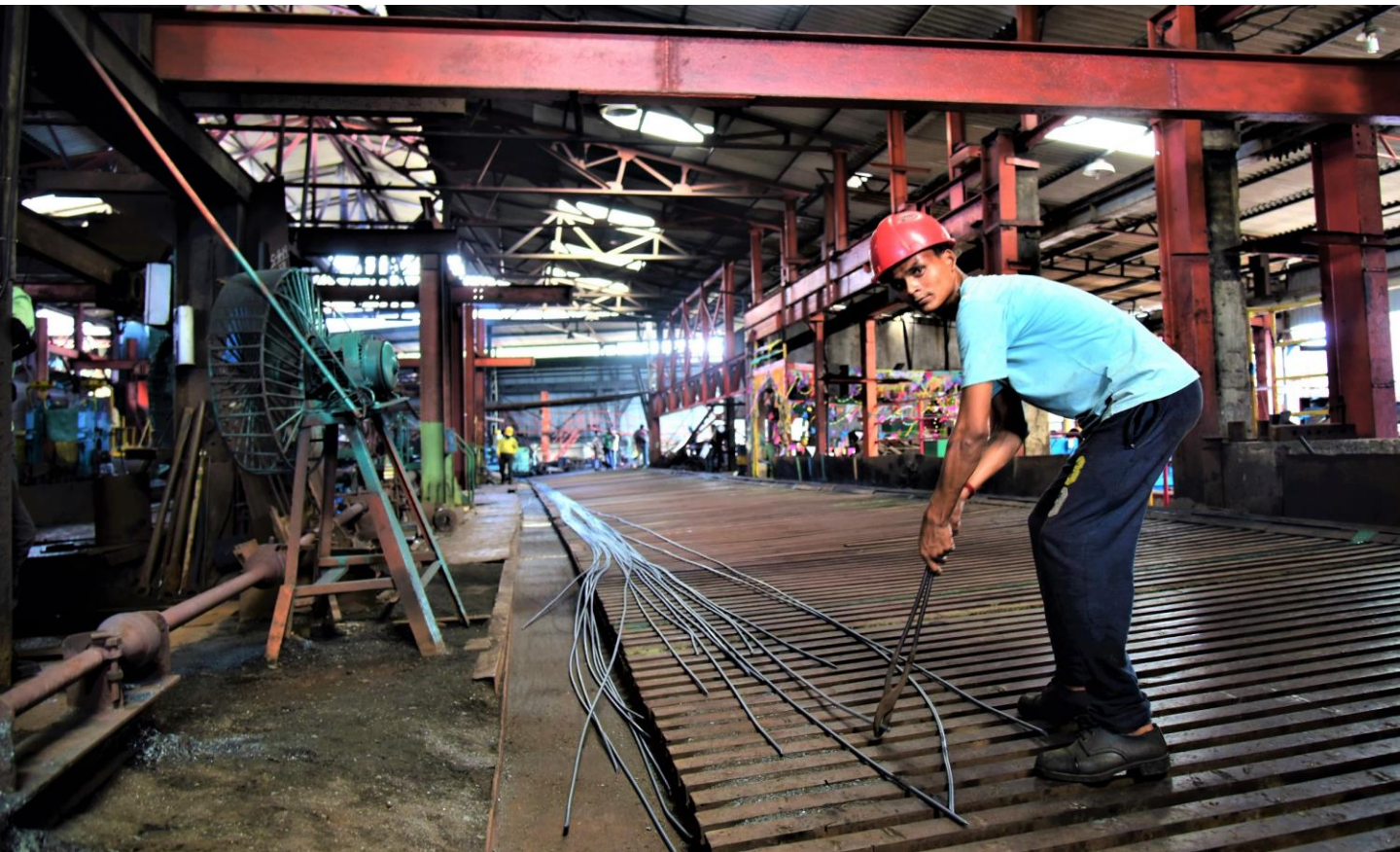




Resource-Efficient Supply Chains for Metal  
Products in Buildings Sector in South Asia

# PROJECT FLAGSHIP REPORT



2016 - 2020

Project Funded by



Project Implemented by



# Imprint

## Dr. Malini Balakrishnan

The Energy and Resources Institute (TERI)  
Darbari Seth Block, IHC Complex, Lodhi Road  
New Delhi - 110 003, India

**Tel.:** +91 11 2468 2100

+91 11 4150 4900

**Fax:** +91 11 2468 2144

+91 11 2468 2145

**Email:** malinib@teri.res.in

**Website:** [www.teriin.org](http://www.teriin.org)

**Project Website:** [www.metabuild-southasia.org](http://www.metabuild-southasia.org)

## Authors:

Amarnath Munnolimath (adelphi), Lukas Kocher (adelphi), Malini Balakrishnan (TERI), Vidya Batra (TERI), Rajat Batra (STENUM Asia), Markus Möller (AREC), Stefan Melnitzky (AREC)

## Editor:

Amarnath Munnolimath (adelphi)

## Contribution to the SDGs



## Disclaimer

This publication has been produced with the financial assistance of the European Union. The contents of this publication are the sole responsibility of The Energy and Resources Institute (TERI) and can in no way be taken to reflect the views of the European Union.

# Content

1.	Introduction	5
2.	The Project Approach and Background	7
3.	Resource Efficient Cleaner Production	12
4.	Capacity Building of Local Consultants	14
5.	Direct Industry Support	16
6.	Cleantech Finance	24
7.	Dialogues and Roundtables	27
8.	Sustainability of the Action and Outlook	31
9.	Lessons Learnt	32
10.	Bibliography	34

# Foreword

Web

www.teriin.org



The Energy and Resources Institute

Darbari Seth Block  
I H C Complex  
Lodhi Road  
New Delhi – 110 003

Tel. 2468 2151 or 2468 2152  
E-mail dg@teri.res.in  
Fax 2468 2144  
India +91 • Delhi (0) 11

Regional centres within India

**North-Eastern Regional Centre**  
Guwahati

Tel. (361) 233 4790  
E-mail terine@teri.res.in  
Fax (361) 233 4869

**Southern Regional Centre**  
Bangalore

Tel. (80) 2535 6590 (5 lines)  
E-mail terisc@teri.res.in  
Fax (80) 2535 6589

**Goa**

Tel. (832) 245 9306 or 245 9328  
E-mail terisc@teri.res.in  
Fax (832) 245 9338

**Western Regional Centre**  
Mumbai

Tel. (22) 2758 0021 or 4024 1615  
E-mail terimumbai@teri.res.in  
Fax (22) 2758 0022

**Himalayan Centre**  
Mukteshwar

Tel. (5942) 286 433  
E-mail praveen.sharma@teri.res.in  
Fax (5942) 286 460/433

TERI worldwide

**TERI North America**

Tel. (+91) 9811150290  
E-mail  
annapurna.vancheswaran@terina.org

**Antwerp**

TERI-VITO  
Tel. (+32 3) 286 74 31  
E-mail ihrehman@teri.res.in

**TERI Japan**  
Tokyo

Tel. (+81 3) 3519 8970  
E-mail teri@iges.or.jp  
Fax +81 33 5195 1084

**Ajay Mathur Ph.D.**  
Director-General



The European Union funded SWITCH-Asia project METABUILD (*"Resource efficient supply chain for metal products in buildings sector in South Asia"*) commenced in 2016, with the aim of achieving resource savings in the metal products small and medium enterprises (SMEs) supplying to the building and construction sector in Bangladesh, Nepal and Sri Lanka. SMEs typically have no awareness of Resource Efficient Cleaner Production (RECP), carry out limited monitoring of their resources and thus offer tremendous opportunities for reducing use of resources. The METABUILD project, through implementation of low and no cost measures as well as ones requiring investment, has achieved significant savings in energy use, water consumption, hazardous waste generation and raw material use. The project has also sensitized different ecosystem players such as policy makers, financial institutions, customers, industry associations and government bodies on best RECP practices.

The European Union not only co-funded the project but the European Union Delegation in Dhaka, Bangladesh also supported and facilitated the project team in resolving issues on the ground, improving dissemination, linking with the Delegations in Nepal and Sri Lanka and participated in key project events.

This report highlighting the project features and results is most welcome. I hope that the approaches and activities mentioned in this report motivate other sectors to take up such initiatives. I also take this opportunity to extend my sincere thanks to the European Union for co-funding this excellent project and hope to see their continuous support for similar initiatives in South Asia.

  
(Ajay Mathur)

# 1. Introduction

## Overview of Status Quo Including Key Project Outcomes

As you are reading this flagship report, the METABUILD project has come to an end. This four year multi-country project was part of the European Union's SWITCH-Asia Programme and has been implemented in **Bangladesh, Nepal and Sri Lanka** from **March 2016 until February 2020**.

The project has proven that Resource Efficient Cleaner Production (RECP) not only entails ecological and social benefits by increasing the sustainability in metal processing and finishing, but also makes the case for economic benefits for small and medium industries. As such, the RECP measures implemented in **403 metal product industries** supplying to the construction sector across three countries led to aggregated annual **savings of € 2.9 million** through increased resource and energy efficiency. The project also **sensitised over 3,000 industry personnel** and more than 1,000 other stakeholders on RECP through capacity building workshops and events.

