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MSME TRAINING SERIES

#04: Resource Efficient Cleaner Production

10th March 2021| 3 PM – 5 PM IST

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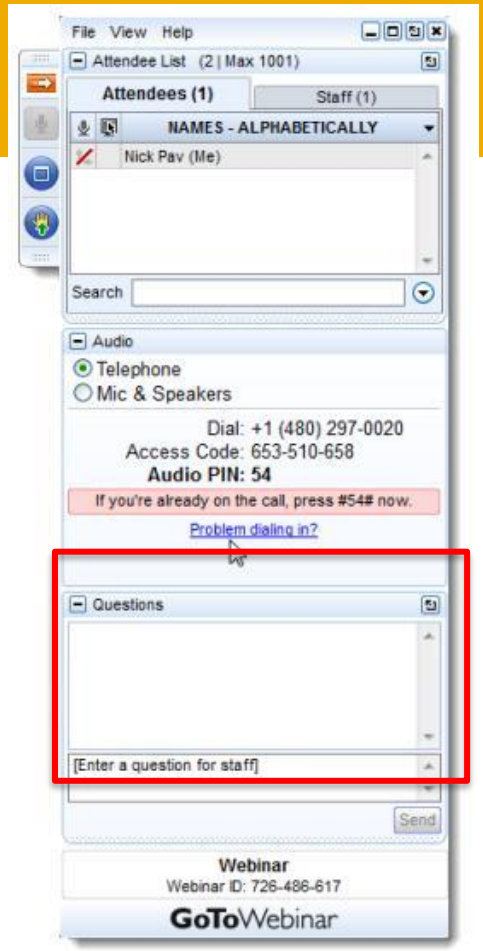
INTRODUCTION

Tejaswini Kulkarni, *Project Associate, WRI India*

GUIDELINES

- Attendees will remain in listen-only mode.
- Today's presentation is being recorded and will be shared with registered participants.
- Please use the "Questions" pane to type in your comments or questions during the webinar.



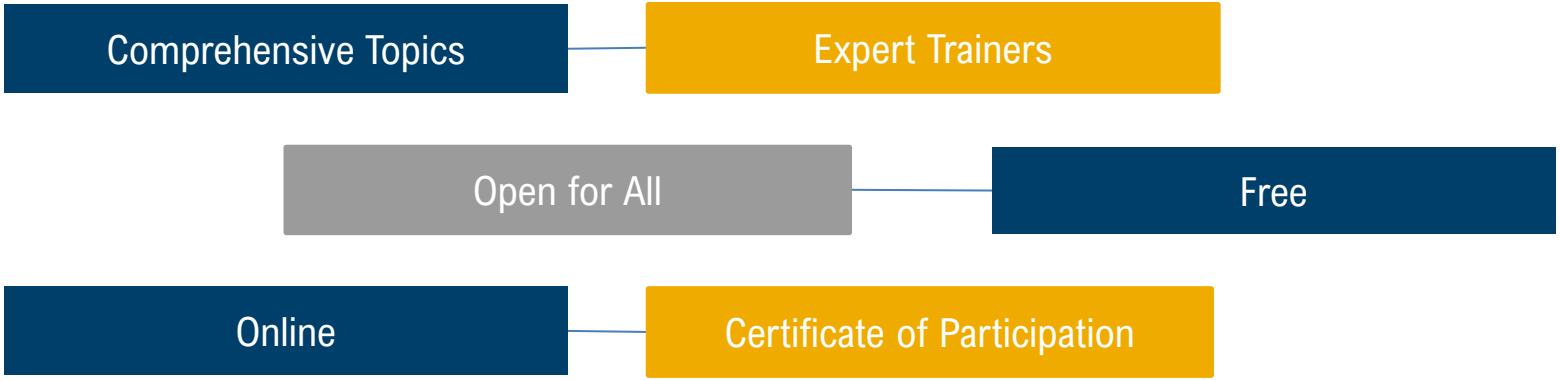
OBJECTIVES OF THE TRAINING SERIES

TOPICS COVERED IN THE TRAINING SERIES

* Hyperlink to event page with session recording and materials attached

ABOUT THE TRAINING SERIES

- Part of the Carbon Market Simulation Project, facilitated by WRI India and supported by MacArthur Foundation
- Conducted in partnership with Confederation of Indian Industry (CII)



AGENDA

INTRODUCTION	Tejaswini Kulkarni, *Project Associate – Climate Programme, WRI India*
PART I : INTRODUCTION TO RECP IN THE MSME SECTOR	
RECP : Concept & Approach	Dr Bharat Jain, *Member Secretary, Gujarat Cleaner Production Centre*
RECP for the MSME Sector	Atik Shaikh, *Councellor – Energy & Climate Change, CII Godrej Green Business Centre*
Question & Answer Session I	
PART II : OPERATIONALIZING RECP	
Resource Efficiency: MSME Experience Sharing	Kathiresan Arunachalam *Owner, Syndicate Impex*
Cleaner Production: Renewable Energy	Ashok K Thanikonda *Manager - Energy Programme, WRI India*
Question & Answer Session II	
CLOSING REMARKS	Atik Sheikh, *Counsellor, CII-GBC*

SIGNIFICANCE OF RECP FOR MSMES

- Readiness to meet Future Regulations
- Access Green Finance & Schemes

- Meet Procurement Requirements of OEMs

- Cost Savings
- Production Efficiency
- Reduce Environmental Impact

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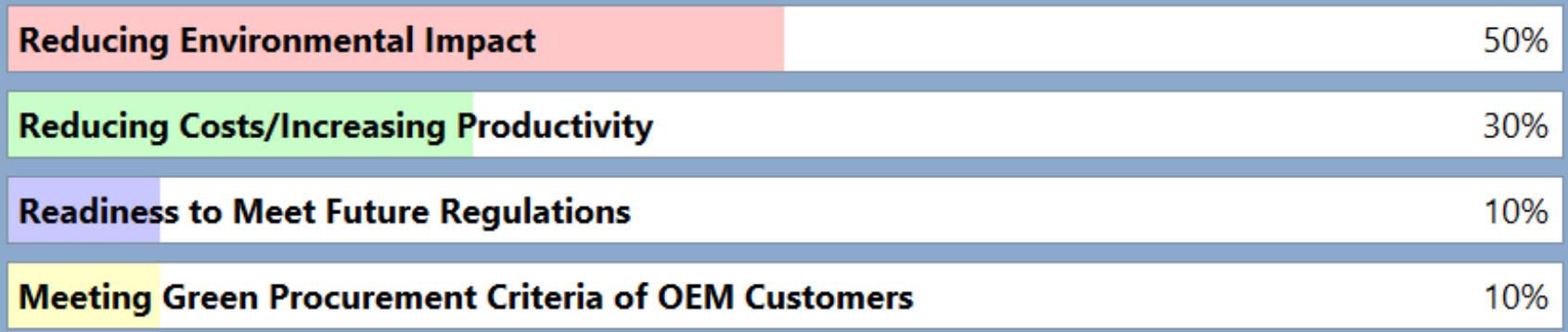
What in your opinion could be the biggest benefit of RECP to your organization?

Poll Results (single answer required):



PART I: INTRODUCTION TO RECP IN THE MSME SECTOR

CONCEPT & APPROACH

Dr Bharat Jain, *Member Secretary, Gujarat Cleaner Production Centre*

Resource Efficiency and Cleaner Production

RECP

By:

Dr. Bharat Jain

Member Secretary

Gujarat Cleaner Production Centre

Gandhinagar

10th March 2021

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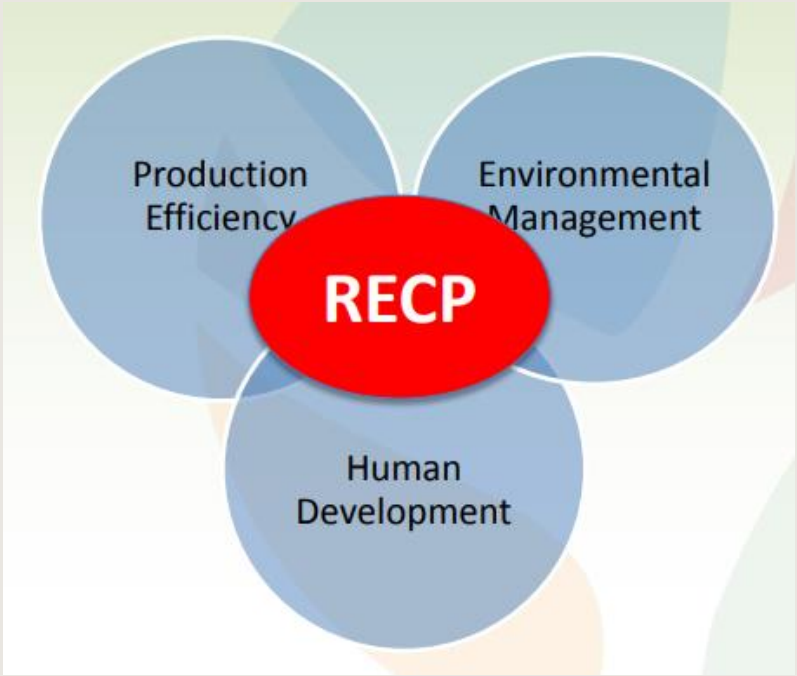
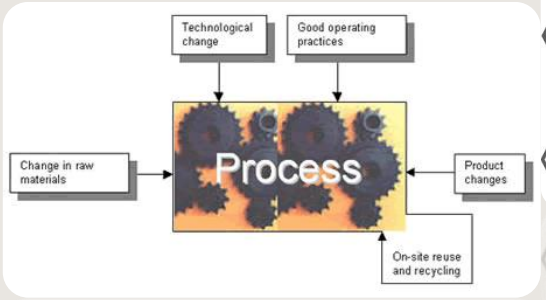
RECP: A Concept





RECP entails the continuous application of preventive environmental strategies to processes, products and services in order to increase efficiency and reduce risks to humans and the environment.

Background

1st International conference on environment

Action Plan for Human Environment

Establishment of Ministries of Environment in different countries

1972

1987

Formation of "Brundtland Report" providing Concept of Sustainable Development

UNEP began its initiative on Cleaner Production

1989

1992

Rio Conference produced Agenda 21 which offered a set of goals to achieve sustainable development

UNIDO and UNEP jointly initiated National CP centre programme. Since then, 22 CP centres have been established

1994

1998

UNEP prepared International Declaration on Cleaner Production

Gujarat Cleaner Production Centre

Gujarat Cleaner Production Centre- Cleaner Production/ Clean Technology (CP/CT)

Realizing the potential of Cleaner Production (CP) in the state of Gujarat, GCPC was established in the year 1998 by the Industries Department of the State Government under technical support of United Nations International Development Organization (UNIDO). GCPC also acts as an ENVIS centre for Ministry of Environment, Forests and Climate Change (MoEFCC) under "Chemical wastes and Toxicology". GCPC Imparts Knowledge as well as expertise to tackle with various environmental issues to different industries. It promotes CP/CT through various services like Orientation Programmes, Assessment Project, Training Programmes and Dissemination Programmes.

OUR SERVICES

- CP Orientation & Awareness Programme.
- CP Training Programme
- CP Demonstration Project
- CP Promotional Activity
- Guidelines on CP for different Industrial Sectors

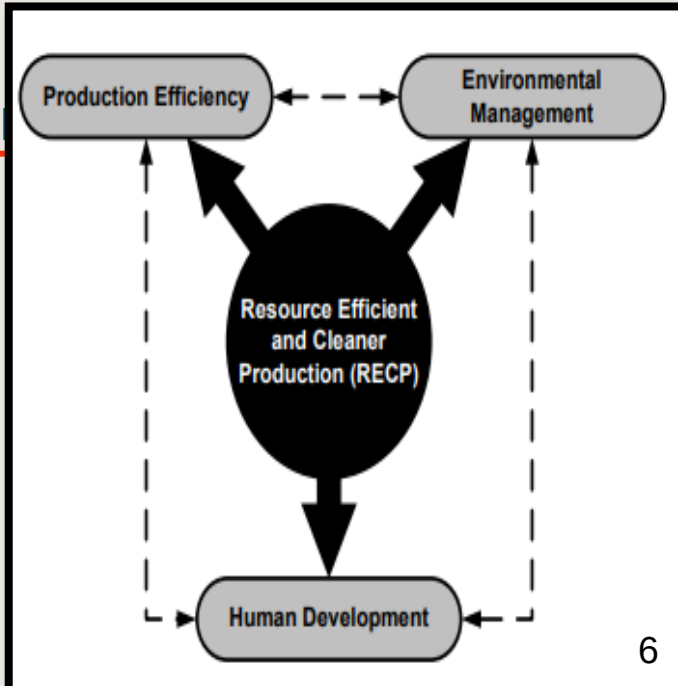
A step towards…
Pollution Control to Cleaner Production

RECP addresses the three sustainability dimensions **individually** and **synergistically**:

ECONOMIC: Production Efficiency:
optimization of the productive use of natural resources (materials, energy and water);

ENVIRONMENT: Environmental management:
minimization of impacts on environment and nature through reduction of wastes and emissions;

SOCIAL: Human Development:
minimization of risks to people and communities and support for their development.



