
**Developing Capacity of
Stakeholders towards
Green Factories: An
Action Research**



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Introduction

- The Industrial sector is one of the most prominent sectors which drives the Indian economy. Its overall growth in 2008-09 has been reported to be 9.5%.
- The industries have pursued their manufacturing operations without giving much attention to environmental issue.
- This has resulted in impact on resources, besides creating impacts on human health and wellbeing.
- This indicates towards a rampant need for the development and adoption of green building rating systems in manufacturing sector.



Green Factory Rating System

Aspect of Green Factory



**Water
Conservation**



**Material
Conservation**



**Energy
efficiency**



Site Selection



**Indoor
Environment
Quality**



Kind of Rating system addressing Industrial buildings



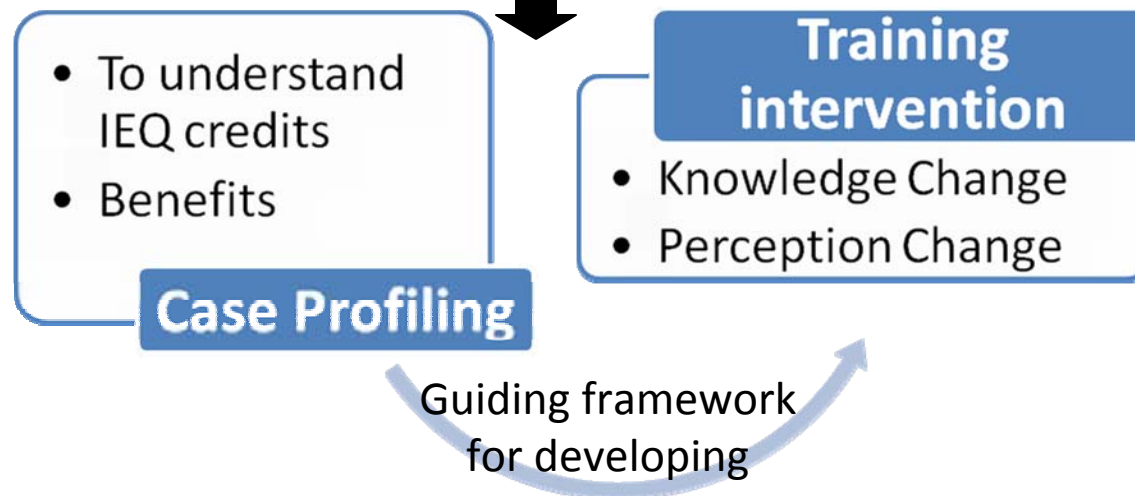
Significance

Stakeholder participation and awareness is required for initiation of this movement



Training programme was thus sought to be a tool for awareness and information sharing to empowering stakeholders

The research focused on





Objectives

- To do case profiling of operational green factories.
- To study the knowledge and perception of stakeholders vis a vis green factories.
- Developing a need based training program regarding Indoor environmental quality in factories.
- To conduct the training program to generate awareness regarding Indoor environmental quality and occupational health in factories.
- To study post training change in knowledge and perception regarding green factories.
- To appraise the training program from the perspective of stakeholders.



METHODOLOGY

LOCALE

Intervention –
NCR

Case profile

- Grundfos Pvt Ltd, Chennai
- SFK India, Haridwar)

SAMPLE

Stakeholders from
manufacturing corporations in
NCR

Top managers

+

Middle managers



Selection

Phase-1- Selection of the Organization

A listing of all the manufacturing corporations located in Capital and National Capital Region



The corporations were contacted through mails and explained the purpose of the study.



Two were selected randomly



Organizational structure of these organizations was studied



Specific level of managers were targeted and included in the training program



Selection

Phase-2 Selection of sample

The sample comprised of all the top and middle level manager who were deputed by the organization for training.