## Objective of the Report

The objective of this report is to make the results, detected challenges and success factors around RECP in South Asia available to a wider audience. The report addresses everybody working in a managing position in Small and Medium Enterprises (SMEs) in metal sector, everybody sourcing products from these SMEs, everybody advising these industries as an RECP consultant, everybody designing regulations and policies around RECP, and ultimately everybody who is simply interested in resource efficiency and cleaner production in general. This report will provide you with a broad

overview of what has been achieved through the METABUILD approach towards RECP in Bangladesh, Nepal and Sri Lanka and explain the most prevalent challenges for metal industries, policy makers and financiers in the RECP arena in South Asia.

## Report Structure

This flagship report begins with **(1)** an overview of key outcomes of the METABUILD project, before **(2)** explaining the context for metal product manufacturing SMEs in the project countries Bangladesh, Nepal and Sri Lanka, the set-up of the METABUILD project consortium and the project approach to strengthen RECP in these focal geographies. Then follows **(3)** a detailed description of METABUILD's perception of RECP and the project's specific approach to foster RECP engagement of metal industries.

The report continues with **(4)** describing the activities entailed in capacity development for local RECP consultants to mobilise and advise metal industries to engage in RECP. Next, the **(5)** direct industry support measures are explained with a focus on respective country contributions and a description of technology interventions, illustrated by selected case studies from the project countries. The report **(6)** assesses in detail the activities carried out under the project around improving the conditions for cleantech finance in the respective countries; it explains the activities strengthening the capabilities of metal industries to gain access to finance in their markets followed by the capacity development for financial institutions in developing and optimizing cleantech financial products for small and medium metal industries. In the next section, the report **(7)** summarizes the measures for stakeholder engagement,

particularly customer roundtables, policy dialogue and clean technology fairs connecting technology suppliers and SMEs in the metal sector.

The report closes with (8) an assessment of the sustainability of the actions undertaken

in METABUILD and an outlook for the next steps and developments in the three project countries as well as RECP in general, before (9) outlining the lessons learnt over the four years of implementing the project.



## 2. The Project Approach and Background

### Project Brief

The METABUILD project is one of more than 120 grant projects implemented under the SWITCH-Asia programme in 24 Asian countries (2007 - 2020). The SWITCH-Asia programme was launched by the European Commission in 2007 with the goal to promote economic prosperity and to reduce poverty by encouraging sustainable growth with a low environmental impact amongst industries and consumers. **The programme specifically aims to promote sustainable products, processes, services and consumption patterns in Asia.** More information on the SWITCH-Asia programme can be found on the SWITCH-Asia website [www.switch-asia.eu](http://www.switch-asia.eu).

**METABUILD specifically targeted the metal industry supplying to the construction sector** across Bangladesh, Nepal and Sri Lanka. It aimed to introduce resource efficiency practices and technologies that lead to improved environmental quality and combat pollution.

The project target industries covered: steel rerolling mills, foundries (ferrous and non-ferrous), black smithy and light engineering products that are linked to the construction sector with products such as bars, roofing materials, gates, doors, grills, frames, bathroom fittings, electrical cables etc.

METABUILD has drawn on the expertise, experiences and exchanges of stakeholders engaged to support over 400 SMEs in the metal sector to become more resource efficient. This support has taken the form of direct industry support and awareness building amongst SMEs in the project countries, as well as wider stakeholder engagement through technology fairs, customer roundtables, policy dialogue and workshops on cleantech finance for financial institutions. Building on the achievements of the preceding ACIDLOOP project, METABUILD has successfully replicated the approach across three geographies, generating lessons learnt on RECP challenges and success factors along the way.

### Project Objectives



implement Resource Efficient Cleaner Production (RECP) measures in metal product SMEs



create a local pool of trained RECP consultants



engage different stakeholders to build a supportive framework for resource efficient SMEs

## Project Partners

The METABUILD project was implemented by a **project consortium comprised of organisations from the project countries (Bangladesh, Nepal and Sri Lanka) and international partner organisations from India, Germany and Austria** – each with specific expertise to contribute to the overall success of the project.

The project was led and coordinated by The Energy and Resources Institute (TERI) from India. STENUM Asia as the second Indian project partner, together with the Austrian partner

Austria Recycling, Verein zur Förderung von Recycling und Umweltschutz in Österreich (AREC) led the technical component of the project. The Dhaka Chamber of Commerce & Industry (DCCI) from Bangladesh, the Society for Environmental & Economic Development - Nepal (SEED-Nepal) from Nepal and the National Cleaner Production Centre (NCPC) from Sri Lanka carried out the on-the-ground implementation of the project in the respective countries. adelphi research gGmbH from Germany led the policy and finance components in the project.



**adelphi** is a leading independent think tank and public policy consultancy on climate, environment and development. adelphi offers demand-driven, tailor-made services for sustainable development. [www.adelphi.de/en](http://www.adelphi.de/en)



**AREC** has more than 20 years of experience in consulting SMEs in Europe and many parts of Asia on resource efficient cleaner production and sustainable consumer behaviour. [www.austriarecycling.at/en](http://www.austriarecycling.at/en)



**DCCI** is the largest and most vibrant business chamber in Bangladesh. The main objectives of DCCI are to promote private sector enterprises and businesses with advocacy, awareness and policy inputs to government. [www.dhakachamber.com](http://www.dhakachamber.com)



**SEED - Nepal** promotes awareness and advocacy on environmental protection, resource efficiency and Occupational Health and Safety (OHS) issues to industrial organisations and implements RECP in industries. [www.seednepal.org](http://www.seednepal.org)



**NCPC Sri Lanka** was established in 2002 by UNIDO & the Ministry of Industry of Sri Lanka. NCPC Sri Lanka's service portfolio aims at strengthening sustainability efforts of governmental and private organisations. [www.ncpcsrilanka.org](http://www.ncpcsrilanka.org)



**STENUM Asia** is a training and consultancy organisation registered in India since 2007. It has extensive experience in promoting resource efficient cleaner production in various sectors across Asia. [www.stenum-asia.org](http://www.stenum-asia.org)



**TERI** is a not-for-profit research organisation working on all dimensions of sustainable development to find solutions to global problems in the fields of energy, environment and current patterns of development. [www.teriin.org](http://www.teriin.org)

## Country Brief

Economic and population growth in South Asia has led to booming construction and manufacturing sector. Steel and other metals are a key, yet resource-intensive component of construction. There is a significant opportunity to improve the environmental and economic performance of industries by adopting RECP measures in the metal sector.

**In South Asia, SMEs comprise a significant portion of the economy, including the manufacturing and construction sector.** SMEs in Bangladesh account for 45% of value addition in the manufacturing sector, 80% of industrial employment, and 75-80% of export earnings (Bangladesh Government 2017). The industrial sector – mostly comprised of SMEs – contributes 31% of GDP. In Nepal, SMEs constitute about 80% of industrial employment, 70% of the total national export, and around 25% of the country's GDP (ESCAP 2017). Likewise, in Sri Lanka, SMEs are considered the backbone of the economy, contributing to 52% of GDP and 45% of employment (MIC 2018).

Despite their significance to economic development in these countries, many SMEs have low financial and technical capacities, leading to inefficient and resource-intensive production – especially in terms of water and energy use – and non-competitiveness in the building and construction sector. Hazardous wastes are often generated and there is scope for improving working environment.

All of this points to the need to target SMEs for implementing RECP measures. SMEs present huge potential to decrease the energy, water and overall resource footprint of these emerging economies and at the same time can increase the countries' overall competitiveness in terms of resource efficiency standards and innovation.

The need to adopt sustainable practices is spearheaded by customer demand for high quality and low cost products, more stringent environmental standards and the costs incurred to meet these standards. So far, the focus of the industry in South Asia has been on competitiveness due to cheap and abundant labour, favourable exchange rates, low interest rates and concessional duty structure. However, due to increasing pressure on resources like water, energy etc., it is becoming clear that the economic edge of the region can be sustained only by ensuring high resource efficiency.