RECP Practices

Good Housekeeping

Better Process Control

01

02

03

04

Input Material Change

Equipment Modification

Technology Change

Production of useful Byproducts

05

06

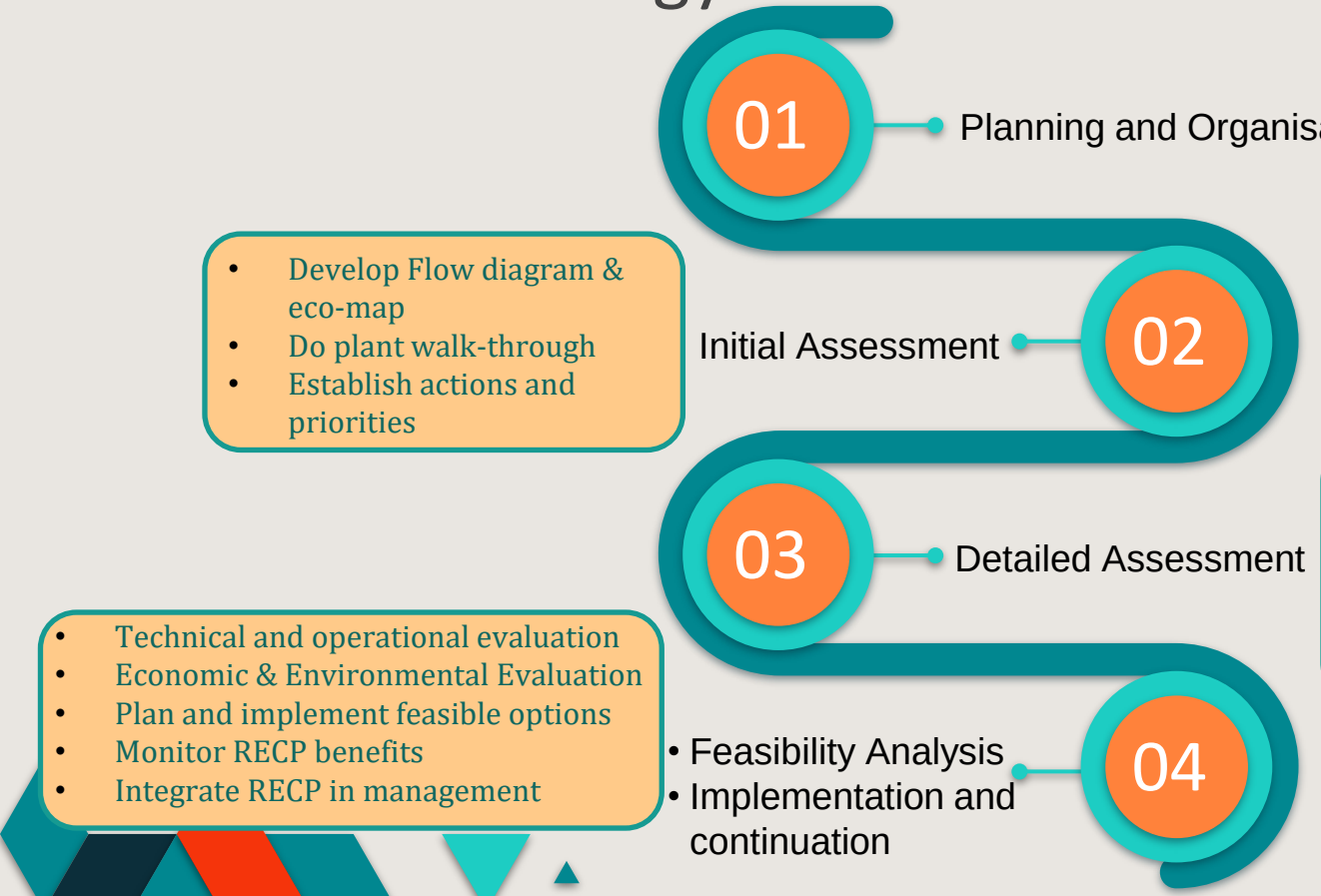
07

08

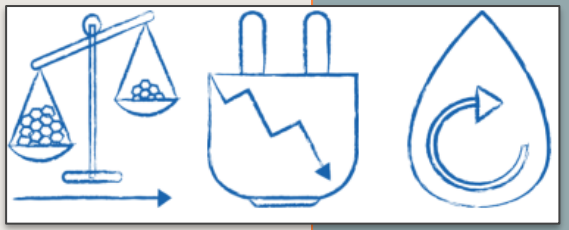
Onsite Reuse and Recycling

Product Modification

RECP Methodology

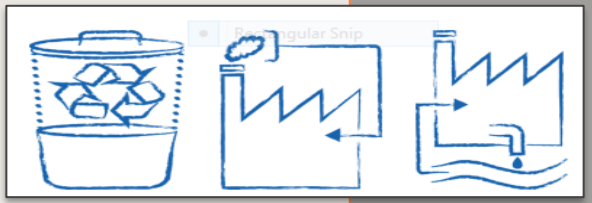


RECP progress at an enterprise is monitored using a set of Resource Productivity and Pollution **Intensity indicators** as follows:



Resource productivity

- Energy productivity (product output per unit of energy used)
- Materials productivity (product output per unit of material used);
- Water productivity (product output per unit of water used).



Pollution intensity

- Carbon intensity (greenhouse gas emissions per unit of product output);
- Waste intensity (waste generation per unit of product output);
- Waste-water intensity (waste-water generation per unit of product output).

Benefits of RECP

Increasing Productivity

Gaining competitive advantage

Increasing Economic benefits

Continuous Environmental improvement

Improving environmental situation

Common types of Barriers

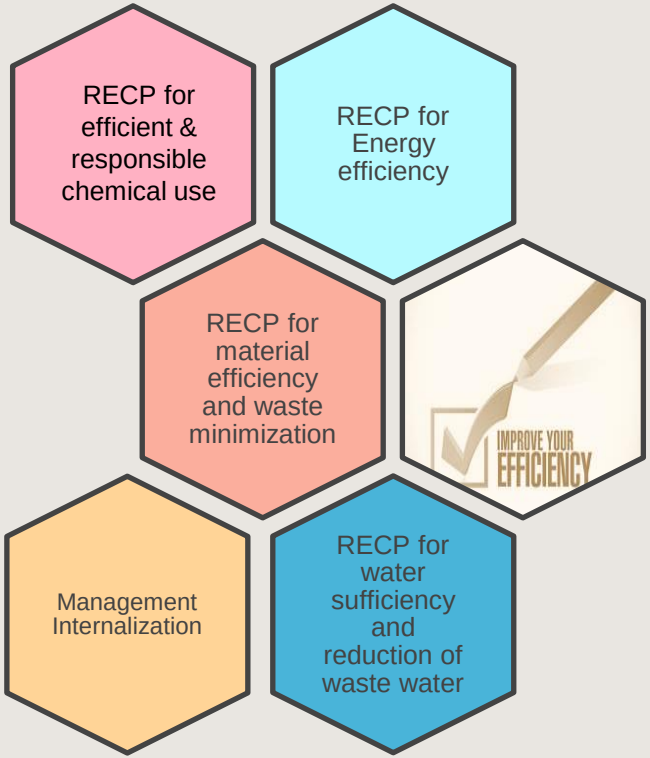
Conceptual and motivational
(Preparedness and willingness to accept)

Organizational
(Roles and Responsibilities in a firm)

Economic
(Cost/benefits, Market acceptance and access to finance)

Policy
(Regulatory uncertainty)

Examples /areas of application



RECP for Energy Efficiency

Sources

- Where is energy used?
- For what purpose?
- With what losses?

Causes

- What factors influence these energy uses and losses?

Options

- How to minimize these causes of energy uses and energy losses?

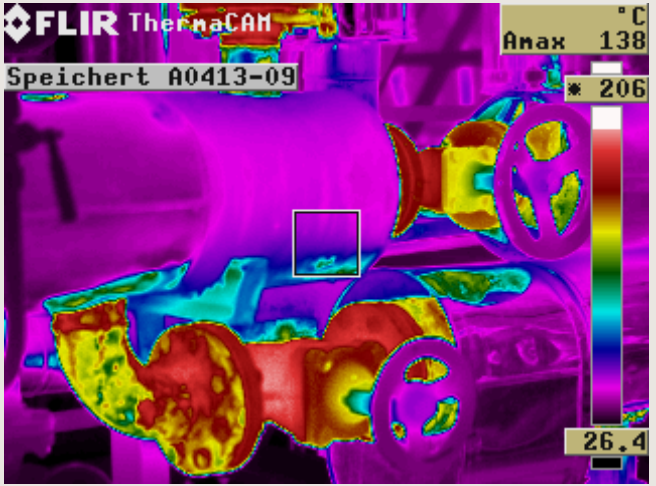
Energy: Probable checklist

- ☑ Regular **surveying & repairing of steam leaks**
- ☑ Regular surveying & repairing **Hot/Cold pipe insulation**
- ☑ Reduce the **compressed air pressure** to minimum acceptable level (normally 70-90 PSI)
- ☑ Eliminate the use of **compressed air knives** as much as possible (Blowers/Pressure Regulator)
- ☑ Convert the **plant lighting** to High-Efficiency Lighting Fixtures (T-5, LED 8 use of Motion Sensor)
- ☑ Ensure all HVAC Filters, Condenser, Evaporator Coils are **clean at least annually**
- ☑ Conduct **employees training**/involvement program on energy savings

Check of the energy losses through Thermography

Efficient Use of Energy

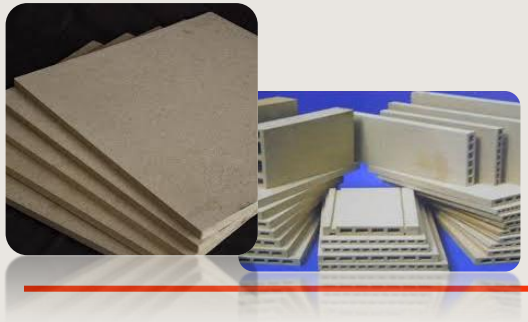
Uninsulated sides Energy Loss



A case study

Ceramic Sector: Modification in Kiln car furniture by replacing "Solid Cordierite Kiln Car Shelves" with "Extruded Batts"

Heavier the material on kiln car more will be the gas consumption of the kiln. The heavier the furniture material, more the heat utilized to heat up the car, which is of no use. The only useful heat is what absorbed by the product loaded on the car.



Recommendations:
As per the thumb rule, the gas consumption will be reduced dramatically by reducing the weight of the kiln car.
The option to reduce the kiln car weight is by changing the design of shelves in the kiln car. Thus, Solid Cordierite shelves were replaced by light weight 'Extruded cordierite batts'

Outcomes:
% reduction in weight: 22%
% reduction in gas consumption: 22% approximately
Savings in gas consumption per annum: 1,20,860 SCM
Investment: Rs. 4,90,000/-
Expected savings: Rs. 22,80,000/-
Payback period: 3 months

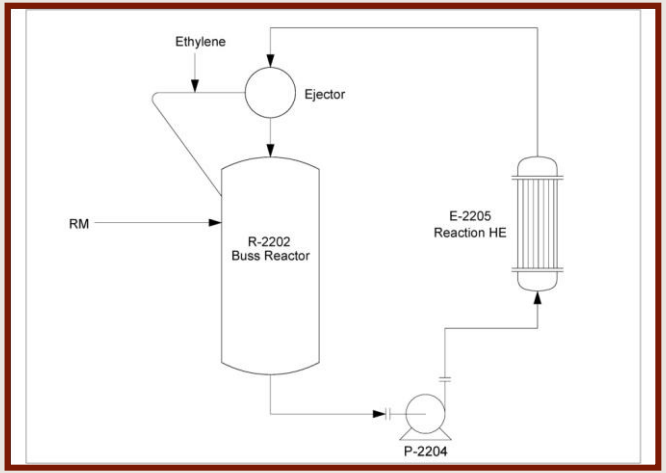
Reduction in Electricity consumption by reduction reaction pump RPM

Before Cleaner Production

In the process, reaction pump is designed for 30 m head and 920 m3/hr capacity. The electricity consumption is 78 KWH

After Cleaner Production

1. Lab scale trials were carried out to study the effect of rate of reaction on mass transfer.
2. To optimize the RPM of reaction pump, the study was carried out between from 1375 RPM to 1000 RPM.
3. Based on the study, it was observed that lowering the reaction RPM from 1375 to 1000 RPM it did not hamper the rate of reaction and mass transfer rate
4. Further lowering the RPM below 1000, was hampering the circulation.
5. Hence, the reaction pump RPM is optimized to 1000 RPM



Environmental Benefit:

1. Electricity consumption reduced from 78 KWH to 44 KWH
2. Reducing CO2 footprint by 0.878 MT

Economical Benefit:

1. **Investment:** 0 INR
2. **Savings:** 1.65 lakhs

RECP for efficient & responsible chemical use

Sources

- Where are chemicals used?
- For what purpose?
- What is their fate (Product, conversion and waste)?

Causes

- What factors influence the use and fate of chemicals?

Options

- How to minimize these causes of high usage of chemicals and their undesired fate, including possible release into the environment?

Chemical Use: Probable checklist

- ☑ Prepare a **list of raw materials and auxiliaries** which are used in the process.
- ☑ Proper understanding of the **functions** of the raw materials in the production process
- ☑ Check on the **quantities** the chemicals are used.
- ☑ Check the **costs** of the raw materials and auxiliaries used in the process.
- ☑ Check on the **hazardous characteristics** they have for humans and the environment.

A case study

Agrochemical Sector: Reduction in consumption of raw material Acrylonitrile for manufacturing of CMAC (Cypermethric acid chloride) and optimization of raw material.

Reaction of Carbon tetra chloride (CTC) with Acrylonitrile (ACN) occurs in a reactor with help of Cupric Chloride as catalyst, DEA-HCl as buffer & Acetonitrile (AN) as a solvent resulting into Tetra Chloro Butyro Nitrile (TBN) and upon acid hydrolysis of Crude TBN using 30% of HCl solution, Tetrachloro Butyric Acid (TBA) is formed. This is the first stage reaction for the formation of CMAC.

Recommendation:

Reduce the consumption of Acrylonitrile (ACN) which may increase the yield of Tetra Chloro Butyro Nitrile. By suggested reduced amount of **Acrylonitrile,** industry will achieve significant **cost benefit** which is reflected in the outcomes.

Outcomes:

Cost of Acrylonitrile	Rs. 122 / kg
Initial consumption of Acrylonitrile	500 kg / MT of CMAC
Consumption of Acrylonitrile **after CP Assessment**	430 kg / MT of CMAC
Savings due to CP Assessment	Rs. 8540 / MT of CMAC
Savings for 170 MT CMAC production **per month**	Rs. = 8540 x 170 = Rs. 14,51,800
Savings for CMAC production **per year**	Rs. = 14,51,800 x 12 = Rs. 1,74,21,600

RECP for material efficiency and waste minimization

Sources

- Where is material used?
- For what purpose?
- With what material losses?

Causes

- What factors influence these material uses and losses?

Options

- How to minimize the causes of these material uses and losses?

Waste Minimization: Probable checklist

- ✓ Check the quantity and quality of **waste streams** generated from each process
- ✓ Identify the category of wastes as hazardous or non-hazardous.
- ✓ Details of **input materials** used to generate waste streams of a particular process or area.
- ✓ **Quantity** of a particular input material enters each waste stream
- ✓ Check the **efficiency of the process**.
- ✓ Check the **housekeeping practices** which are used to limit the quantity of wastes generated.
- ✓ Identify the various **process controls** are used to improve process efficiency.

RECP for water sufficiency and reduction of waste water

Sources

- Where is water used?
- For what purpose?
- With what losses and pollution?

Causes

- What factors influence these water uses, losses and pollution?

Options

- How to minimize these causes of water uses, losses and pollution?

Water: Probable checklist

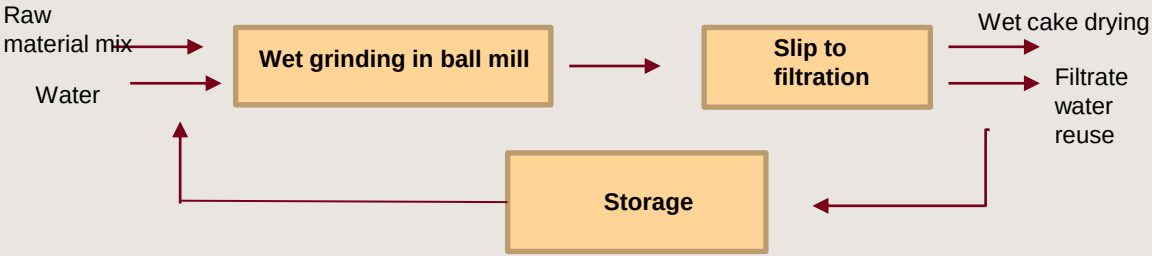
- ☑ Implement **Regular Program for Surveying & Repairing** Water Leaks.
- ☑ Optimize the **design of pump seals**.
- ☑ Optimize **Water Treatment** (Backwash, Recovery, Recycle, Re-Use).
- ☑ Optimize **cleaning and sanitation** procedures.
- ☑ Optimize **Package Washing and Rinsing** (Ionized Air, Recycling).
- ☑ Optimize **Cooling Towers** and its water use (cooling efficiency, pre-treatment, reduction).
- ☑ Optimize water **hoses and sanitary systems**.

A case study

Ceramic Sector: Reusing 100% of wastewater into process.

Ceramic industry requires a stage where slip preparation is to be done. Wherein, the slurry is formed by mixing various types of raw materials in a fixed composition manually in the ball mill.

A batch of ball mill contains equal proportion of raw material, water and riverbed stone pebbles. The ball mill grinds the raw materials for more than 8 hours to form slurry, which is passed through a 40 mesh size sieve, so as to reject the oversized particles.



Recommendations:

It was observed that the water removed from the slip in the form of filtrate was drained out from the plant earlier, which was a major loss of water from the plant. Approximately 7.48 KLD Of water was wasted in the process stage.

All of the filtrate water can be reused in the process, at the wet grinding stage in ball mill.

Outcomes:

The plant is a Zero Liquid Discharge plant, all the water is reused in the process.

Additionally, reduction in the cost of purchasing water from GIDC was also obtained.

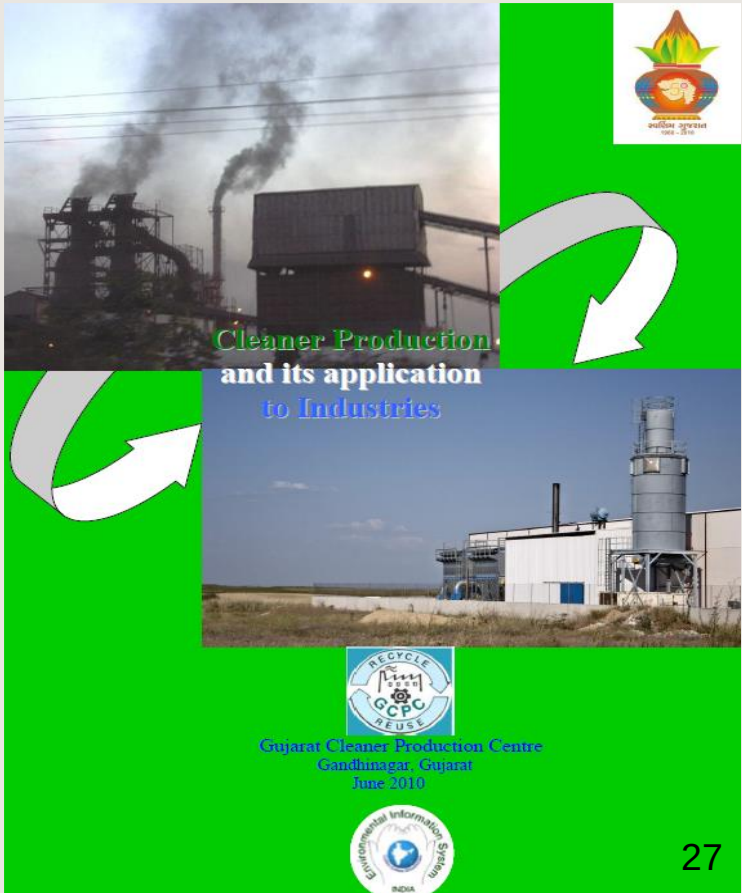
Approximately reduction in fresh water demand: 7.48 KLD.

Management Internalization

- Plan and implement RECP options
- Monitoring of RECP progress
- Mainstreaming RECP in company's management and operations

CLEANER PRODUCTION AS A SUBJECT IN CHEMICAL & ENVIRONMENTAL ENGINEERING

- "Cleaner Production and its application to Industries" is being used as a reference material (text book) for the students to understand the concept of Cleaner Production and its various applications.
- The book is intended to provide guidance on concept of cleaner production and its benefits to the industries.
- The book thoroughly describes the tools and methodologies to implement cleaner production, including success stories and case studies of cleaner production implementation in various industrial sectors.



Interlinking of Industries, Government and Academia

Gujarat Cleaner Production Centre (GCPC), is promoting 'Research and Development' in the field of Cleaner Production, Clean Technologies, by interlinking of Government, Academia and Industries providing a single knowledge sharing platform to academicians and industrial technocrats, organizing programme named 'Integration of Research to Industrial Application'. The programme aims on practical application of theoretical research conducted by students on Cleaner Production and Clean Technology.

Industry **- Academia -** **Government**

CP Award Ceremony

Schemes of Assistance for Environment Protection Measures

Scheme-1

Scheme for assistance to Environment Management

Eligible Activities

Implementation of ***Cleaner Production Technology*** in place of existing process such as substitution & optimization of raw material, reduction in water consumption or energy consumption or waste generation.

1. Any other environment management project with use of Clean, Efficient and Innovative Pollution Control Equipment.

Quantum of Assistance

The following quantum of assistance shall be provided:

Sr. No.	Eligible Activity	Quantum of Assistance per project
1.	Implementation of cleaner production technology in place of existing process such as substitution & optimization of raw material, reduction in water consumption or energy consumption or energy consumption or waste generation	1. Upto 35% of cost of plant & machinery with ceiling of Rs. 35 lacs during the operative period of the scheme for MSME. 2. Upto 10% of cost of plant & machinery with ceiling of Rs. 35 lacs during the operative period of the scheme for large projects.
2.	Any other environment management project with use of Clean, Efficient and Innovative Pollution Control Equipment	1. Upto 25% of cost of plant & machinery with ceiling of Rs.35 lacs during the operative period of the scheme for MSME. 2. Upto 10% of cost of plant & machinery with ceiling of Rs. 35 lacs during the operative period of the scheme for large projects.

THANKS!

RECP FOR THE MSME SECTOR

Atik Sheikh, *Counsellor, CII-GBC*

WRI INDIA

Confederation of Indian Industry
125 Years: 1895-2020

Resource Efficiency & Cleaner Production

Status, approach and Tools

ATIK SHEIKH, Counsellor, CII Godrej GBC

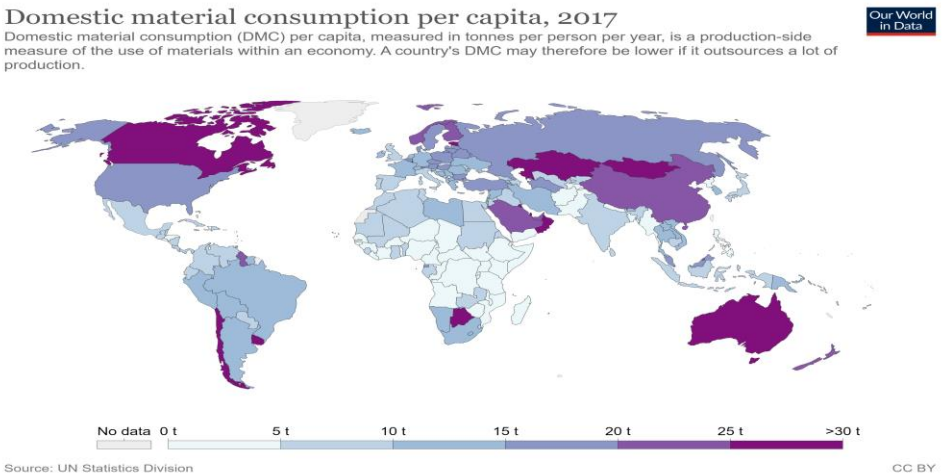
10th March 2021

Agenda

- Material Consumption and Productivity
- RECP – Concept
- Sectoral Potential
- RECP – Audit
- RECP –Tools
- Summary

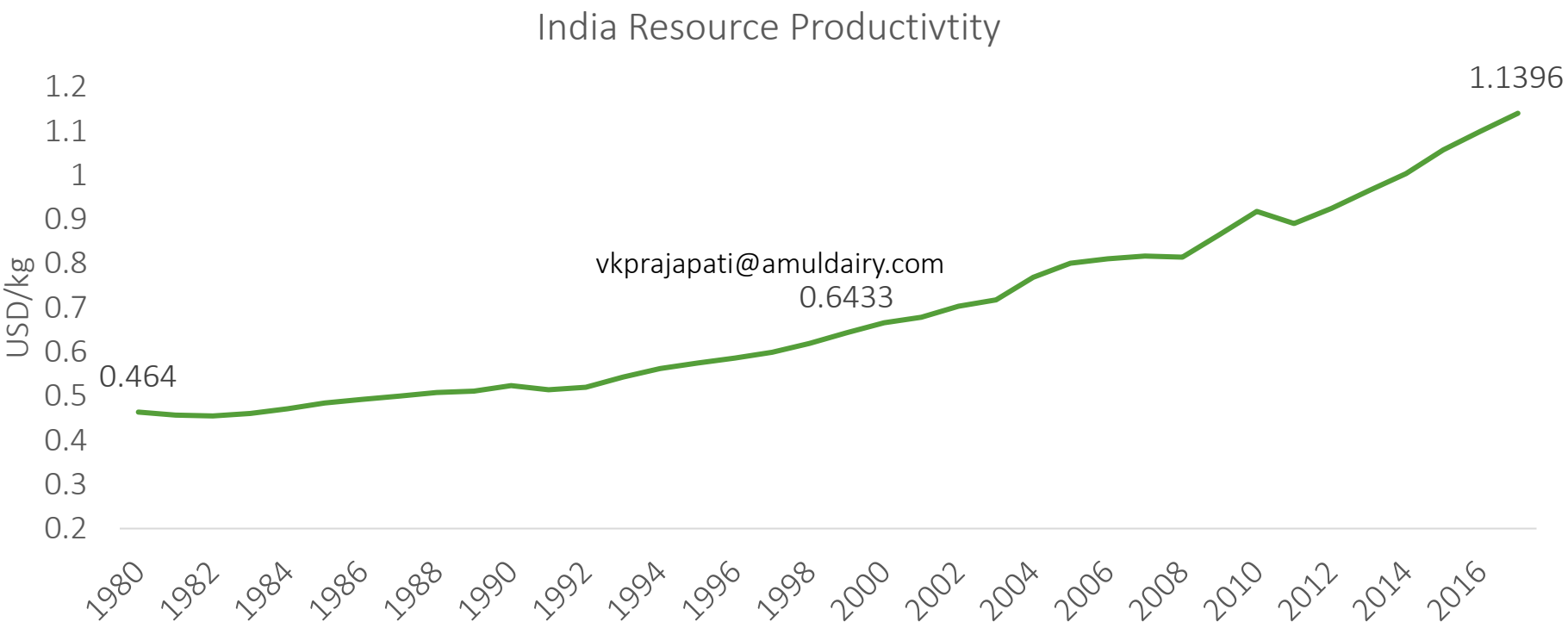
Material consumption – India

- **India material consumption grew by 7 times** from 1.18 billion tonnes in 1970 to 7 billion tonnes in 2015 (Agrarian to industrial society)
- Material consumption expected **to double** by 2030 – Economic growth and urbanisation
- India's **Per capita consumption India is low** - 7 tonnes, while global average is 10 tonnes
- Regulatory & Policy Framework on material/resource efficiency taking shape in India
  - **National Resource Efficiency Policy, 2019 (Draft)**



India's per capita consumption, though on lower side, but are 3rd largest in absolute material consumption