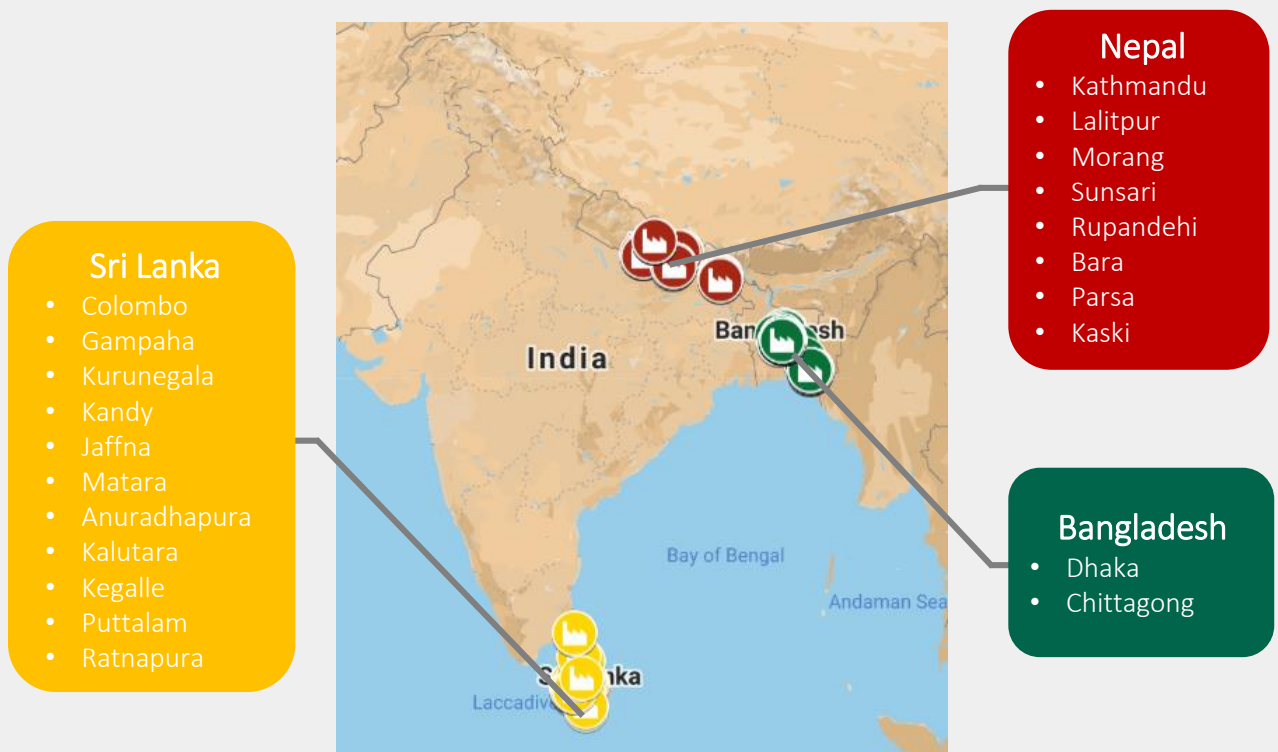
The readiness for a comprehensive RECP framework varies between the three project countries, where various governmental institutions and local and multilateral organisations are involved in RECP.

### Bangladesh



With continuously high GDP growth rates between six and eight percent, a rocketing energy demand and as the most densely populated territorial state in the world, resource efficiency is of vital importance for Bangladesh's economic and social welfare in the upcoming years.

As per ADB's Bangladesh Industrial Energy Efficiency Finance Program study (ADB 2011), the metal and iron sector in Bangladesh has very high potential for energy savings. For instance, gas consumption can be reduced by 30% in rerolling mills by burner nozzle modification. Light engineering and metalworking are among the 11 booster sectors consisting of 31 clusters. Building-related products from this sector are door and window grills, door and window frames, gates, other small components for construction. There are around 150 re-rolling mills with a total average output of 2.4 million t/year that mainly supply structural steel to the construction industry.



## Nepal



Although Nepal is still recovering from a devastating earthquake in 2015, the metal industry is on a steady rise as construction and especially reconstruction have led to a rising demand for metal products with many construction projects still lying ahead.

The Ministry of Industry, Commerce and Supplies, the Ministry of Forest and Environment and the Ministry of Labour together with the Nepalese Planning Commission (NPC) represent the most relevant actors in the field of RECP at the national level.

In Nepal, iron and steel products are major export goods. Products identified for export by the Nepal Trade Integration Strategy (NTIS) include galvanized iron (GI) sheets, pipes and rolled iron bars (GIZ 2017). Due to Nepal's infrastructure development trajectory, domestic demand for metal products is also increasing. Based on a 2012 study by GIZ, there is a significant potential for energy savings in this sector.

## Sri Lanka

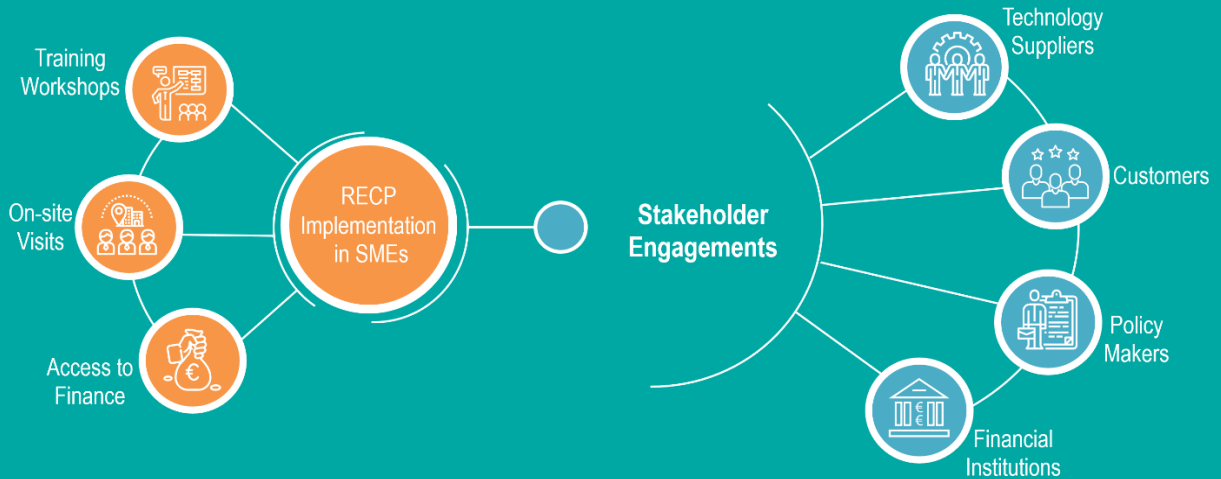


Sri Lanka's building and construction sector is booming. According to the National Development Bank Securities (NDBS) data, in 2014 the construction industry accounted for 9.6% of Sri Lanka's GDP, which represented a significantly greater proportion of the economy than most other countries in Asia. The metal industry in Sri Lanka faces increasing pressure on energy, material and water resources as they become scarcer and thus more expensive. One of the key challenges that the industry faces is the high costs of production due to increasing prices of the above resources. This often results in a lack of competitiveness in the regional and international market.

Sri Lanka is trying to attract more foreign investment in the steel industry given the expected growth in construction.

## Project Approach

The METABUILD project targeted metal product SMEs, industry associations, financial institutions, policy-makers as well as large customers in Bangladesh, Nepal and Sri Lanka to encourage RECP in the metal supply chain of building and construction sector. Thus, METABUILD drew on multiple partners and international and local expertise and was implemented along three project dimensions:



### ➤ Direct Industry Support

The first set of activities of the project was steered towards direct industry support provided to companies through capacity building measures, direct consultation, cluster trainings, and guidance through the process of implementing concrete RECP measures. This comprised close collaboration, capacity building and handholding for industries taking part in project activities as well as training for national consultants responsible for on-site visits and the development of training materials.

### ➤ Stakeholder Engagement

This activity area was based on the underlying assumption that industries cannot manage the transition to RECP practices alone, but also require support from other actors, including environmental authorities and policy makers, technology suppliers, customers, and financial institutions. Specific activities in this component were conceptualised and implemented to target key stakeholder groups individually – for example through customer roundtables, technology fairs, policy dialogue and financial sector engagement - in order to create a comprehensive support framework for RECP optimisation of metal industries.

### ➤ Project Support

Finally, managing a multi-country, multi-stakeholder project required project support measures to facilitate and optimise the direct support delivered to SMEs and wider stakeholder engagement. Here, lessons learnt and key success factors for effective and efficient project management were derived from internal project management, balancing the activities and stakeholders involved, as well as reporting and continuous internal learning of project team members.

### 3. Resource Efficient Cleaner Production

The inefficient and at times wasteful use of natural resources, including energy, water and materials, is a key challenge for environmentally sustainable development. Recognising this, the Resource Efficient Cleaner Production (RECP) approach applies enterprise-wide preventive environmental strategies to processes, products and services in order to increase efficiency and reduce risks to humans and the environment.

An RECP-anchored sustainability approach is a cost-effective business strategy, particularly for SMEs. RECP starts by improving current processes, preferably by using existing technologies instead of advising an SME to make high value capital investments. **The main benefits from RECP based interventions are reduced resource consumption and lower generation of waste.**

Both benefits have potential to drive down operating costs for the SME. **The payback period for RECP interventions are usually well below one year, hence more feasible for small and medium enterprises.** Further RECP approaches can be scaled up to cover a wider scope of processes or materials and incorporate higher costs for process improvements, as the SME develops and progresses on its sustainability journey.

#### The METABUILD Approach to RECP

The METABUILD approach to RECP evolved over several years of experience with RECP adoption by SMEs. This evolution has benefited from a sharper and deeper understanding of the expectations and capacity constraints of SMEs.



The figure illustrates the METABUILD approach, while also highlighting the documentation that supports this approach.

The METABUILD approach to RECP starts by demonstrating early on to SMEs the tangible value of involvement in the process; implementing a few “easy” options rather than waiting for a comprehensive assessment or selecting all RECP opportunities for implementation. This selection of measures is done in close consultation with the SME management team as well as operational staff to generate a sense of ownership.

Under this approach, gaining trust and building capacities within the SME are the initial objectives of RECP consultants. METABUILD consultants ensured confidentiality throughout the process and with regard to the usage of data of SMEs.

Coaching and hand-holding for implementation is provided throughout the implementation process. Rather than simply prescribing an improvement measure, METABUILD consultants trained the teams within the SME to first understand the underlying technical issues. Active monitoring of the progress, and the provision of additional guidance if needed, is a vital part of the METABUILD approach. Creating simple showcases early on in the engagement allows SMEs to visualise tangible benefits, however small, while also articulating the business case through a simple payback calculation. Such showcases can then be distributed (with permission of the SME) to other SMEs to motivate and to cross-pollinate ideas for implementation. Once the initial round of “easy” options are implemented, the next round of opportunities for deeper and potentially high cost interventions are attempted.