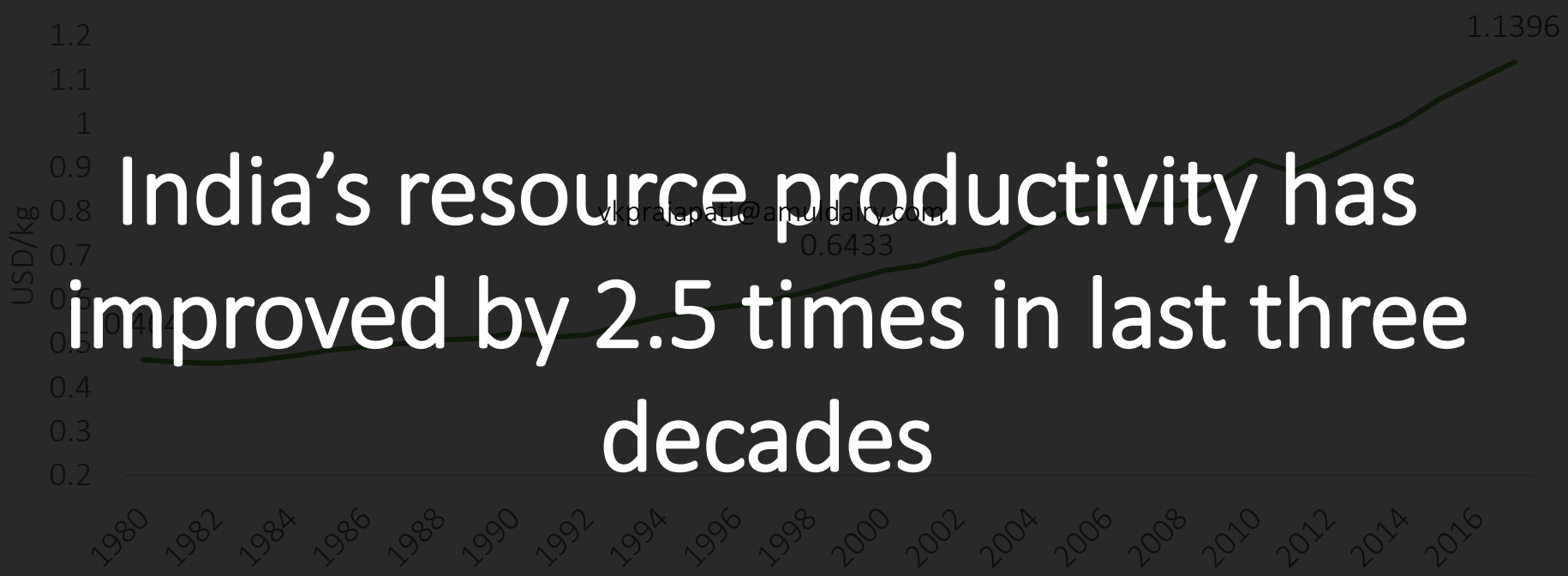
Resource Efficiency



vkprajapati@amuldairy.com

Source: OECD

Resource Efficiency

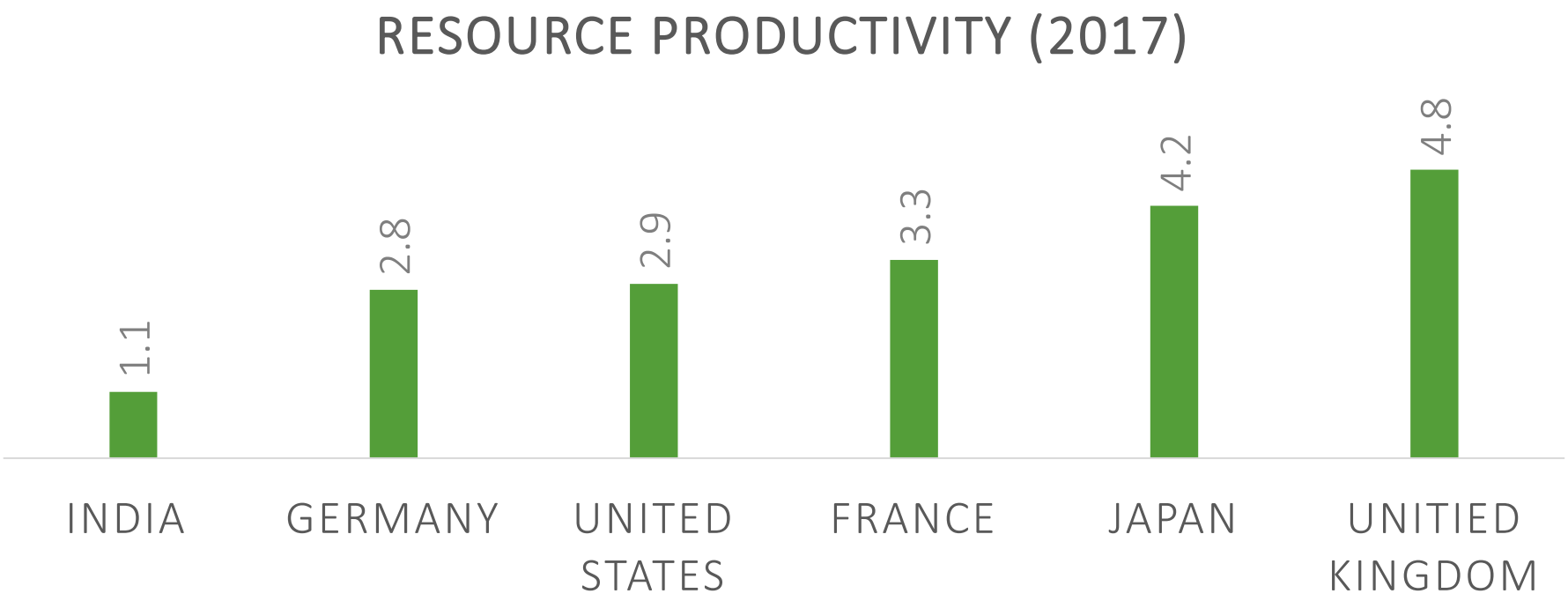


India's resource productivity has improved by 2.5 times in last three decades

vkpraharaj@amudaary.com

Source: OECD

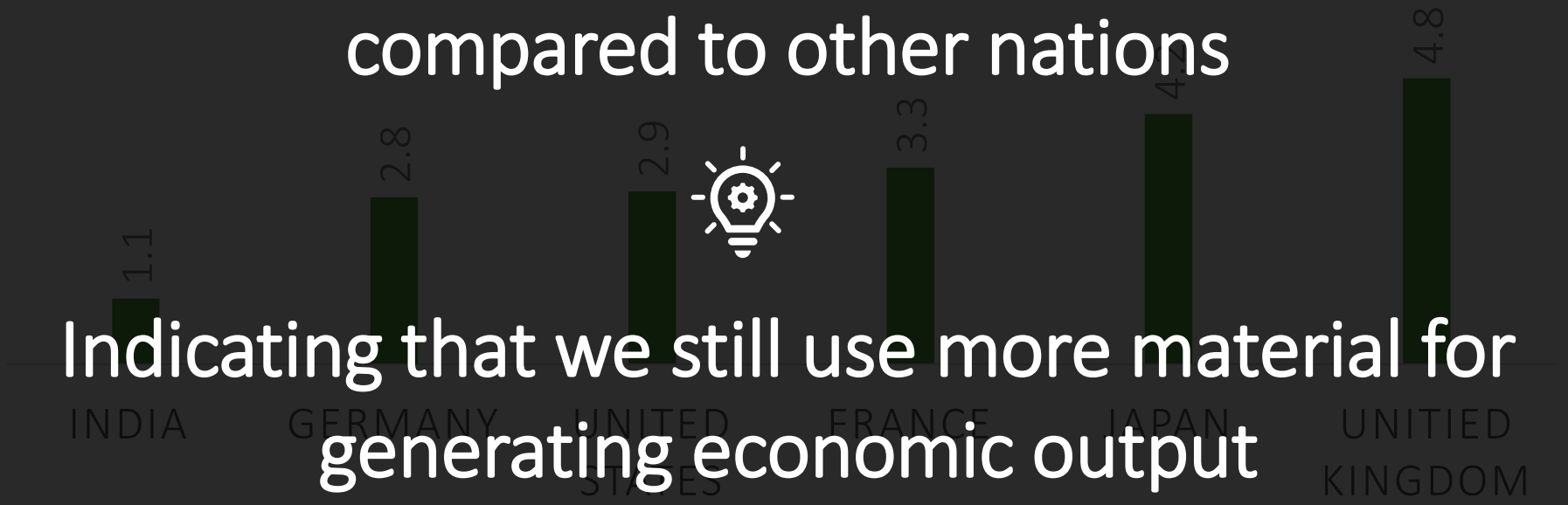
Countries - comparison



Source – Energy- BP Statiscal Review of World Energy

Countries comparison

India’s resource productivity is much lower as compared to other nations



Indicating that we still use more material for generating economic output

Source – Energy- BP Statiscal Review of World Energy

India – Opportunities for Material Efficiency

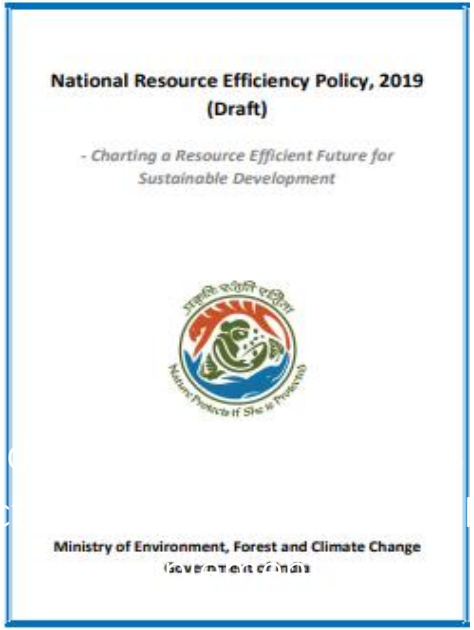
SUSTAINABLE DEVELOPMENT GOALS

CII
Confederation of Indian Industry
125 Years: 1895-2020

India's Resource Efficiency Policy

NREP aims to **impiement resource efficiency across all resources i**ncluding both biotic and abiotic resources, sectors and life cycle stages

NREP, 2019 (Draft)



India's Resource Efficiency Policy

Scope of the National Resource Efficiency Policy encompasses resources and materials used across all life cycle stages of any sector

NREP aims to **implement resource efficiency across all resources i**ncluding both biotic and abiotic resources, sectors and life cycle stages

NREP, 2019 (Draft)

Mix of policy, regulatory and market instruments proposed for improving material efficiency across sectors

The progress on resource efficiency will be tracked on the set of indicators that will include sector specific indicators, recovery and recycling indicators.

Role of Industry and stakeholders critical

3 year action plan for improving RE will be implemented

Resource efficiency and Cleaner Production

Which approach?

Producing more with less

Resources & Pollution

Example – Adding Excess Water to meet the water discharge norms

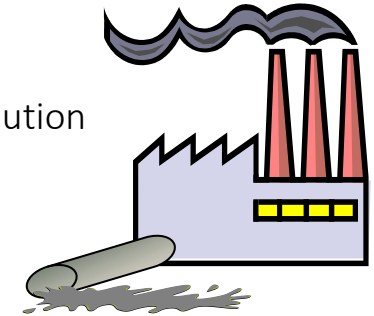
Example – Process Improvements with reduction of water pollution at source, Automatic blowdown for boilers, Green Chemistry,

Example – Setting up of ETPs, and use of CETPs at Cluster Level

Which approach?

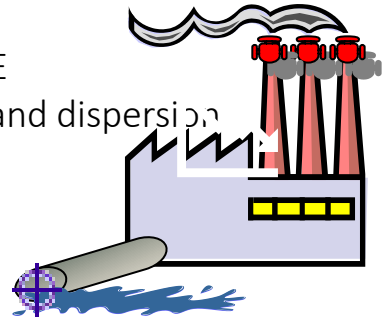
PASSIVE
Ignore pollution

1



REACTIVE
Dilution and dispersion

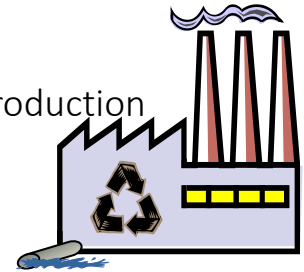
2



Example – Adding Excess Water to meet the water discharge norms

PROACTIVE
RE Cleaner Production

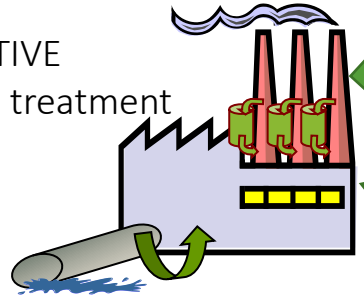
4



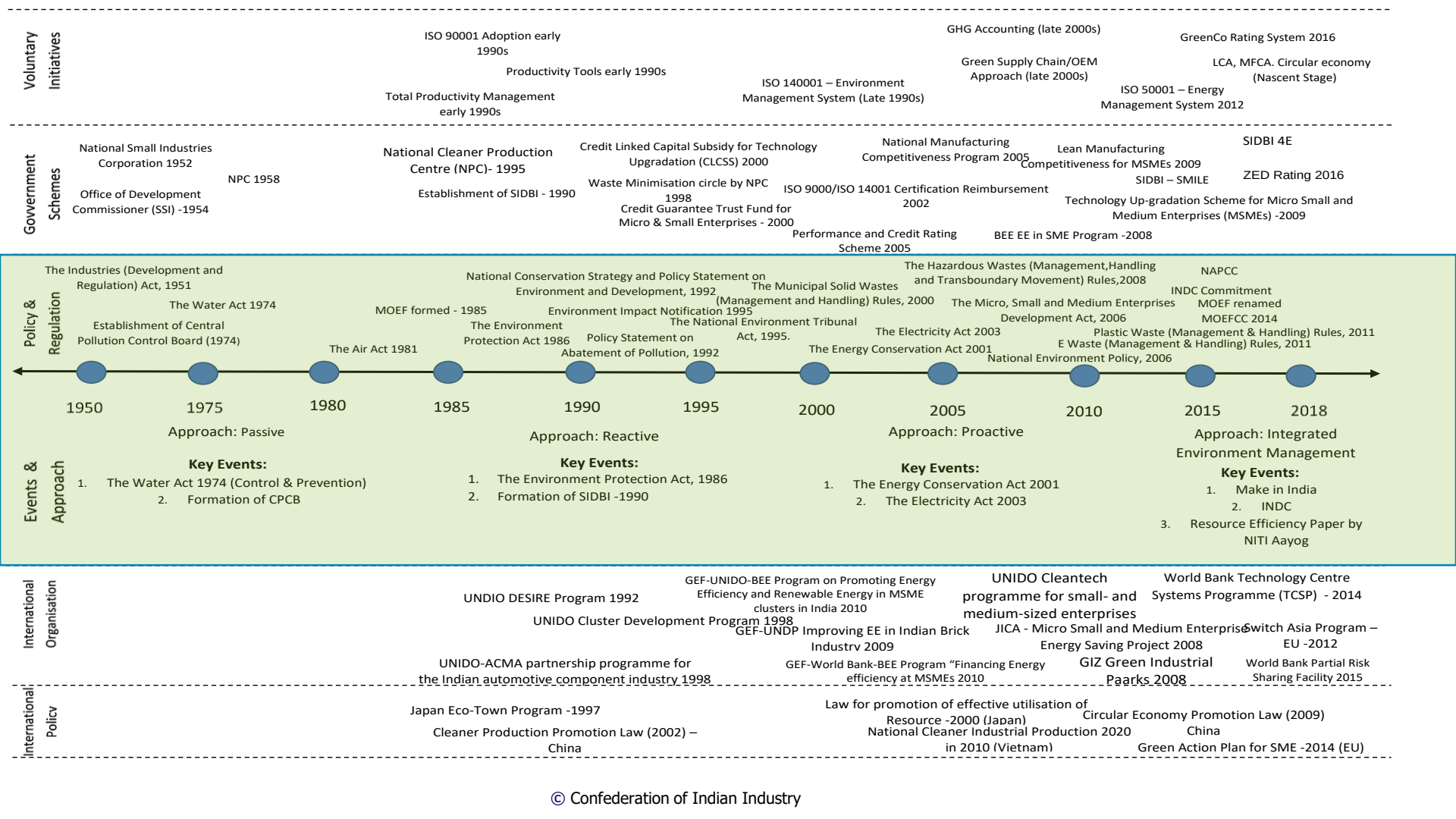
Example – Process Improvements with reduction of water pollution at source, Automatic blowdown for boilers, Green Chemistry,

CONSTRUCTIVE
End-of-pipe treatment

3

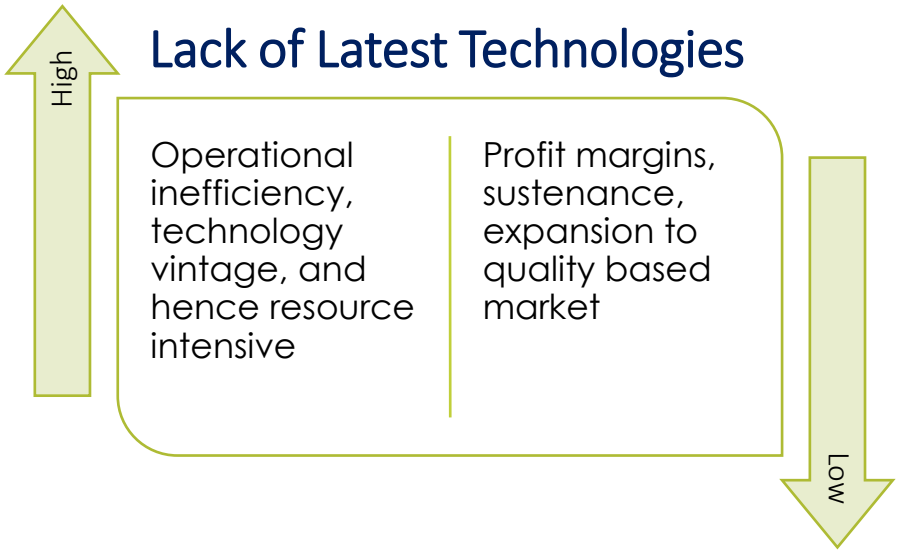


Example – Setting up of ETPs, and use of CETPs at Cluster Level



Why RECP in MSMEs?

- Significant potential exists for improvements
- Technology obsolescence has been a common phenomenon with Indian MSMEs
- Lack of penetration of modern and efficient technologies commonly observed



Potential of 25-30 % improvement in efficiency through RECP measures

Sectoral Potential

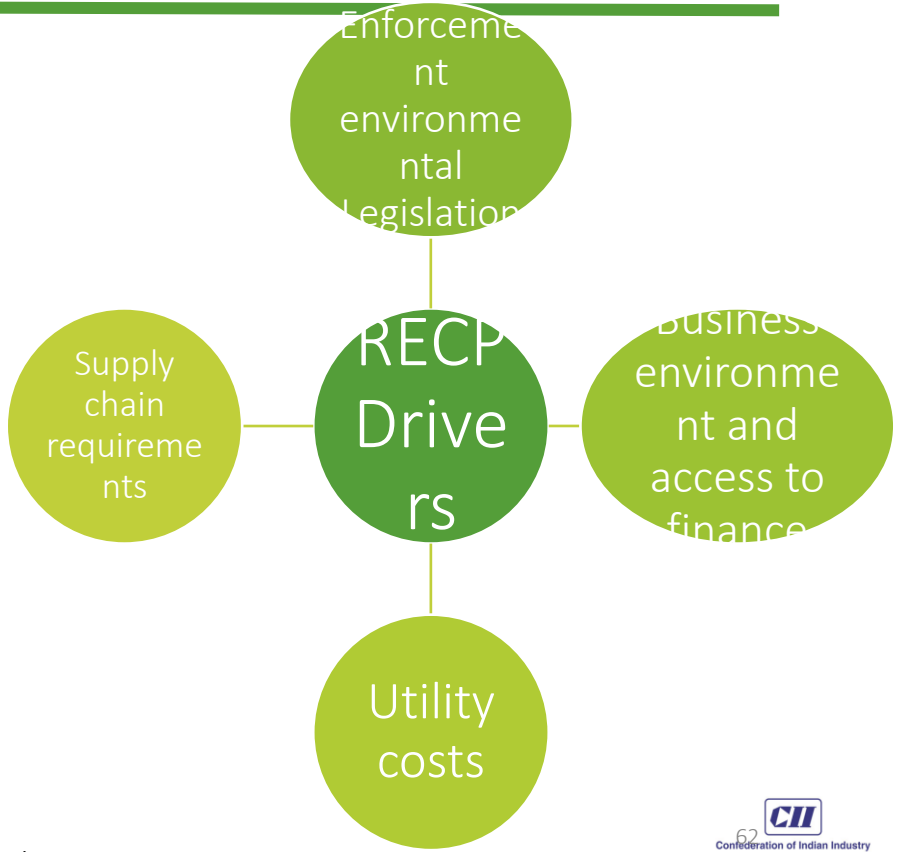
Sl. NO	SECTORS	Pollution Intensity			RECP Potential				
		Air Pollution	Water Pollution	Solid/Haz. Waste	Energy Efficiency	Water Conservation	Material Conservation/Waste Management	Lean Manufacturing	Cleaner Production (Chemical, process)
1	Electroplating	H	H	H	H	H	H	H	H
2	Engineering units (Metal surface treatment)	H	H	H	H	H	H	H	H
3	Pharmaceuticals (bulk drugs)	H	H	H	H	H	H	M	H
4	Dairy and Dairy products (Integrated)	H	H	H	H	H	M	H	M
5	Tannery	M	H	H	H	H	H	H	H
6	Textiles (Yarn, Dying & Printing)	L	H	H	H	H	H	H	H
7	Chemical Pesticides	H	H	H	H	H	H	M	H
8	Recycled Paper	H	H	M	H	H	H	L	H
9	Common treatment and disposal facilities(CETP, TSDF, E-Waste recycling, CBMWTF, effluent conveyance project, incinerator, solvent/acid recovery plant, MSW sanitary land fill site)	H	H	H	H	H	H	M	H
10	Dye & Dye intermediates (Located outside notified industrial area)	H	H	H	H	H	H	L	H
11	Dye & Dye intermediates (Located inside notified industrial areas)	H	H	H	H	H	H	L	H
12	Manufacturing of paints, varnishes, pigments and intermediate	H	H	H	H	H	H	L	H
13	Organic chemical (Located outside notified industrial area)	H	H	M	H	H	H	L	H
14	Organic chemical (Located inside notified industrial areas)	H	H	M	H	H	H	L	H
15	Wood & Agro Based Paper mill (with pulping)	H	H	M	H	H	H	L	H

Sectoral Potential

Sl. NO	SECTORS	Pollution Intensity			RECP Potential				
		Air Pollution	Water Pollution	Solid/Haz. Waste	Energy Efficiency	Water Conservation	Material Conservation/Waste Management	Lean Manufacturing	Cleaner Production (Chemical, process)
15	Wood & Agro Based Paper mill (with pulping)	H	H	M	H	H	H	L	H
16	Foundry and Forging units	H	L	M	H	L	H	H	H
17	Cotton spinning and weaving (medium and large scale)	H	L	L	H	H	H	M	H
18	Pharma (Formulation)	L	M	M	H	H	H	M	H
19	Distilleries (All molasses and sugarcane based >30 KLD)	M	H	H	H	H	H	L	H
20	Distilleries (All non-molasses and sugar based <30 KLD)	M	H	H	H	H	H	L	H
21	Dairy and Dairy products (Small scale)	H	H	M	H	H	M	H	L
22	Paints and varnishes (mixing and blending)	M	H	M	H	H	H	L	H
23	Tyres and tubes vulcanization/ hot retreating	M	M	L	H	H	H	M	H
24	Fish feed, poultry feed and cattle feed	H	M	L	H	H	H	M	H
25	Spray painting, paint baking, paint shipping	M	L	M	H	H	H	H	H
26	Glass ceramics, earthen potteries and tile manufacturing with fossil fuel kiln	M	M	L	H	H	H	M	H
27	Glass , ceramic, earthen potteries, tile and tile manufacturing using electrical kiln	L	M	L	H	H	H	M	H
28	Edible Oil & Vanaspati (>100 KLD waste water generation)	L	H	M	H	H	M	L	M
29	Soft Drinks	L	M	L	H	H	H	M	M
30	Ceramics	H	L	L	H	L	M	H	H
31	Glass Manufacturing & Processing	H	L	L	H	H	M	L	H

RECP – Implementation in India MSMEs

- RECP is being implemented by industries in form –
  - Technology upgradation and operation optimization
    - Energy (Most focus)
    - Water (Depending on the costs – Textile, Chemical, etc)
    - Waste Management
    - Lean Manufacturing
    - Renewable Energy
  - Driven by cost savings and improvement in operations
  - Compliance to proactive approach



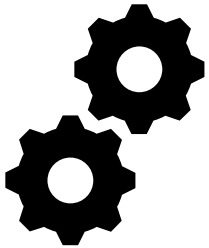
Key RECP initiatives

- Government Led Initiatives
  - National Manufacturing Competitiveness Program
  - CLSS
  - ZED Rating
  - MSME cluster development program
  - BEE EE in SME Program
  - GCPC
- Financial Institutions
  - SIDBI Programs/Schemes
  - SBI Program
- Voluntary Programs
  - GreenCo Rating

Implementation RECP in MSMEs

RECP Audits – Material, Energy Balances, waste audits, lean manufacturing etc.

Rating & Certification – GreenCo, ZED Rating, ISO

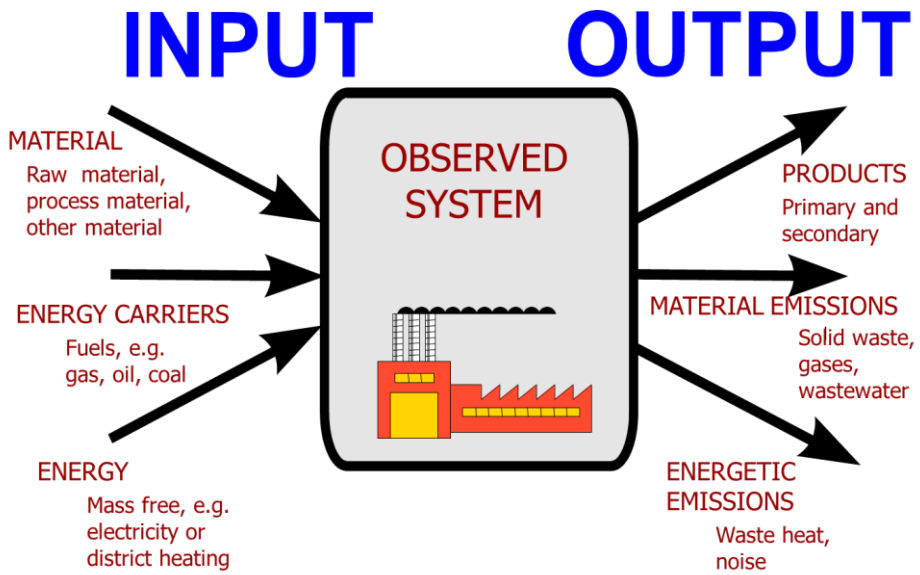


Tools

MFCA, LCA, Chemical Leasing, Industrial Ecology, Green Chemistry etc.

RECP Audit

- Measurement and analysis in various section
  - Total amount of energy used
    - Thermal , Electrical
  - Total material flow
    - Raw , Waste Production Information
  - Total water consumption
  - Waste Mapping
  - Analysis of water and air emissions
  - Quantification of emissions
- Evaluation of results
- Identification of opportunities
  - Feasibility Analysis
    - Techno-commercial analysis



MFCA

- Objective : To pilot, upscale and upstream RECP activities in SME
- Pilot Sectors
  - Engineering (5 units)
  - Food & Beverage (5 units)

Pilot Companies (10 Companies)

TWEEZERMAN
The Beauty Tool Experts™

ITC Limited

Amrutanjan
Pure Healthy Essence

UNIDO

Global Network
Resource Efficient and Cleaner Production
RECPnet

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs FDEA
State Secretariat for Economic Affairs SECO

- Focus for improvements
  - Rejection reduction
  - Material Conservation (process, utilities, packaging)
  - Yield Improvement

MFCA Expert

Approach

New concept

2-3 months implementation

Capacity Development

Handholding & Systems

Opportunities Identification

Quantification of Savings

Implementation

Collaborative approach

Involvement at all levels

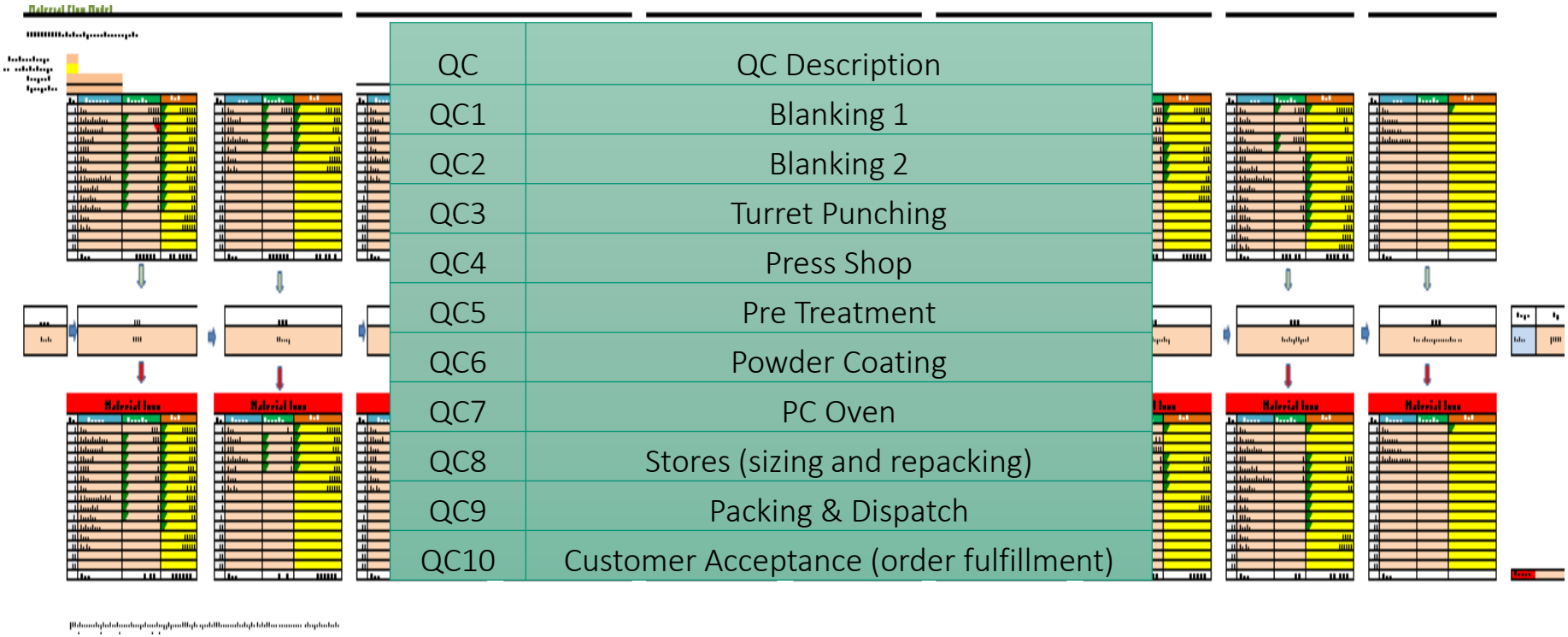
Material Inputs/Loss Identification

Identification of Opportunities

Focus on consumables also

Case Study – 1 - Storage solutions - Manufacturing

FLOW MODEL



QC	QC Description
QC1	Blanking 1
QC2	Blanking 2
QC3	Turret Punching
QC4	Press Shop
QC5	Pre Treatment
QC6	Powder Coating
QC7	PC Oven
QC8	Stores (sizing and repacking)
QC9	Packing & Dispatch
QC10	Customer Acceptance (order fulfillment)

Case Example 1 – Pilot Studies

Example : CTLL Process

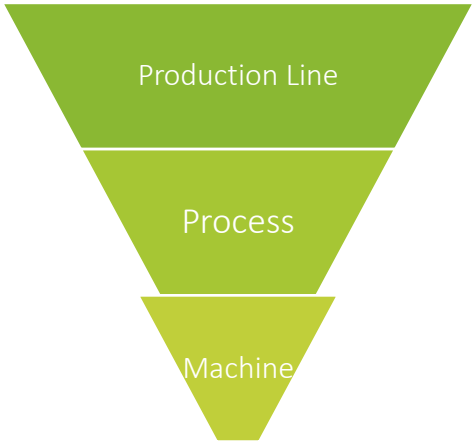
Material Input

No.	Type of Input	Quantity (kg)
1	Steel	282370.0
2	Electricity	
3	Coil Packing Material	1785.0
4	Rust Prevention Oil	16.2
5	Hydraulic Oil	3.7
6	PPE Kit	18.3
7	H Diesel	32.2
8	Tools	0.8
9	3m Tape nylon braided	5.0
10	Banian Cloth	10.0
11	Cotton Waste	3.0
12	Masking Tape	2.0
	Total	**284246.2**