“

Through this project we have been able to successfully demonstrate that RECP oriented efforts, when guided by experts, bring about positive change within SMEs. It is heartening to note that the business case for RECP interventions has once again been established while abating environmental issues.

”



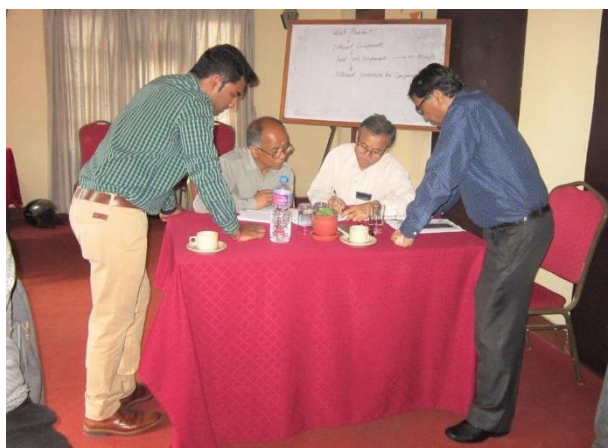
**Mr. Rajat Batra**  
CEO, STENUM ASIA, India

## 4. Capacity Building of Local Consultants

This activity was aimed at creating a pool of local RECP consultants in the region who could implement RECP measures and help SMEs access (green) finance independently even after the project's closure. In order to ensure sustainability of the project in Bangladesh, Nepal and Sri Lanka, it was essential to have a team of local RECP experts. The baseline for RECP experts in the countries varied. In Nepal and Sri Lanka, the partner organisations had been working in the field of RECP in the past and had some experienced staff. Conversely, in Bangladesh no RECP staff was available in the partner organization. Despite varying levels of familiarity with and expertise in RECP, team members had to be hired in all countries to be trained on the METABUILD approach for implementing RECP in companies and to ensure high quality implementation of tasks in line with the project objectives.

A “Training of Trainers” (ToT) programme was designed for the local teams, to ensure a uniform understanding of the requirements and the underlying approach. In the first ToT organised in each project country, the **focus was on methods to mobilise industries and how to deal with client industries, the basics of RECP, and how to use implementation and monitoring methods.** The design of the ToT materials focused on easy-to-understand content and the hands-on involvement of ToT participants through exercises and case studies.

The second ToT that was organized as a joint event in India for all country teams **focused on in-depth knowledge of RECP, application of RECP tools including an**



impact calculation tool, material flow analysis, specific guidelines and checklists for consulting work, presentation of findings, selection of options, and how to motivate and coach companies for RECP implementation.

Later on, a series of refresher ToTs took place to discuss problems with the consulting work and implementation of RECP measures in industries, and to showcase best practice cases of successful RECP consulting. Additionally, **experience exchange events (online and onsite) were conducted to enable cross-country learnings** between the teams in all three countries.

Beyond the technical trainings, a series of management and finance workshops was conducted to build the capacities of local

consultants on how to green the supply chains and on how to support industries in accessing finance to implement high cost RECP measures.

The trainings and meetings adopted the Whole Person Process Facilitation (WPPF) methodology of the Genuine Contact™ approach. This meeting method is highly participatory, effective and produces tangible results. WPPF allows participants to connect easily with one another as well as with the topic at hand. When using WPPF methodology, the level of trust is elevated and an open atmosphere is created that enhances participation, accountability and responsibility as well as allows difficult issues to be addressed. It is simultaneously a facilitation method and a container for a variety of tools and processes.



## 5. Direct Industry Support



In the direct industry support component of the METABUILD project, industry mobilisation has been the central first step in each target country to on-board industries to participate in the METABUILD project. To support mobilisation, convincing marketing materials were developed. Mobilisation events were conducted for industries in cooperation with industry associations and clusters. Once the pioneering companies were on-boarded by the country partners, the RECP measures were implemented based on the suggestions of international experts following initial onsite RECP assessments. The results of implemented measures were compiled as best practice examples and utilised to convince other industries to participate in the project.



To support the implementation of RECP approach and measures, it was necessary for workers and employees in the companies to gain an understanding of RECP. The local project team with international experts conducted hands-on, in-house RECP trainings to build the capacities of industry workers on RECP measures. This resulted in industry workers' independent development of RECP measures. These trainings were conducted in a mix of English and local languages.



This process ensured that RECP was followed up across industries by management as well as at the shop floor-level, thus multiplying the results by producing further savings in resources and money.

## Key Results

The 403 participating SMEs were sensitised on RECP and over 3600 RECP measures were implemented based on the recommendations given by the project teams. Many of these measures were “low” or “no” cost in terms of financial investments and led to considerable monetary savings. These measures targeted energy use, water use, material use and waste generation. The energy saved contributed directly to reductions in CO<sub>2</sub> emissions.

To create an enabling environment for assessing participating SMEs and supporting RECP implementation, first, a team of consultants was locally selected and trained. Teams of local consultants and international experts then supported SMEs to interconnect with technology suppliers and financial institutions to implement some of the more expensive measures.







The information below is based on project results as of 31 December 2019.



## Country Achievements

Energy saving measures were implemented in all three countries and the kWh savings per annum are comparable. In terms of water saved, the amounts differed for the three countries. SMEs in Nepal that regularly faced issues with water availability implemented many relevant measures in line with the industrial imperative of water conservation across the country, whereas in Bangladesh, where water availability is not a major issue, showed lower levels of water savings per annum. The opportunity for waste minimization was tapped most notably in Nepal which also experienced high material savings – where the significant material loss due to poor handling/storage of material was taking place in SMEs prior to the project intervention. In Bangladesh, some high impact measures were initiated later in the project and, hence, could not be completed within the project lifecycle. These measures included process layout changes to avoid cooling then reheating steel billets and the installation of more efficient furnaces, which have the potential for significant energy demand reduction while simultaneously increasing output. The estimated savings from such measures would measurably enhance the figures for Bangladeshi SMEs.

The information below is based on results until 31 December 2019.

	BANGLADESH	NEPAL	SRI LANKA
 SMEs involved in the project	240	82	81
 Kilowatt hours energy saved per annum	8,995,413	14,997,753	9,960,651
 Litres of water saved per annum	292,600	40,785,500	7,900,040
 Kilograms of waste minimised per annum	58,121	494,945	147,370
 Kilograms of material saved per annum	262,132	1,563,539	2,609,110
 Monetary savings in Euros per annum	938,514	1,556,267	449,094

## Technology Interventions

Many SMEs had limited or no awareness on resource use optimisation prior to participating in the METABUILD project. Hence a wide range of process optimisation and technology interventions was implemented across various processes in the three project countries.

The most common RECP measures were:

### Lighting optimisation



- Increased use of daylight through polycarbonate roofing sheets
- Increased use of efficient lights fixtures such as LED

### Compressed air optimisation



- Reduced leaks in compressed air systems
- Reduced pressure for generation of compressed air
- Reduced demand for compressed air in the processes

### Heating energy optimisation



- Improved insulation on furnaces or other heating systems/process equipment
- Installed temperature control systems to avoid unnecessary heating
- Executed combustion parameter control based on flue gas analysis
- Recovered waste heat through recuperators

### Electrical power optimisation



- Corrected power factor through capacitor panels
- Reduced motor losses through belt tension, motor sizing, lighter fan blades, improved bearings and use of efficient motors

### Material loss reduction



- Avoided spillage (materials such as paint, powder, water and chemicals) and practised internal reuse of collected material
- Cascaded water in rinsing processes
- Avoided rejection through innovative process changes and improved storage of raw materials

Case Studies from Bangladesh



Electricity savings through compressed air leakage reduction

**Location:** Galco Steel (BD) Ltd., Dhaka, Bangladesh

**Process:** Sheet metal manufacturing

BEFORE



- \* Air leakages were observed in various machines.
- \* Air compressor operated on load for 5 minutes and was off load for only 5 minutes.

AFTER



- \* Company repaired leaking pipelines, joints and also replaced some defective pneumatic valves.
- \* Air compressor unloading time has now increased to 14 minutes, saving energy.

Electricity saved: 31,000 kWh per annum

Cost: € 110

Annual savings: € 2,730

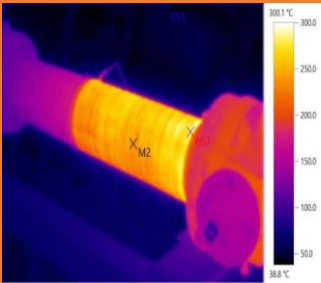
Payback period: Less than 1 month

Electricity savings through improved monitoring

**Location:** Cable manufacturing industry, Dhaka, Bangladesh

**Process:** Co-extrusion

BEFORE



- \* The temperature of the extruder machine was not controlled, leading to heat loss.
- \* To make up for heat loss, heater stayed on for more time, leading to high electricity consumption.

AFTER



- \* A temperature monitoring system with thermocouples on heaters was installed which regulates the temperature and avoids overheating.
- \* This has reduced heat losses and specific electricity consumption.