Material loss

No.	Material loss	Quantity (kg)
1	Steel	4274.0
2	Electricity	
3	Coil Packing Material	1785.0
4	Rust Prevention Oil	1.6
5	Hydraulic Oil	3.7
6	PPE Kit	18.3
7	H Diesel	32.2
8	Tools	0.8
9	3m Tape nylon braided	5.0
10	Banian Cloth	10.0
11	Cotton Waste	3.0
12	Masking Tape	0.0
	Total	**6133.6**

Productivity @ different Levels



Insights - Scrap Generation

QC Description	Percentage of Scrap	No of Machines
Blanking 1	10%	1
Blanking 2	14%	1
Turret Punching	40%	2
Press Shop	35%	37
Pre Treatment	0%	
Powder Coating	0%	
PC Oven	0%	
Stores (sizing and repacking)	0%	
Packing & Dispatch	0%	
Customer Acceptance (order fulfillment)	0%	

Constructing the flow model helped in figuring out where high amount of scrap is generated

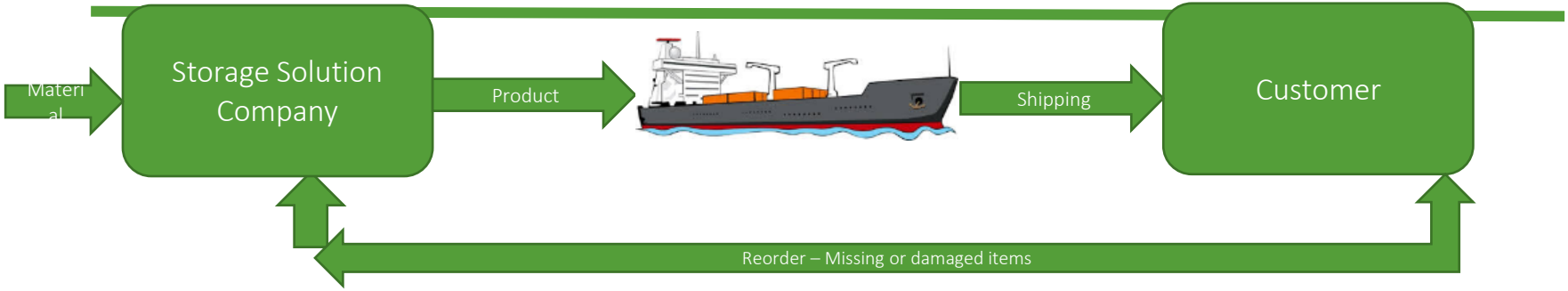
Observation

- Turret punching was generating more scrap as opposed to thought of press shop being the major contributor

Kaizens Proposed

- ❖ Instead of punching out the entire component from turret, take zero reference from machine bed and punch out the remaining two sides for accuracy.
- ❖ Repositioning machine clamp so that components can be punched out near to zero reference
- ❖ Punching out “C” class items (small components)from the blank which goes unused

Insights - Replacement



Component Cost: Rs. 681	Re-order Component Cost: Rs. 820 – Rs. 13,000	Opportunity Cost: Rs. 1,30,000	Suggestion: Inclusion/Improvement of Quality Check before Dispatch

Insights - Replacement

Cost Heads	Component Cost	Cost of replacement (ordinary case)	Cost of replacement (extreme case)
Raw material	189	189	189
Press Shop cost	428	554	554
Paint shop cost	37	37	2,604
Packing Cost	5	18	18
Packing Material Cost	11	11	65
Freight , Documentation & Clearance (approx)	10	10	10,500
Total Cost (INR)	681	820	13,930
Opportunity Cost (Products that can be produced during that time period)	1,12,000		

Cost estimate for Rejects/Replacements demanded by Customer

Case Study 2 – Beverage Company

Process

Mixing

Pasteurising

Filling

Cooling

Sleeving

Packing

Overall Juice Product and Reject (Conventional)

No.	Input	Quantity (kg)
1	Material A	13760.0
2	Material B	19720.0
3	Material C	123.3
4	Material D	174.0
5	RO water (only for Juice)	89900.0
	Total Input	**123692**

Input	**Quantity (kg)**
Cap	1130.4
180 ML Bottle	5156.3
250 ML Bottle	111.0
500 ML Bottle	1516.6
1000 Ml Bottle	46.9
Input	**7961**

Total Input: 131923 kgs

Resource Productivity : 96%

Product 127389.7 kgs

MFCA Productivity

No.	Input	Quantity (kg)
1	Material A	13760.0
2	Material B	19720.0
3	Material C	123.3
4	Material D	174.0
5	RO water (only for Juice)	89900.0
	Total Input	**123692**

+

Input	Quantity (kg)
Cap	1130.4
180 ML Bottle	5156.3
250 ML Bottle	111.0
500 ML Bottle	1516.6
1000 Ml Bottle	46.9
Input	**7961**

+

Input	**Kgs**
Steam	9300.0
RO Water for Cleaning	27000.0
RO water for rinsing	29000.0
Caustic Soda	72.0
Input	**65372**

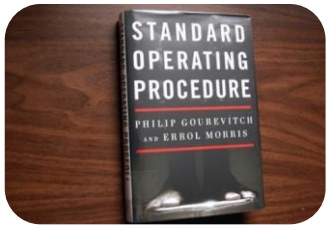
Total Input: 197025 kgs

Product 127389.7 kgs

Resource Productivity : 65%

Identification of Waste

- Start-up Losses
- Filling Losses
- Defect Losses
- Unaccounted Losses
- Customer Requirement/Supplier Losses
- Machine Losses
- Energy Efficiency Improvement (more than 15 measures)



SOP


Machine Loss


Human

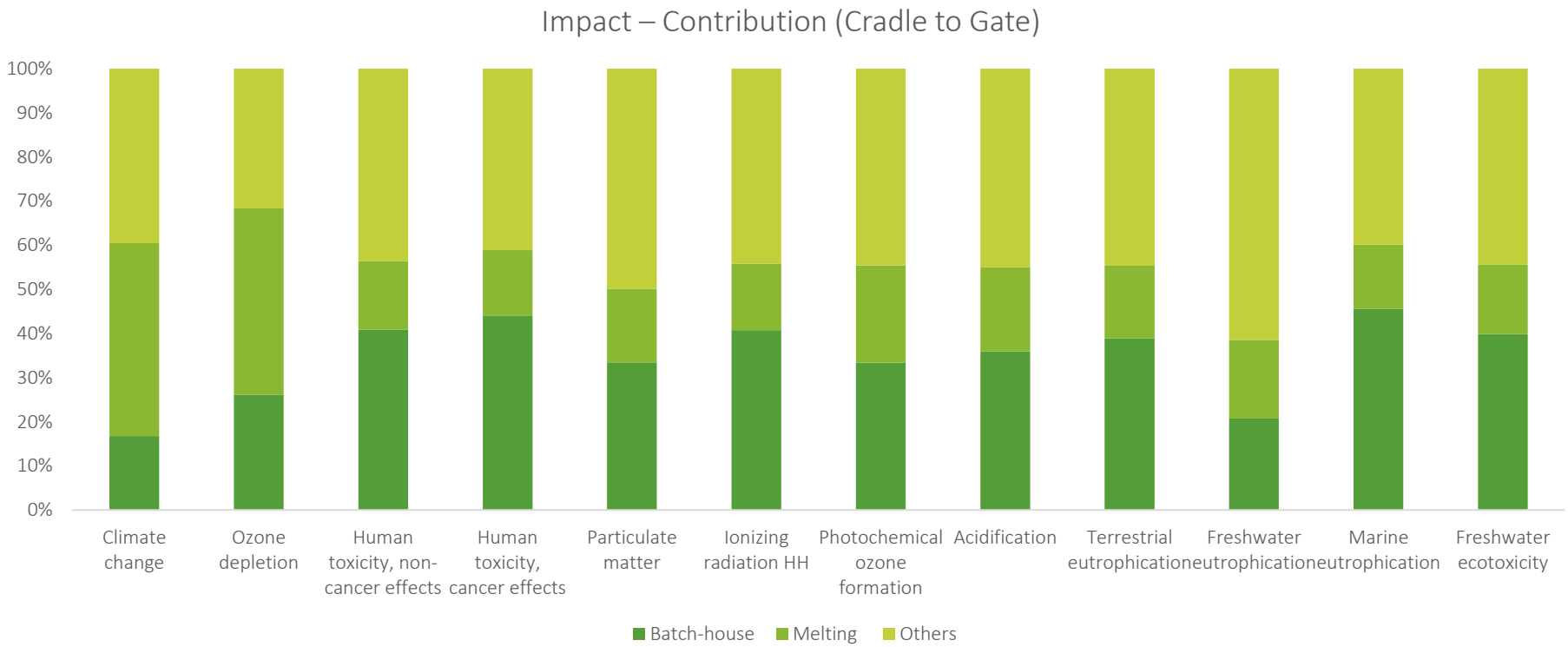

Customer/Supplier Requirement

Life Cycle Assessment Study – Glass Industry

LCA Methodology

Glass Manufacturing Process

LCA – Impact Contribution



Cradle to Cradle Impact Reduction (Per tonne glass)

Impact category	% - Impact Reduction
Climate change	13.70%
Ozone depletion	15.75%
Human toxicity, non-cancer effects	17.73%
Human toxicity, cancer effects	17.84%
Particulate matter	11.40%
Ionizing radiation HH	17.45%
Photochemical ozone formation	14.96%
Acidification	16.30%
Terrestrial eutrophication	16.76%
Freshwater eutrophication	9.18%
Marine eutrophication	19.80%
Freshwater ecotoxicity	16.32%
Land use	6.81%
Water scarcity	22.35%
Resource use, energy carriers	11.84%
Resource use, mineral and metals	26.86%

Impacts – Increasing Renewable Energy

Impact Category	% Reduction in Impacts
Climate change	6.20%
Ozone depletion	4.33%
Human toxicity, non-cancer effects	7.48%
Human toxicity, cancer effects	7.97%
Particulate matter	7.39%
Ionizing radiation HH	5.32%
Photochemical ozone formation	4.97%
Acidification	6.67%
Terrestrial eutrophication	6.26%
Freshwater eutrophication	14.61%
Marine eutrophication	6.56%
Freshwater ecotoxicity	5.62%
Land use	-
Water scarcity	6.17%

Summary

- RECP provides a great opportunity to reduce environmental impacts, create customer satisfaction and generate greater profits
- Many tools for implementation of RECP
  - ZED, GreenCo, MFCA, quality tools, supply chain support
- A few international agencies have ongoing programs for RECP
- Some banks have specific products for EE
  - Specific products for other RECP initiatives not available yet
    - Many bank interested in such products – may be available in the near future
- Many government schemes also support some elements of RECP

RECP implementation ecosystem is available in the country
CII would be glad to support MSMEs in their RECP journey

Contact:
Atik Sheikh
CII - Godrej Green Business Centre, India
Atik.sheikh@cii.in
+91 8600331477

THANK YOU !

For any queries related to energy efficiency log in @

CII Energy Efficiency Helpdesk

http://energy.greenbusinesscentre.com/sup/

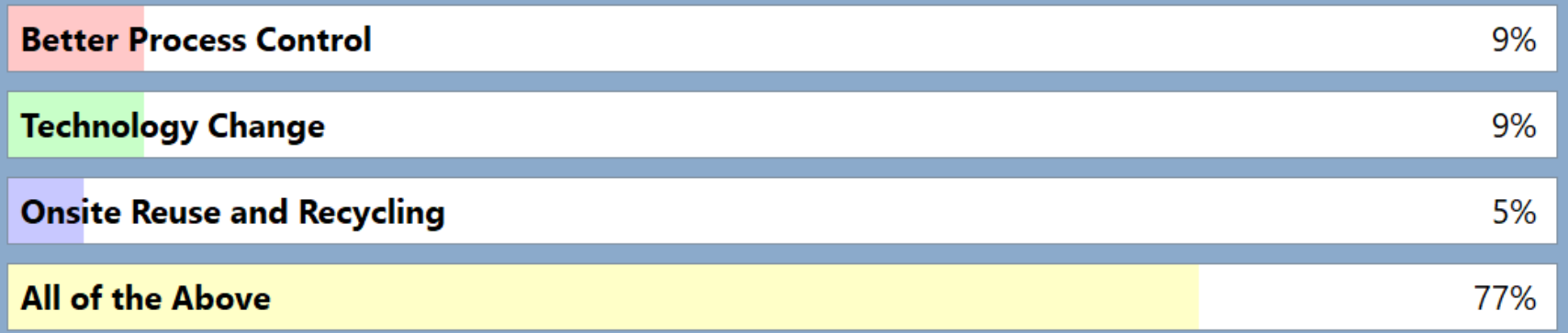
For latest updates on energy efficiency please visit

http://www.energy.greenbusinesscentre.com/

QUESTION & ANSWER SESSION I

Which of the following are examples of RECP practices?

Poll Results (single answer required):



PART II: OPERATIONALIZING RECP

RESOURCE EFFICIENCY: EXPERIENCE SHARING OF AN MSME

Kathiresan Arunachalam, *Owner, Syndicate Impex*

- Video Clip 1: https://www.youtube.com/watch?v=Wk5-rZr2O5Q&t=78s

ecohike®

mizo
MISSION ZERO

Vision - Mission.

VISION

To produce garments with least environmental impact and create awareness across boundaries on sustainable fashion.

MISSION

To evolve as a sustainable textile solutions company by adopting closed loop manufacturing with **Mission ZERO** program; creating ZERO landfill with our products.

mizo
MISSION ZERO

Ecohike is brought to you by:

SYNDICATE IMPEX
Garment Manufactures & Exporters

- First generation entrepreneurs
- India‘s first GreenCo certified green garment facility
- Production capacity: 3 Lakh T-shirts per month
- Adherence to leading green standards:

www.ecohike.in

Statistics:

- Number of garments sold in INDIA in 2019 - 300 cr.
- Garments made of polyester >50%.
- Sales expected to increase by 11.6% YoY.
- Less than 1% of the garments recycled after life cycle.
- 99% of Old / damaged garments go to landfill .
- Polyester garments take about 800 years to decompose, much like PET.
- Recycling PET to polyester, the life cycle is extended by another 3-5 yrs and eventually the garments still end up in landfills.
- Currently we have almost 100 garments landfill / capita in India which will never be recycled.

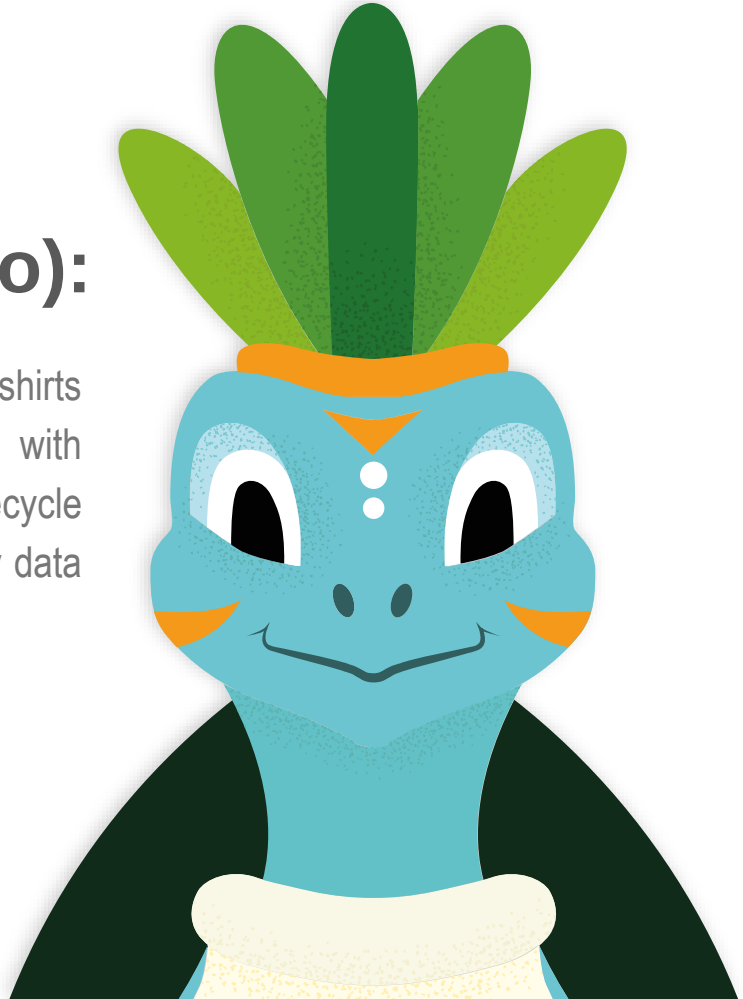
Ecohike manufacturing video:
https://youtu.be/aFxc586lPPU

mizo
MISSION ZERO

mizo
MISSION ZERO

Mission for MiZo(Mission Zero):

We, as a brand not only manufacture and promote sustainable t-shirts to brands , but also collect the old t-shirts after their lifecycle with discounts / minimum buy back price from the customers and recycle them back to a product of same quality; with complete traceability data creating Zero Landfill with our products.



Our contributions to UN-SDGs :

SUSTAINABLE DEVELOPMENT GOALS

We are proud to say that through our unique and sustainable way of manufacturing, our products contribute directly and indirectly to the following Sustainable Development Goals (SDGs) defined by **UNDP.**

What is Ecohike tee:

It takes about 2,600 litres of water to make one cotton T-shirt. The water consumption starts from the cotton farms, continues to the dyeing and post-production washing in the factories. Ecohike T-shirts need a fraction of that water as they are entirely made of recycled PET plastic bottles and are non-dyed!

12 PET Bottles Recycled

No Dyeing or Bleaching done

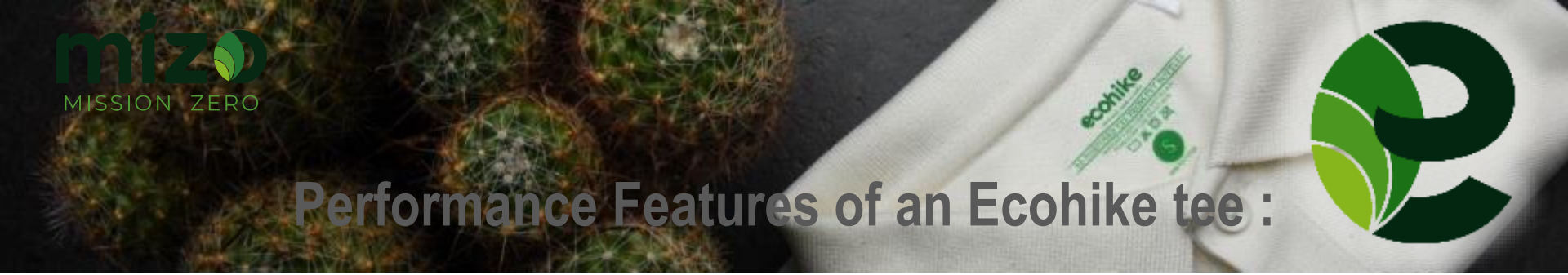
2600 Liters of Water Saved

No Pesticides & Fertilizers Used

70% less CO2 Emmission

250 grams of Landfill Saved

**The above saving comparison based on normal cotton M size t-shirt*



Performance Features of an Ecohike tee :

- ODOUR FREE
- FAST DRYING
- PREMIUM QUALITY
- ANTI-MICROBIAL FINISH
- LONG LASTING PERFORMANCE
- EASY CARE
- MOISTURE WICKING
- SUPERIOR COMFORT
- SOFT & SKIN FRIENDLY

www.ecohike.in

Sustainable labeling and Packing:

Label :

The product label is another sustainable innovation, where the user rather than discarding it, can plant the tag and grow an organic plant.

Packaging :

As part of our zero-poly-bag initiative, each t-shirt is roll packed in a re-purposed draw-string pouch. This can also be re-used beyond the intended purpose.

MISSION zero

Problem Statement....

- Growing PET bottle waste in India
- Need for effective management of textile waste in India
- Need for Marine conservation - life decreasing due to PET bottle / Textile waste
- Impact on water Pollution due to textile dying in India .
- Growing numbers of overcapacity Textile landfills.





MISSION zero

Product Variations:

POLO COLLAR T-SHIRT

ROUND NECK T-SHIRT

SIZE RANGE

XS-3XL

REUSABLE NAPKINS

www.ecohike.in

Life Cycle Assessment (ENVIROMENTAL SAVING):

- 14.600 Kg of CO2 / Yr.
- 438.000 Ltrs of water / Yr.
- 6.000 Kg of landfill / Yr.

www.ecohike.in

Awards & Accolades:

- One of the 10 finalists among 900 contestants for UNO – SEED AWARD 2019, Germany.
- MoU with Indian Railways for Circular Economy Program.
- First company Listed in GeM (Government e-Market) portal under Clean tech category.
- First garment company in India to work on CLOSED LOOP program to ensure ZERO LANDFILL from product.

" BE A PART OF THE SOLUTION
NOT POLLUTION "

GeM
Government
e Marketplace

Signature
COLLECTION

NON DYED

ecohike®

SAVE IN WHAT U WEAR

FOR CORPORATE ENQUIRES

+91 421 424 4885
+91 98947 14983

NO MINIMUM
ORDER QUANTITY

MANUFACTURED AND MARKETED BY

SYNDICATE IMPEX
Garment Manufactures & Exporters

5B, R.V.E. Thottam, Velan Nagar, Thennampalayam, Tirupur - 641 604. Tamil Nadu, INDIA
info@syndicateimpex.com www.ecohike.in

- Video Clip 2: https://www.youtube.com/watch?v=aFxc586lPPU

CLEAN PRODUCTION: RENEWABLE ENERGY

Ashok K Thanikonda, *Manager, Energy Programme, WRI India*

Renewable Energy for MSMEs

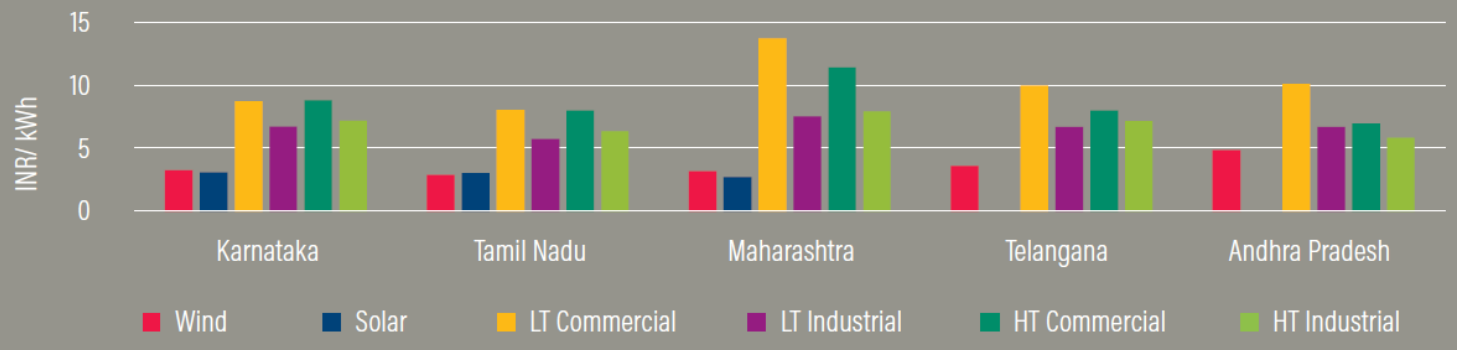
Ashok Thanikonda

WRI INDIA

10/03/2021

Why Renewable Energy (RE)?

FIGURE B-1 | BENCHMARK COST OF WIND AND SOLAR POWER VERSUS ELECTRICITY TARIFFS IN MAJOR INDIAN STATES

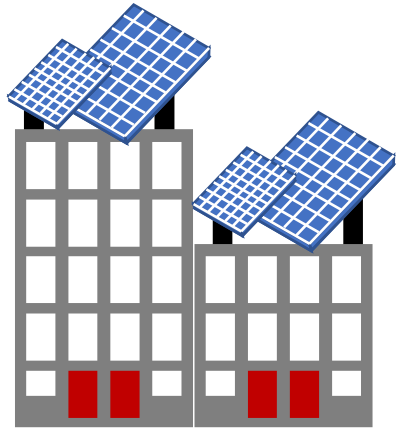


Note: [a] The figures for the cost of power are sourced from the latest available tariff orders of the respective states. [b] The solar power costs correspond to grid-connected, MW-scale projects—and usually exclude Accelerated Depreciation (AD) (a Government-of-India-approved methodology in which RE projects depreciate at a higher rate in the initial years of the project, a concept useful for minimizing taxable income). [c] The wind and solar costs are at the bus bars of the respective plants; additional grid usage charges and surcharges will apply. Even considering these, C&I consumers gain Rs. 1–2 in comparison with the utility tariff. [d] Maharashtra's wind tariff is applicable for Zone 4 as classified by Maharashtra Energy Development Agency (MEDA). [e] High tension (HT) tariffs usually correspond to 33 kilovolts (kV).

WRI INDIA

Solar PV for MSMEs!

- Cheaper
- Modular
- On-site
- Easy maintenance
- More predictable and easier to store



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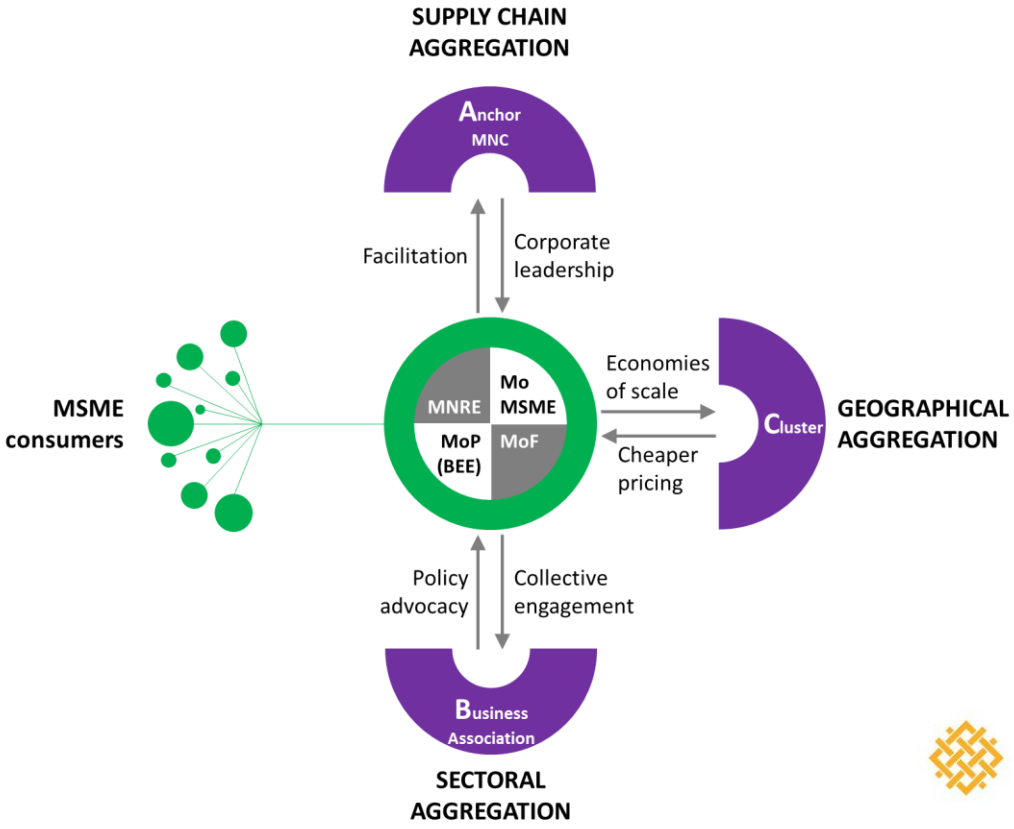
Barriers for MSMEs to access RE

- Low awareness about techno-commercial aspects
- Operating out of leased premises, and utility meter being on landlord's name
- No tailor-made net/gross metering, and subsidy schemes
- 65 million MSMEs, representing 40% of all the MSMEs in 128 countries, are credit constrained. This is a barrier to sign Power Purchase Agreements (PPAs) with Independent Power Producers (IPPs)
- Cannot invest in on-site renewable energy (solar) plants
- Risk of delaying or defaulting on payments to IPPs is called counterparty credit risk, and in case of India adds as much as 1.07% of additional risk premium to the cost of debt for RE projects.