Electricity saved: 675 kWh per annum

Cost: € 27

Annual savings: € 66

Payback period: 5 months

Installation of mechanical descaling

**Location:** Hulas Wire Industries Ltd., Tankisinwari, Nepal

**Process:** Pickling

BEFORE



Mild steel (MS) wire (both high carbon and low carbon) used for production of GI wire was being treated with hydrochloric acid (HCl) in pickling process for descaling. The total annual consumption of HCl was 848,642 litre.

AFTER



Mechanical descaling process instead of pickling process is now used for low carbon steel. This has significantly reduced the consumption of HCl to 615,673 litre only.

Acid saved: 232,969 litre per annum

Cost: € 80

Annual savings: € 22,500

Payback period: Less than 1 month

VFD installation in the motors

**Location:** Premier Wires Pvt. Ltd ., Tankisinwari, Nepal

**Process:** Galvanising

BEFORE



Output speed from several motors was varied using pulleys, in order to meet the process requirements.

AFTER



Output speed of 44 nos. of motors is now controlled through variable frequency drives (VFD). This improves productivity (as VFD setting change is faster and easier than changing pulleys) and significantly reduces the energy used at lower speeds of operation.

Electricity saved: 1,406,178 kWh per annum

Cost: € 88,540

Annual savings: € 113,185

Payback period: 9 months

Case Studies from Sri Lanka



Replacing bearings in the quenching motor

**Location:** Moscow Lanka Steel, Polgasowita, Sri Lanka

**Process:** Quenching

BEFORE



- \* Fibre bearings were used in rolls driven by a 600 kW motor.
- \* The fibre bearings got worn out and thus needed to be replaced every other week to ensure smooth operation.

AFTER

- \* Ball bearings were introduced in rolls instead of fibre based bearings thereby reducing the electrical load by ~50% .
- \* Although ball bearings are expensive compared to fibre bearings, the operational period per set was much higher (~3 months) making it more cost effective compared to the fibre bearings.

Electricity saved: 497,700 kWh per annum

Cost: € 4,580

Annual savings: € 27,850

Payback period: 2 months

Rain water harvesting

**Location:** Lanka Special Steel, Sapugaskanda, Sri Lanka

**Process:** Rinsing bath

BEFORE

Rain water was not utilized. The roof top gutters were directed into ground.

AFTER



- \* Rooftop gutters are now directed to a 25 m<sup>3</sup> unutilized tank, that was already available, to store rain water.
- \* Rainwater is collected from the roof area of 2420 m<sup>2</sup> where annual rainfall is around 1250 mm.
- \* The collected water is utilized directly in the production floor.

Water saved: 2,904 m<sup>3</sup> per annum

Cost: € 30

Annual savings: € 1,330

Payback period: Less than 1 month

## Case Studies Related to Housekeeping

**Industry:** Screw and bolt manufacturing, Dhaka, Bangladesh



Specific tools hangers are now used for orderly storage, leading to reduced search time and cleaner work environment.

**Industry:** Fabrication industry, Kaski, Nepal



Workers have been provided with separate changing rooms, individual lockers and first aid treatment facility.

**Industry:** Steel industry, Athurugiriya, Sri Lanka

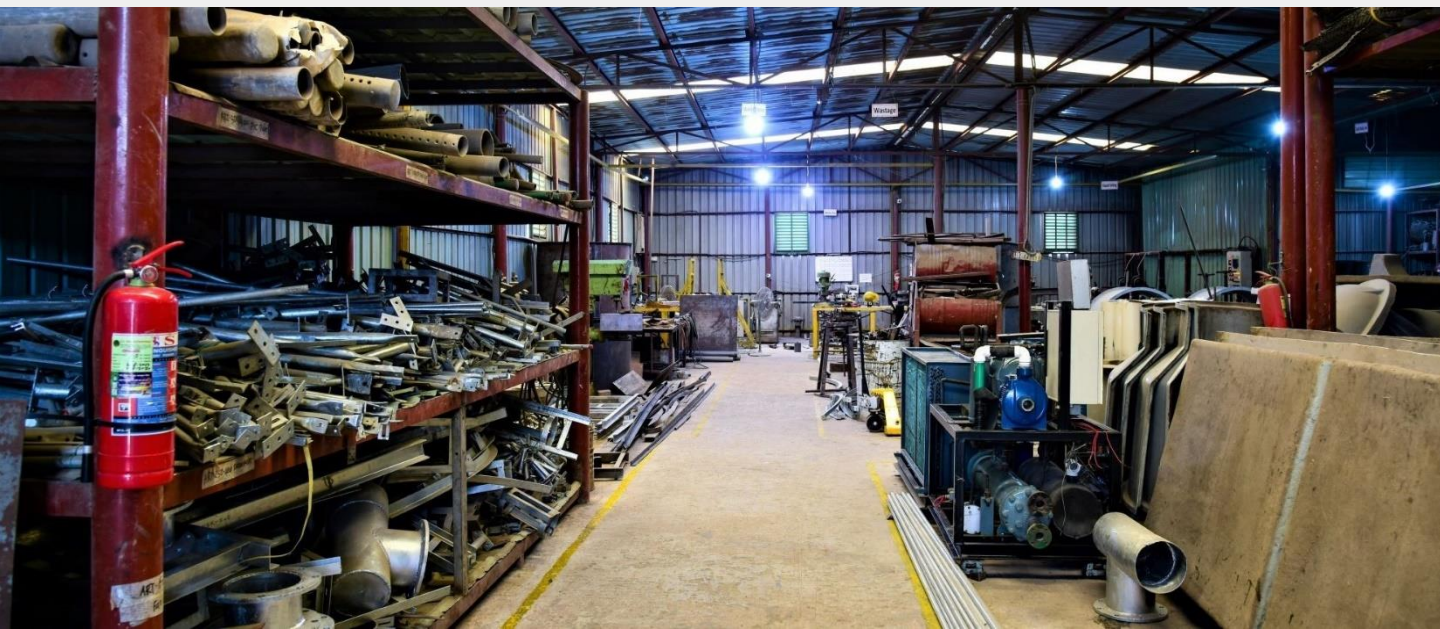


Cleaning of AC filters and condenser fins is done and a regular maintenance schedule has been set up to ensure optimal performance.

Improved housekeeping and interventions such as better insulation of heated surfaces, lesser duration of compressor operation, avoiding leaks etc. has led to improved working conditions in terms of noise level, lighting and thermal comfort. This has also resulted in enhanced productivity as recorded in the working conditions survey and company testimonials.

For more showcases on RECP measures implementation in Bangladesh, Nepal and Sri Lanka, please visit our METABUILD project website:

<https://metabuild-southasia.org/resource-centre/showcases>



## 6. Cleantech Finance

Beyond direct industry support to implement RECP measures and capacity building for local RECP consultants, METABUILD engaged with a wider group of stakeholders to build a supportive framework for SME action. One facet of this stakeholder support entailed a specific focus on financial institutions.

Including financial institutions as a target group in the project besides metal industries was key in order to support the development of a comprehensive framework around cleantech finance, in particular in terms of the provision of customised and affordable financial product lines for RECP enhancement of SMEs.

The three project countries show different levels of cleantech finance readiness in terms of the variety of financial products in the market, the institutional set-up of the financial market and SMEs' investment readiness.

### Bangladesh

In spite of a lack of a clear policy framework, cleantech finance as such has been on the rise in Bangladesh during recent years, mostly focused on renewable energy and energy efficiency. Some of the most active international donors are the World Bank, the Asian Development Bank, the Global Environment Facility (GEF) and the German development bank Kreditanstalt für Wiederaufbau (KfW), the latter issuing a low-interest loan of €156 million to the Bangladesh government in 2019 to strengthen the overall energy efficiency in the country (PV Magazine 2019).

Given that the private sector is generally hesitant to invest in cleantech, the Bangladesh government itself acts as an important financier, most prominently through its two state-owned funds, the **Bangladesh Climate Change Trust Fund (BCCTF)** and the **Bangladesh Climate Change Resilience Fund (BCCRF)** (World Bank 2012). Both of these funds have proven to be amongst the most important national sources of cleantech funding.



**Cleantech finance**, also often referred to as energy-efficiency (EE) finance, sustainable consumption and production (SCP) finance or RECP finance, plays a pivotal role to enable SMEs to implement measures to unlock their potential for resource efficiency and cleaner production. Essentially, the term cleantech

finance comprises all financial products, most commonly grants or loans, which specifically aim at equipping businesses with the financial resources to reduce the amount of primary resources, water and energy used in their production processes. Usually, this requires purchasing specific technologies, restructuring working processes and developing capacities amongst employees. The costs connected to such measures can be substantial, especially for smaller enterprises with limited funds.

## Nepal

In 2009, a private sector initiative constituted the Energy Efficiency Centre (EEC), which functions as a networking and capacity building platform on energy efficiency in different sectors across Nepal.

Some large donor organisations provide funding opportunities through grant schemes, including the International Energy Agency (IEA), the World Bank, the International Finance Corporation (IFC), the Climate Technology Initiative – Private Financing Advisory Network (CTI-PFAN) and KfW. From the side of private financial institutions, there exist only very few financing schemes for cleantech enhancement in Nepal (Karki 2016).

Despite the efforts around resource efficiency, the discussions amongst international donors about green finance in Nepal mainly circle around the topic of access to (renewable) energy, as this remains an issue especially in rural and remote regions of the country. Accordingly, the World Bank issued two grants with a total of \$7.6 m especially to support off-grid renewable energy projects in Nepal (World Bank 2019).

## Sri Lanka

During recent years, the Sri Lankan financial sector has increasingly picked up initiatives to build green finance portfolios. In 2015, 18 commercial banks signed a joint Sustainable Banking Principles (SBPs) to link their banking activities to the Sustainable Development Goals (Sri Lanka Banks' Association 2020).

In 2019, the Central Bank launched a "Roadmap for Sustainable Finance" to foster financing for climate change resilience projects in Sri Lanka, including energy and resource efficiency (Central Bank of Sri Lanka 2019). Its goal is to scale up contributions from the financial sector towards green growth in Sri Lanka. Apart from infrastructure projects, this entails financing SMEs' efforts to increase climate-resilience in their production processes.

Some of the major organisations that provide funding opportunities through grant schemes, including the Asian Development Bank, the International Finance Corporation and a few Sri Lankan ministries such as the National Ministry of Mahaweli Development and Environment and the Ministry of Industry and Commerce.

## Support in Access to Finance

It is not only the financial sector that is facing challenges around RECP. Despite their role as a backbone for the economic development in the markets relevant to METABUILD, SMEs have issues in obtaining cleantech finance to improve their resource efficiency, working standards and overall sustainability. This blocks them from realising promising competitive advantages within and beyond their markets. Amongst the most prevalent challenges across the three project countries are:

- High interest rates and collaterals for loans due to financial institutions' uncertainty on SME's default risk
- Limited technical skills and financial literacy within SMEs to cope with complex loan application forms
- Limited variety of available loans and grants, especially for waste and water efficiency.

Over the course of this project, we have **facilitated access-to-finance support for 133 SMEs in the metal sector. Around 25% of these SMEs already received financing** which they can use to enhance RECP in their production processes.



### Cleantech Financial Product Prototyping

In the course of METABUILD, financial institutions have been provided with a toolkit to conceptualise, refine and implement product prototypes directed towards cleantech finance in their respective country contexts.

The prototyping toolkit consists of different systemic phases, altogether covering aspects such as strategic external and internal analysis, prioritizing product development opportunities, deriving value propositions, conducting innovation readiness assessments and ultimately developing product prototypes and establishing a managerial plan for embedding them in the local market as well as in the own institutional setting of the financial institution.

In Bangladesh, subsequent to these trainings, NRB (Non-Resident Bangladeshis) Bank as well as Jamuna Bank are currently further carving out their cleantech finance profile based on the prototyping training they received.

In Nepal, Rastriya Banijya Bank Limited (RBBL) is developing a financial product to distribute energy-efficiency credit lines to SMEs, supported by funding through KfW (Energy Efficiency Nepal 2020).

In Sri Lanka the National Development Bank is developing a cleantech financial product with additional funding from the Green Climate Fund (GCF), while the Nations Trust Bank developed a green mortgage product line for the Sri Lankan market.

“ This particular workshop helped us to have a structured methodology, from identifying the opportunities out there to how we can internally work with different teams to come up with cleantech financial products. We feel that there is a potential for all commercial banks to come up with cleantech financial products through this prototyping approach. ”



**Mr. Adheesha Perera**

*Sustainability Manager, Nations Trust Bank, Sri Lanka*

# 7. Dialogues and Roundtables

## Customer Roundtables

With the aim to sensitise large customers on RECP and greening their supply chains, under this project, customer roundtables have been successfully organised in all the three project countries. These events brought together different stakeholders that are linked with metal industries in the building and construction sector, including businessmen, associations, SMEs, technical consultants, product salespersons and construction companies. The events were conducted with the objective to facilitate dialogues on improved metal component production processes with a strong focus on environmentally sustainable supply chains.



As an outcome of these customer roundtables, over 200 stakeholders from different organisations have been trained on the 'Green Supply Chain Toolkit'.

Participants gained knowledge on supply chain tools and their benefits. By working on case studies, participants were able to identify the supply side problems and the development of effective solutions to these problems. As the event brought together different stakeholders from the sector, the participants got the chance to interact and to build networks and partnerships.

## Policy Dialogue

Policy makers were another key stakeholder group targeted in the METABUILD approach to strengthen RECP. A comprehensive policy framework around RECP is required in order to establish and enforce clear-cut regulations on resource, water and energy efficiency, to embed and orchestrate various existing initiatives around RECP and to create awareness for the issue of sustainable production processes and for the regulatory, financial and societal requirements to foster RECP.

The status quo of RECP policies from the three countries has been assessed prior to developing formats to enhance RECP policymaking.

### Bangladesh

Apart from relevant ministries, such as the Ministry of Industries, the Ministry of Power, Energy and Mineral Resources and the Ministry of Commerce, it is especially the Sustainable and Renewable Energy Authority (SREDA), who is championing RECP within the country (SREDA 2015).

There is a certain number of sector-specific regulatory policies and voluntary strategies like the 3R Strategy (2010), however, there are no direct policies to specifically promote cleaner



production, resource efficiency or energy efficiency specifically with regard to the metal industry.

Under the so-called Energy Efficiency and Conservation Master Plan (EECMP) of SREDA, three energy efficiency programmes will be promoted, namely, the Energy Management Program, the EE Labelling Programme and the EE Buildings Program. Financial incentives such as low-interest loans, subsidies and preferential taxes will be provided to decrease the initial costs to end users who purchase high energy efficient appliances and industrial equipment (Government of Bangladesh 2017). With regard to the implementation of RECP and energy efficiency policies, the government pursues the goal of a self-reliant RECP/EE&C society by 2030, through various incentive mechanisms. Local governments take responsibility to administer the new version of the Bangladesh National Building Code (BNBC) and the Green Building Guideline (GBG) as well as RECP activities in projects and own procurement.

## Nepal

The Ministry of Industry, Commerce and Supplies, the Ministry of Forest and Environment and the Ministry of Labour together with the Nepalese Planning Commission (NPC) represent the most relevant actors in the field of RECP on a national level.

In 1997, the Nepalese government issued an Environmental Protection Act that requires



industries depending on size and type of sector to undergo mandatory Initial Environment Examinations (IEE) and Environment Impact Assessments (EIA) (Government of Nepal 1997). In recent years, some policies have been introduced addressing electricity efficiency, such as the National Energy Efficiency Strategy. However, there exists no comprehensive policy framework around RECP.

## Sri Lanka

Specifically addressing the issue of RECP, the Ministry of Environment jointly with the country's National Cleaner Production Centre (NCPC) developed a National Cleaner Production Policy and Strategy (NCPPS) in 2005 (MoE 2005). This policy marks a paradigm shift in mainstreaming RECP in Sri Lanka as it envisages the incorporation of clean production concepts and practices in all sectors.



While the NCPPS serves as an umbrella policy on cleaner production, sectoral cleaner production policies and strategies were subsequently developed. Here, the main responsibility lies with the National Steering Committee on Cleaner Production Policy and Strategy. The committee is led by the Ministry of Environment and includes representatives of other ministries and government agencies. Until today, sectoral RECP strategies exist for the health sector, the tourism sector, the fisheries sector and the agriculture sector.

In addition, Sri Lanka has issued a National Solid Waste Management Policy in 2008 that explicitly aims at maximising resource recovery and minimising waste disposal (Government of Sri Lanka 2019). This policy is currently being revised and will be supplemented by the “National Waste Management Policy”. As of now, the responsibility for solid waste management lies mainly with local government agencies. Moreover, the Ministry of Environment is currently drafting an overarching national policy for sustainable consumption and production (MoE 2018).

Despite a growing body of policies around RECP, Sri Lanka is still facing some challenges. One of these challenges is prevailing inconsistencies within RECP policies from different government institutions. Another crucial challenge is a need to more rigorously enforce and monitor the policies in place.

### Regional Policy Dialogue

As part of our policy advocacy activities embedded in the METABUILD project, we held

the METABUILD Regional Policy Dialogue in New Delhi, India in November 2019. This three-day event provided an opportunity to facilitate exchange between policymakers, practitioners, sector experts and development experts from Bangladesh, Nepal, Sri Lanka and India. It resulted in designing and discussing innovative policy prototype instruments that promote RECP in these countries. Indian experts showcased best practices based on successful RECP policy schemes from India.

During the Policy Prototyping Lab, we facilitated access to up-to-date, sector-specific insights into challenges and success factors for RECP policymaking and assisted participants to design step-by-step policy prototypes relevant to their country-contexts. The prototyping process was facilitated by hands-on and collaborative prototyping tools, context-specific insights and an emphasis on partnership building. Subsequent feedback from peers and experts has helped in refining the designed prototypes.

“This 3-day interactive workshop was very insightful, as it brought in the learnings from other South Asian countries who face almost similar challenges when it comes to policy formulation. This step-by-step prototyping of potential solutions approach has helped in brainstorming on every aspect of policy design and implementation.”



**Mr. Rishi Raj Koirala**

*Former Joint Secretary, Environment & Technology Division,  
Ministry of Industry, Nepal*

For a more detailed analysis of the current RECP policy landscape in Bangladesh, Nepal and Sri Lanka, please access the METABUILD RECP Country Policy Briefs: <https://metabuild-southasia.org/resource-centre/reports>

The prototypes developed during the METABUILD Policy Dialogue tackle significant challenges in the realm of RECP policy making in the project countries of Bangladesh, Nepal and Sri Lanka. Moreover, they shine a light on the areas where RECP policy making should generally draw on, namely creating awareness for the issue amongst industries but also amongst government bodies, securing a thorough implementation and enforcing already existing policies and standards. The goal is to provide both incentives and advisory to help industries overcome the barriers towards increased resource and energy efficiency.