Models to scale up clean energy in MSMEs



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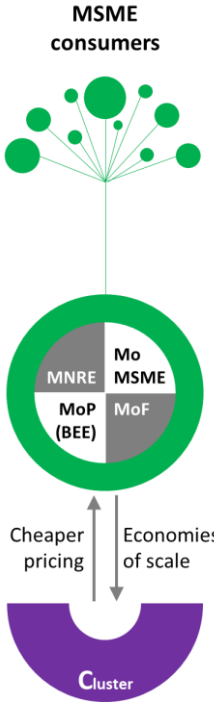
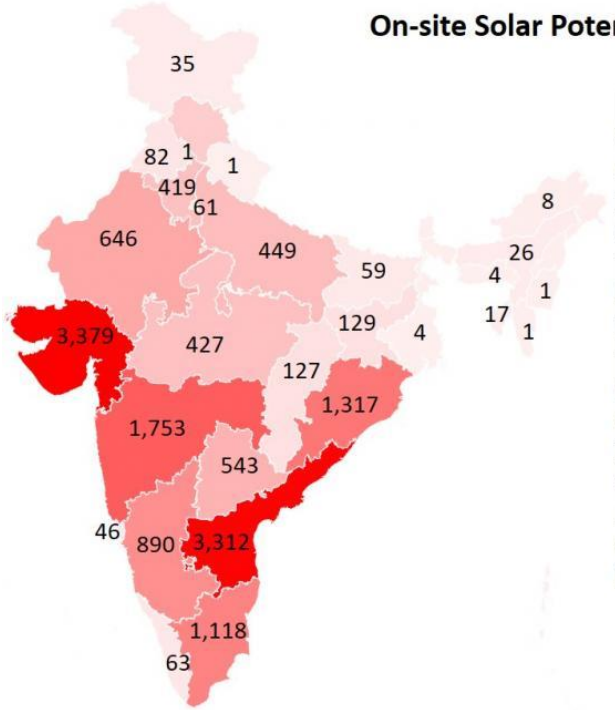
Scale up technical assistance for MSMEs interested in capex model for solar



WRII successfully demonstrated this model with 160 kWp of rooftop solar in two MSME clusters in Naroda and Aurangabad. Another 441 kWp is underway.



On-site Solar Potential (MW) of India's Industrial Agglomerations

State/ Union Territory	MW	State/ Union Territory	MW
Gujarat	3,379	Kerala	63
Andhra Pradesh	3,312	Delhi	61
Maharashtra	1,753	Bihar	59
Odisha	1,317	Goa	46
Tamil Nadu	1,118	Jammu & Kashmir	35
Karnataka	890	Assam	26
Rajasthan	646	Puducherry	19
Telangana	543	Tripura	17
Uttar Pradesh	449	Arunachal Pradesh	8
Madhya Pradesh	427	Meghalaya	4
Haryana	419	West Bengal	4
Himachal Pradesh	309	Uttarakhand	1
Jharkhand	129	Chandigarh	1
Chhatisgarh	127	Mizoram	1
Punjab	82	Nagaland	1

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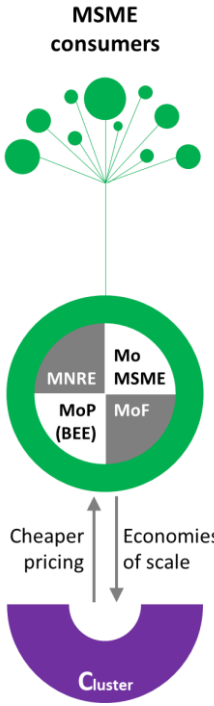
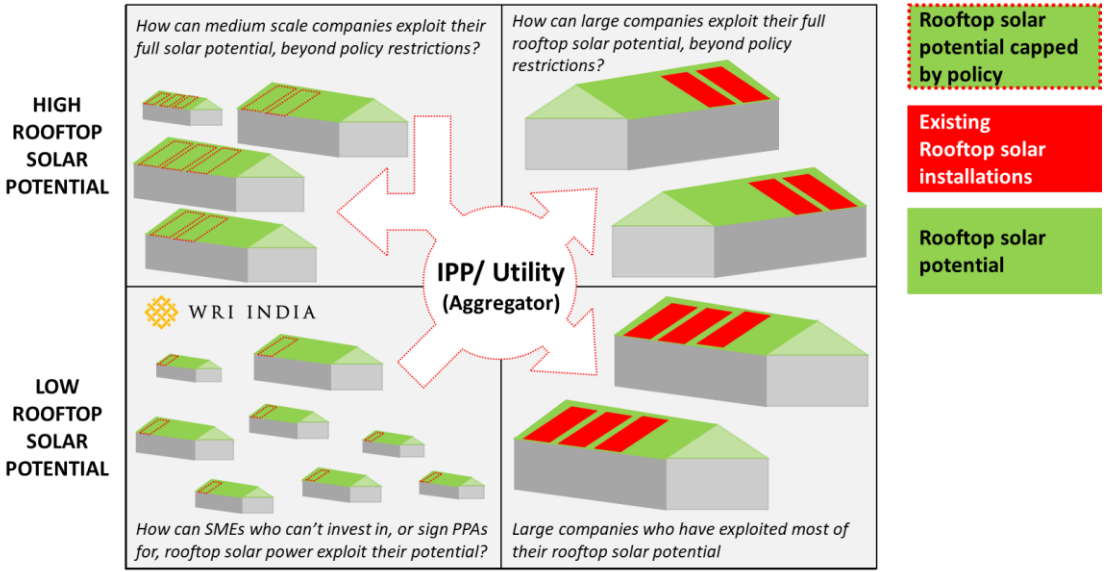
Drive policy changes conducive for rooftop solar aggregation in SEZs



- Remove requirement of deemed distribution license for rooftop solar aggregation in SEZs
- Support utility owned rooftop solar projects in MSME clusters



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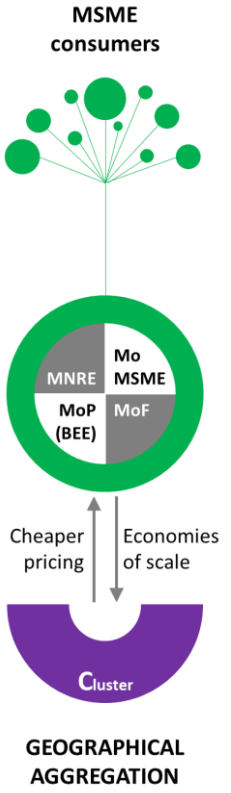
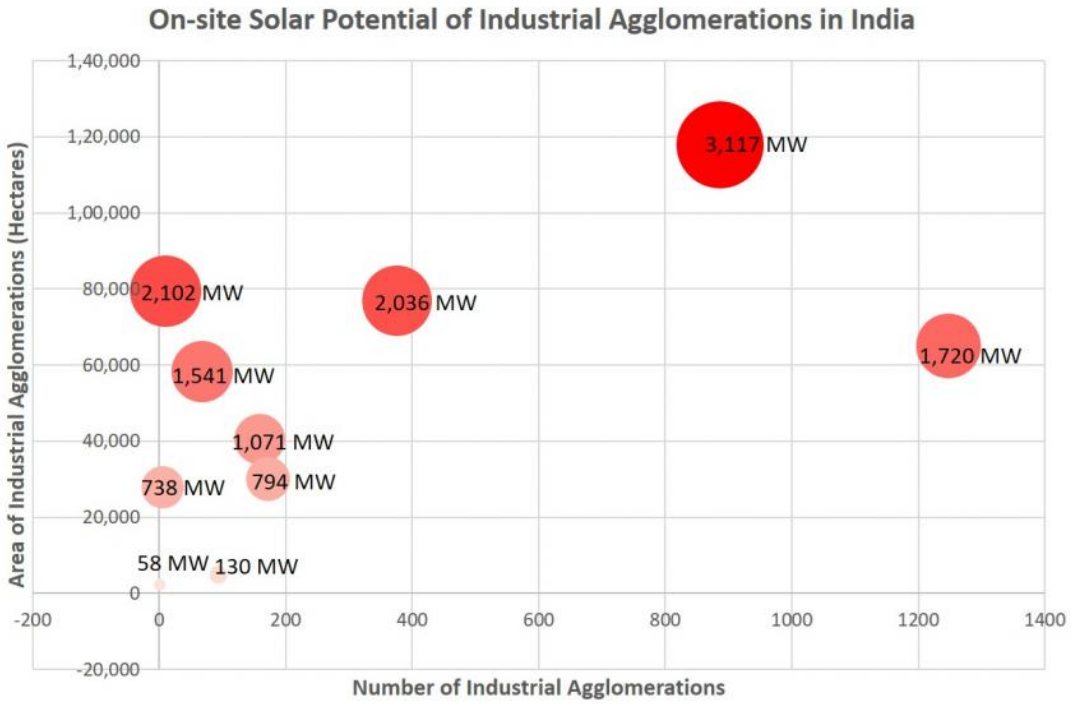
Drive policy changes conducive for rooftop solar aggregation in SEZs





MW	Agglomeration type
3,117	Industrial Areas
2,102	Industrial Corridor Nodes
2,036	Industrial Parks
1,720	Industrial Estates
1,541	Industrial Regions
1,071	Special Economic Zones
794	Others
738	National Investment and Manufacturing Zones
130	Industrial Clusters
58	Coastal Economic Zone

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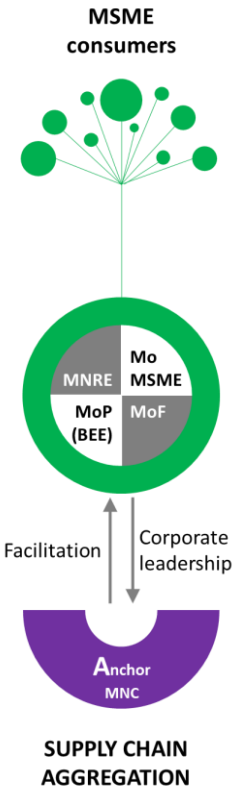
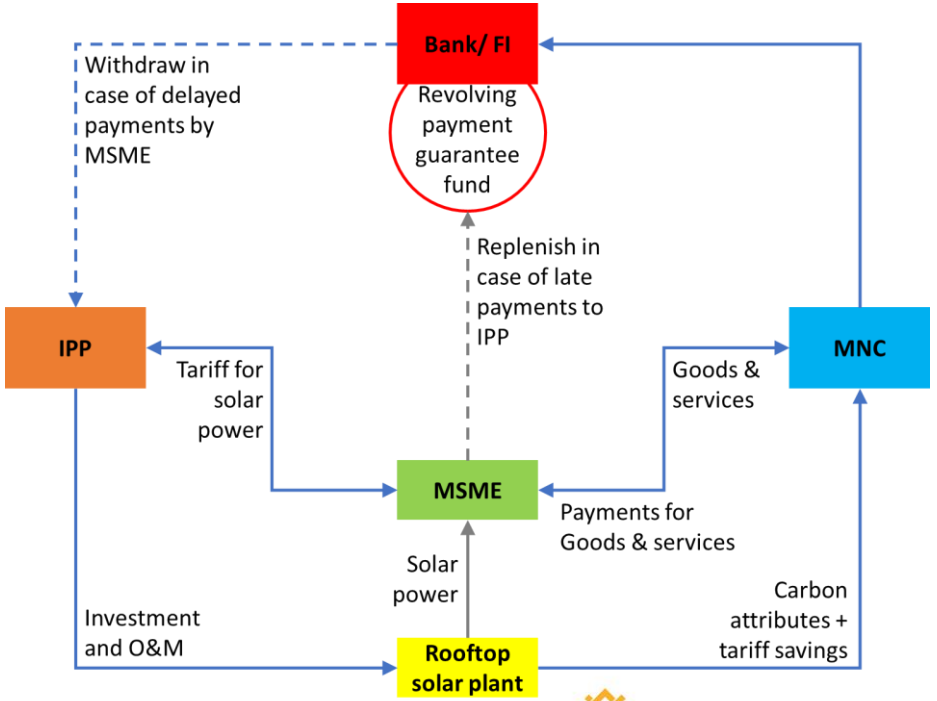
Mobilize corporate ambition to create risk mitigation funds for their supply chains



- Standardize the business model by capitalizing on various corporate sustainability initiatives (GPMDG, RE100, REScale, REDE etc.)
- Contribute to the payment guarantee fund



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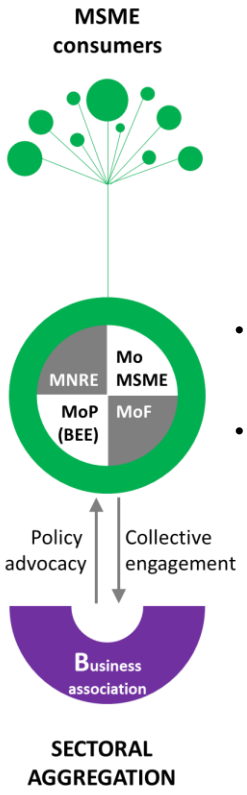
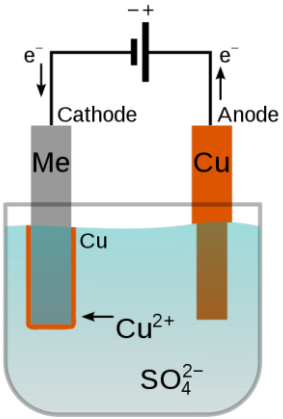
Devise sector-specific incentives, policies, and pilots



- Electroplating clusters require DC power. Such clusters may be solarized without inverters and net-metering
- Food-processing clusters need solar dryers



Electroplating process

Solar dryer

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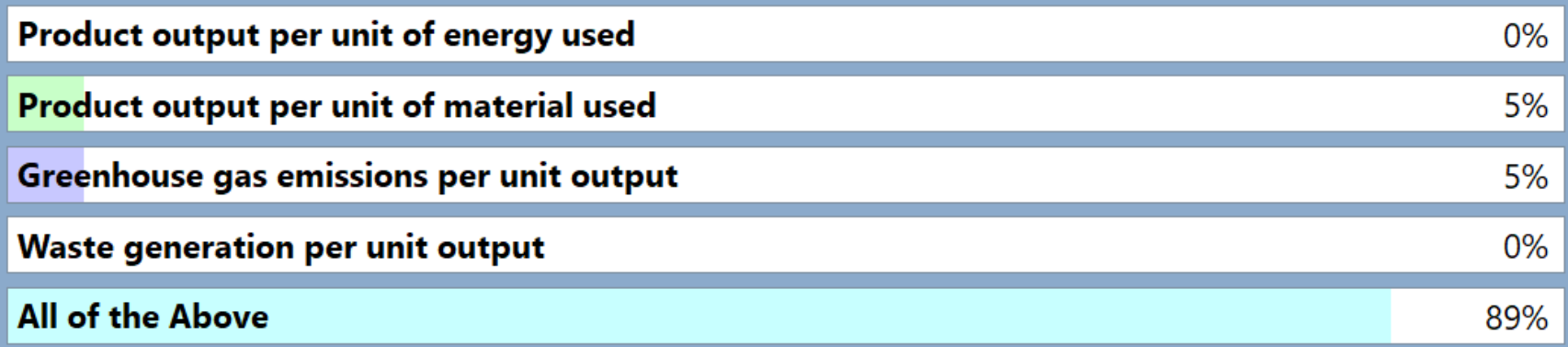
QUESTION & ANSWER SESSION II

Which of these indicators can be used by an enterprise to track RECP progress?

Poll Results (single answer required):



CLOSING REMARKS

Atik Sheikh, *Counsellor, CII-GBC*

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THANK YOU

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