When assessing the prototypes and their underlying challenges it becomes obvious that these prototyped policy solutions are not exclusively relevant for the METABUILD project countries. On the contrary, these solutions could help to foster RECP across South Asia in general and go beyond the present geographical as well as sectoral context.

## Clean Technology Fairs

Clean Technology Fairs were held in each country to expose SMEs and their associations to different types of RECP technologies available for implementation. The fairs also provided an opportunity for the technology suppliers to explore the market among SMEs for their products. Technical sessions in the fairs further elaborated on RECP technologies and their applications in SMEs. Links with technology suppliers were also created through the options for specific implementation measures that were provided to the SMEs as part of the report prepared for implementation support (Detailed Action List). All these interventions played a key role in the SMEs being able to procure the required technologies for implementing the suggested measures and realising savings in resources and money.



## 8. Sustainability of the Action and Outlook

The project has, through different means, created resources for sustainability. Amongst the locally trained consultants, there still exists a core team in each location that can build upon the project achievements. The templates, training materials, showcases, technical reference materials and measuring instruments are available to support ongoing activities. Furthermore, the links created with technology suppliers and financing institutions can be taken forward for similar actions in other sectors. However, one of the challenges will be to mobilise funding for such activities. SMEs themselves are typically reluctant to pay for such services. Therefore, options such as other third party funding, linking with complementary services such as certification and involving large companies interested in greening their supply chain need to be explored.

RECP is one of the core activities of NCPC Sri Lanka and they also have excellent links with national industry associations, financial institutions and government agencies. Therefore the learnings from METABUILD and the approach will continue to be used in their future RECP consulting activities. The methodology used in the METABUILD project, which involved starting with simple options and

providing support until results were obtained and quantified, was new to NCPC Sri Lanka; this approach is expected to appeal to industries and open potential new opportunities.

SEED-Nepal's core work also covers RECP and they are actively looking for future funding for similar activities. To create new opportunities, they are considering various options. These include different packaged services, expanding the scope of work to cover aspects such as Corporate Social Responsibility (CSR) and certification, forming strategic partnerships with other agencies, offering services linked to mandatory environmental requirements and using existing equipment for monitoring services.

In the case of Bangladesh, RECP consulting is a new activity for DCCI and presently, the organisation is unclear on whether to take it forward. However, the local consultants are keen to continue with RECP consulting and are exploring opportunities through the Sustainable and Renewable Energy Development Authority (SREDA) and other industry associations. In this context, the team has plans to take the Energy Auditors Certificate exam being offered by SREDA.

“In all three countries, the project is leaving behind trained teams, methodology, templates, showcases and new networks with different stakeholders. The EU and Indian partners who initiated this approach with the ACIDLOOP project in India and refined it in METABUILD will now be replicating & scaling the approach with added elements in the REAP project in Central Asia.”



**Dr. Malini Balakrishnan**

*Senior Fellow, TERI, India*

## 9. Lessons Learnt

The objective of scaling a successful project approach developed by ACIDLOOP into three additional countries in METABUILD has increased knowledge, unveiled new effective practices and presented challenges that have been addressed efficiently as a project team with regard to all core project components: direct industry support, stakeholder engagement and project support.

### Success factors of direct industry support

- Mixing of standardised and tailored tools for Trainings of Trainers (ToTs) to local consultants in order to harness both standardisation in RECP and local expertise in all countries.
- Identifying and leveraging pioneer companies in the initial months to create and showcase evidence of RECP benefits and to mobilise other industries for the project.
- Providing technical support for implementation as well as informing industries about expected savings and returns in order to highlight the business case of successful RECP measures.
- Accessing member companies through local industry associations in order to maximise industry outreach for mobilising SMEs.
- Developing uniform methodologies for measuring project outcomes of RECP measures and compensating for variations in data availability.
- Extending trainings to cover both general as well as sector-specific RECP technologies gives a very comprehensive hands-on knowledge.

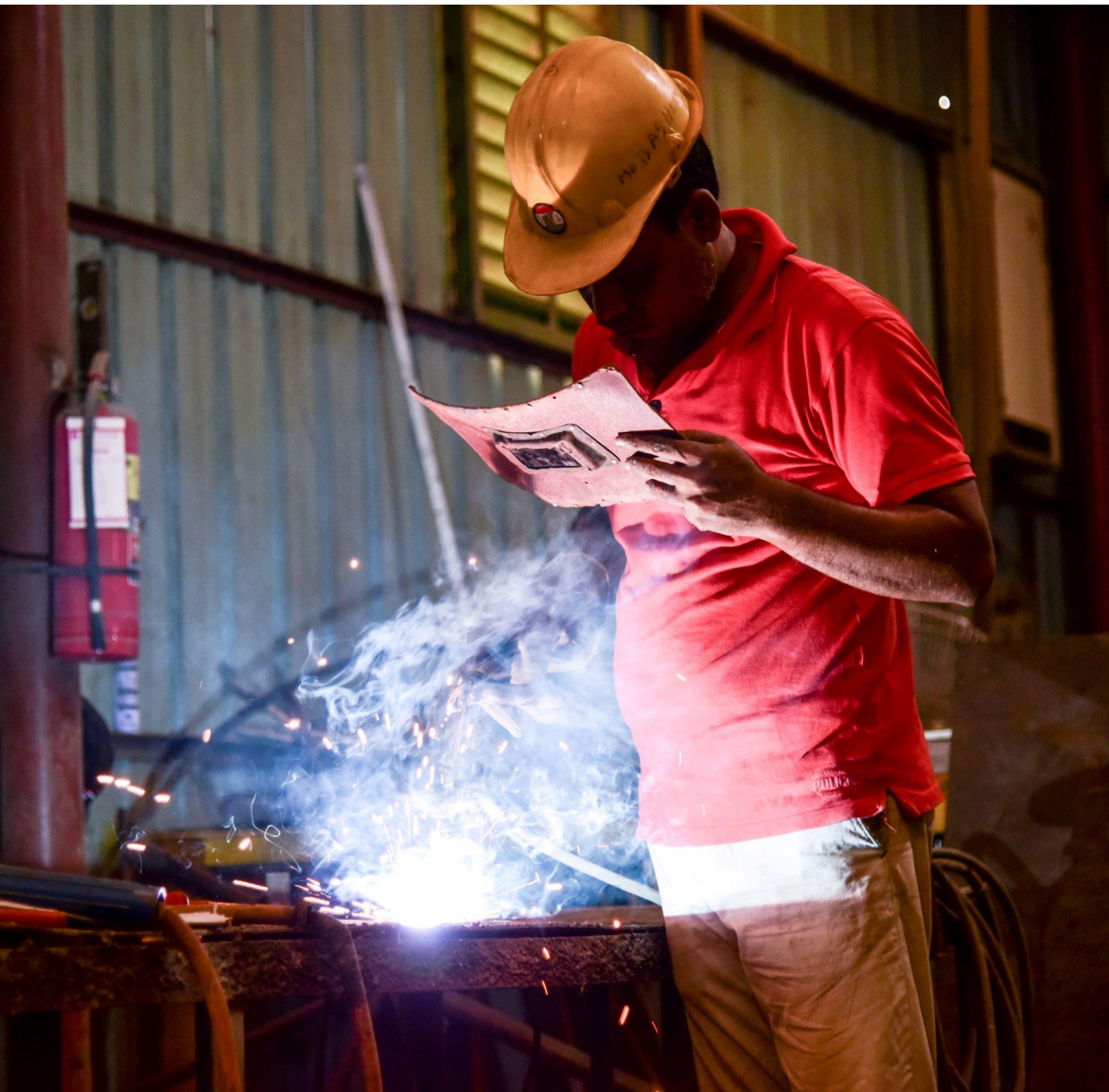
### Success factors of stakeholder engagement

- Linking stakeholder events to larger related events where possible to amplify networking opportunities, participant mobilisation and public awareness.
- Engaging with a wide range of stakeholders including current and potential customers and sensitising them to RECP measures in order to galvanise support throughout the sector.
- Encouraging cross-stakeholder engagement to foster reciprocal understanding of challenges and to track perceived opportunities and needs in order to smooth future cooperation between SMEs, policy makers and financial institutions.

### Success factors of project support initiatives

- Providing clear templates for project reporting and monitoring, establishing clear and frequent communication and holding regular project meetings.
- Developing flexible action plans that respond to context-specific needs and leverage other action points first in case the achievement of targeted project outcomes prove difficult.
- Relying on objectively verifiable indicator (OVI)-driven implementation to ensure a clear-cut strategic orientation throughout the project.
- Building ownership through the Whole Person Process Facilitation (WPPF) methodology to secure strong engagement across the team in a participatory process.

- Offering capacity-building support across different (local) teams to balance out different levels of expertise across teams including the provision of refresher trainings for continued learning.
- Building capacity of multiple consultants at the beginning of the project to establish a pool of experts, especially with regard to future changes in staffing and on-boarding of new consultants.
- Assuming a decentralised team approach to support peer-to-peer exchange and continuous learning to secure that consultants engage in RECP beyond the end of the project lifecycle.



# 10. Bibliography

1. Asian Development Bank 2011. Industrial Energy Efficiency Finance Program(Bangladesh). Retrieved 24.02.2020 from: <https://www.adb.org/sites/default/files/project-document/60531/45916-01-ban-rrp.pdf>
2. Central Bank of Sri Lanka 2019. Roadmap for Sustainable Finance in Sri Lanka. Retrieved 24.02.2020 from: <https://www.cbsl.gov.lk/sites/default/files/Sri%20Lanka%20Sustainable%20Finance%20Roadmap%20FINAL%2008.04.19.pdf>
3. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH 2012. Verbesserung der Energieversorgung in Nepal. Retrieved 24.02.2020 from: <http://star-www.giz.de/cgi-bin/getfile/53616c7465645f5fc73f4185ed596423a932623a860d5a5d5cd620ad249d6822edc66751fe9316783419110be4781497e2db76d30d2d5224d0b8a617a26f1af01140145ea2fa9c0/giz-2012-0216de-nepal.pdf>
4. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH 2017. Background on Nepal Trade Integration Strategy. Retrieved 24.02.2020 from: [http://www.tepc.gov.np/tepc\\_pub/2017\\_NTIS\\_Factsheet.pdf](http://www.tepc.gov.np/tepc_pub/2017_NTIS_Factsheet.pdf)
5. Energy Efficiency Nepal 2020. Financing Energy Efficiency Programme Nepal. Retrieved 24.02.2020 from: <https://energy-efficiency-nepal.com/>
6. Government of Nepal 1997. Environment Protection Rules, 2054. Retrieved 24.02.2020 from: <http://www.lawcommission.gov.np/en/archives/category/documents/prevaling-law/rules-and-regulations/environment-protection-rules-2054-1997>
7. Government of Sri Lanka 2019. Country Report Draft. Retrieved 24.02.2020 from: [https://www.uncrd.or.jp/content/documents/7413Sri%20Lanka\\_Country%20Report+Front%20page.pdf](https://www.uncrd.or.jp/content/documents/7413Sri%20Lanka_Country%20Report+Front%20page.pdf)
8. Government of the People's Republic of Bangladesh, Ministry of Planning (2017): Terms of Reference (TOR) for selection of national firm/institution for conducting a Study/Research and Preparing the Report on Study on Future Direction of SMEs in Bangladesh. [https://plandiv.portal.gov.bd/sites/default/files/files/plandiv.portal.gov.bd/notices/afbffe34\\_be4c\\_417d\\_b36c\\_ecf8db4614fc/ToR%20final%20SME.pdf](https://plandiv.portal.gov.bd/sites/default/files/files/plandiv.portal.gov.bd/notices/afbffe34_be4c_417d_b36c_ecf8db4614fc/ToR%20final%20SME.pdf)
9. Karki 2016. Emerging markets and business potential for cleantech solutions in Nepal – A virtual guide for Finnish companies. Retrieved 24.02.2020 from: <https://core.ac.uk/download/pdf/80990517.pdf>
10. PV magazine 2019. Germany provides low cost loan to Bangladesh for renewables. Retrieved 24.02.2020 from: <https://www.pv-magazine.com/2019/07/31/germany-provides-low-cost-loan-to-bangladesh-for-renewables/>
11. Sri Lanka Banks' Association 2020. About the Sustainable Banking Initiative. Retrieved 24.02.2020 from: <https://sustainablebanking.lk/>

12. Sri Lanka Ministry of Environment and Natural Resources 2018. Draft National Policy on Sustainable Consumption & Production for Sri Lanka. Retrieved 24.02.2020 from: <http://www.scp.mmde.gov.lk/resources/5c3aec9d147862036.pdf>
13. Ministry of Environment and Natural Resources 2005. Sri Lanka National Policy and Strategy for Cleaner Production. Retrieved 24.02.2020 from: <https://policy.asiapacificenergy.org/node/1604>
14. Sri Lanka Ministry of Industry and Commerce (2018): National Policy Framework for Small Medium Enterprise (SME) Development. [http://www.industry.gov.lk/web/images/pdf/framew\\_eng.pdf](http://www.industry.gov.lk/web/images/pdf/framew_eng.pdf)
15. Sustainable and Renewable Energy Development Authority (SREDA) and Power Division Ministry of Power, Energy and Mineral Resources Government of the People's Republic of Bangladesh (2015). Energy Efficiency and Conservation Master Plan up to 2030. Retrieved 24.02.2020 from: [http://sreda.gov.bd/files/EEC\\_Master\\_Plan\\_SREDA.pdf](http://sreda.gov.bd/files/EEC_Master_Plan_SREDA.pdf)
16. United Nations Economic and Social Commission for Asia and the Pacific (2017): A Study Report on Access to Finance of Micro, Small and Medium-Sized Enterprises in Nepal. [https://www.unescap.org/sites/default/files/Final%20PPT\\_Access%20to%20Finance%20Nepal\\_Mr.%20Achyut%20H%20Aryal.pdf](https://www.unescap.org/sites/default/files/Final%20PPT_Access%20to%20Finance%20Nepal_Mr.%20Achyut%20H%20Aryal.pdf)
17. World Bank 2019. World Bank to Help Scale Up Renewable Energy Options in Nepal. Retrieved 24.02.2020 from: <https://www.worldbank.org/en/news/press-release/2019/01/31/world-bank-to-help-scale-up-renewable-energy-options-in-nepal>
18. World Bank 2012. Bangladesh Climate Change Resilience Fund. Retrieved 24.02.2020 from: <https://www.worldbank.org/en/news/feature/2012/05/22/bangladesh-climate-change-resilience-fund-bccrf>



# Industry Testimonials



"The activities of the METABUILD project were satisfying for me. Because by following their suggestions, I've reduced my electricity consumption and electric bill. I became aware of the necessity of maintaining cleanliness in workplaces. The overall production system of my factory is now better than before by following their suggestions."

**Mr. Md. Abdul Aziz**

*Proprietor, Rolex Metal, Bangladesh*



"Before the METABUILD project, we didn't know about Resource Efficient Cleaner Production (RECP), but now we are practising it in our company. After implementing RECP measures, there are monetary savings through reduced electricity consumption and we feel safe and comfortable working on the company shop-floor. We will continue implementing RECP measures. I would like to convince other companies with the success stories we got in our company."

**Mr. Surya Mani Dhital**

*Manager, Global Cable Industries Pvt. Ltd., Nepal*



"Participating in the METABUILD project resulted in many benefits such as electricity savings, improved production, and a better working environment with improved health and safety. In the future, we plan to implement a 5S system, maintaining power factor at 0.99 and to further improve our production process and the work environment."

**Mr. Prasad Weerasinghe**

*Workshop Manager, Dynamic Technologies (Pvt) Ltd., Sri Lanka*



“First I would like to thank the METABUILD project, especially all the team members who worked with us, trained my workers and provided a lot of support. I came to know about energy and resource efficiency after joining the METABUILD project. Through this project I am really aware of the importance of resource management, which helps me a lot in terms of energy savings and hopefully in the future these savings will be increasing exponentially. It will be very helpful for us if the project continues if possible.”

### **Mr. Mustafa Kamal Kiron**

*Proprietor, H.R. Metal Industries, Bangladesh*



“The initiative of the METABUILD project is very good and our industry has benefitted from this project immensely. It has also contributed towards creating environmental awareness and in improving the occupational safety and health conditions in the industry.”

### **Mr. Upendra Agrawal**

*Director, Inter Tech Pvt. Ltd., Nepal*



“The METABUILD project benefitted my company through improved use of resources, an improved working environment, including safety of workers, and facilitated access to a bank loan to improve the factory operations including setting up an air purification system and a proper sorting area. In the future, we plan to change the layout of the factory and improve safety of workers and to install a new furnace with a chimney to improve the environmental conditions of the factory.”

### **Mr. Ajith Shantha**

*Proprietor, Ashan Enterprises, Sri Lanka*



Project Funded by



Project Implemented by



## CONTACT

- **Dr. Malini Balakrishnan**, *METABUILD Project Lead, Senior Fellow, TERI, India*, [malinib@teri.res.in](mailto:malinib@teri.res.in)
- **Mr. Amarnath Munnolimath**, *Project Manager, adelphi, Germany*, [munnoilimath@adelphi.de](mailto:munnoilimath@adelphi.de)
- **Mr. Stefan Melnitzky**, *Managing Director, Austria Recycling (AREC), Austria*, [stefan.melnitzky@arecon.at](mailto:stefan.melnitzky@arecon.at)
- **Mr. Khandoker Anwar Kamal**, *Project Manager, DCCI, Bangladesh*, [project@dhakachamber.com](mailto:project@dhakachamber.com)
- **Mr. Amar Manandhar**, *Executive Director, SEED-Nepal, Nepal*, [amar@seednepal.org](mailto:amar@seednepal.org)
- **Eng. Samantha Kumarasena**, *Chief Executive Officer, NCPC, Sri Lanka*, [samantha@ncpcsrilanka.org](mailto:samantha@ncpcsrilanka.org)
- **Mr. Rajat Batra**, *Chief Executive Officer, STENUM Asia, India*, [rajat.batra@stenum-asia.org](mailto:rajat.batra@stenum-asia.org)