Study tools

Case Study

- Checklist for green features
- A general framework for eliciting information of the project

Interview Schedule

- To assess the perception

Knowledge testing questionnaire

- To assess knowledge

Tool for Training Evaluation

- To assess affective and attitudinal responses to the training program



Training Program- Content

Training module 1: Awareness generation and motivation

- Session A: Understanding Sustainability
- Session B : Climate Change and Global Warming : Adaptation and mitigation
- Session C : Recapitulation

Training module 2: Green built environment

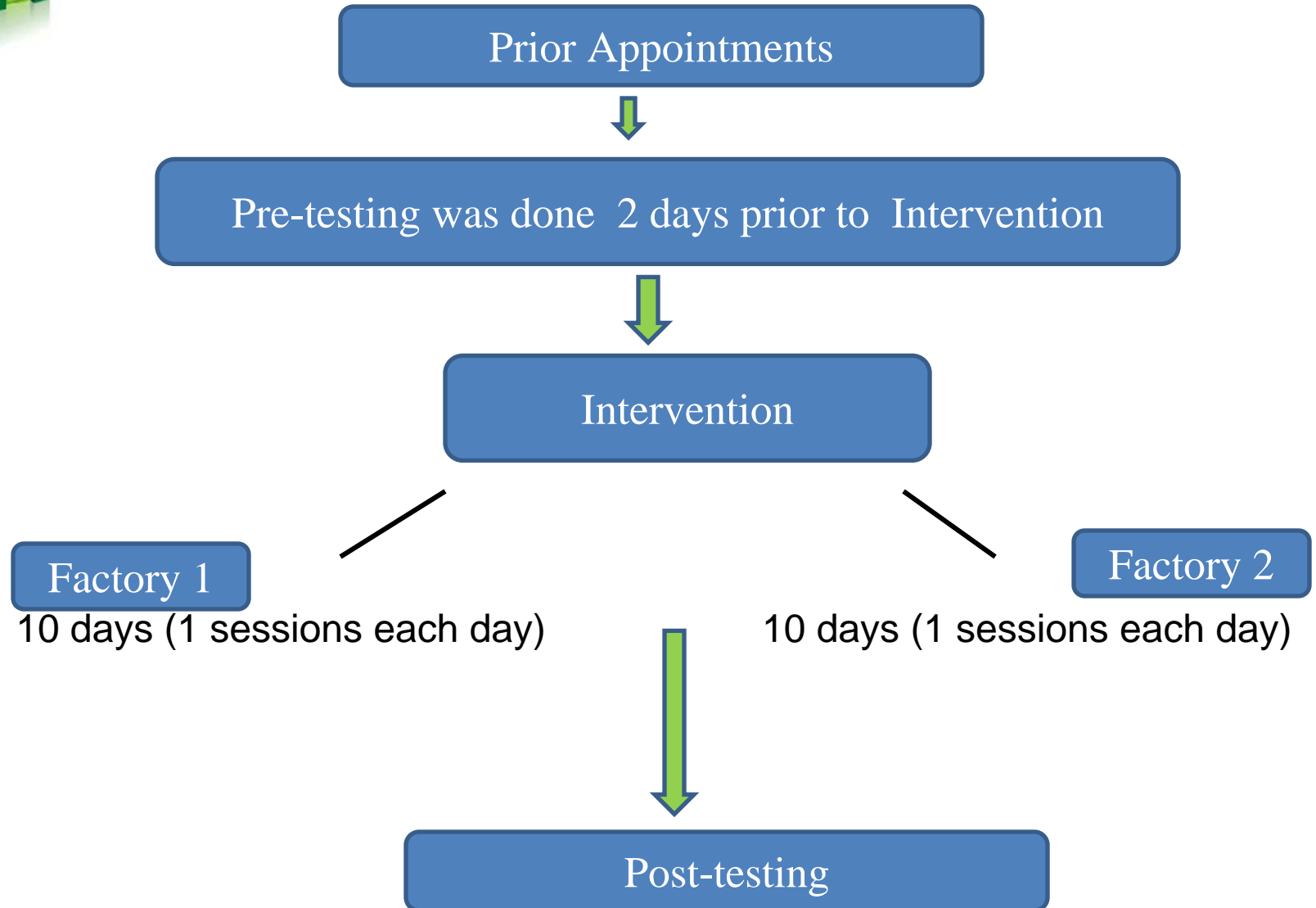
- Session A : Sustainable Built environment : Green buildings and Green Factories
- Session B : Green Rating Systems : IGBC and LEED (USGBC)
- Session C : Recapitulation
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Training module 3: IGBC Green Factory Rating system

- Session A: Green factory rating system
- Session B: Indoor Air Quality and occupation health : Benefits and Credits
- Session C : Recapitulation

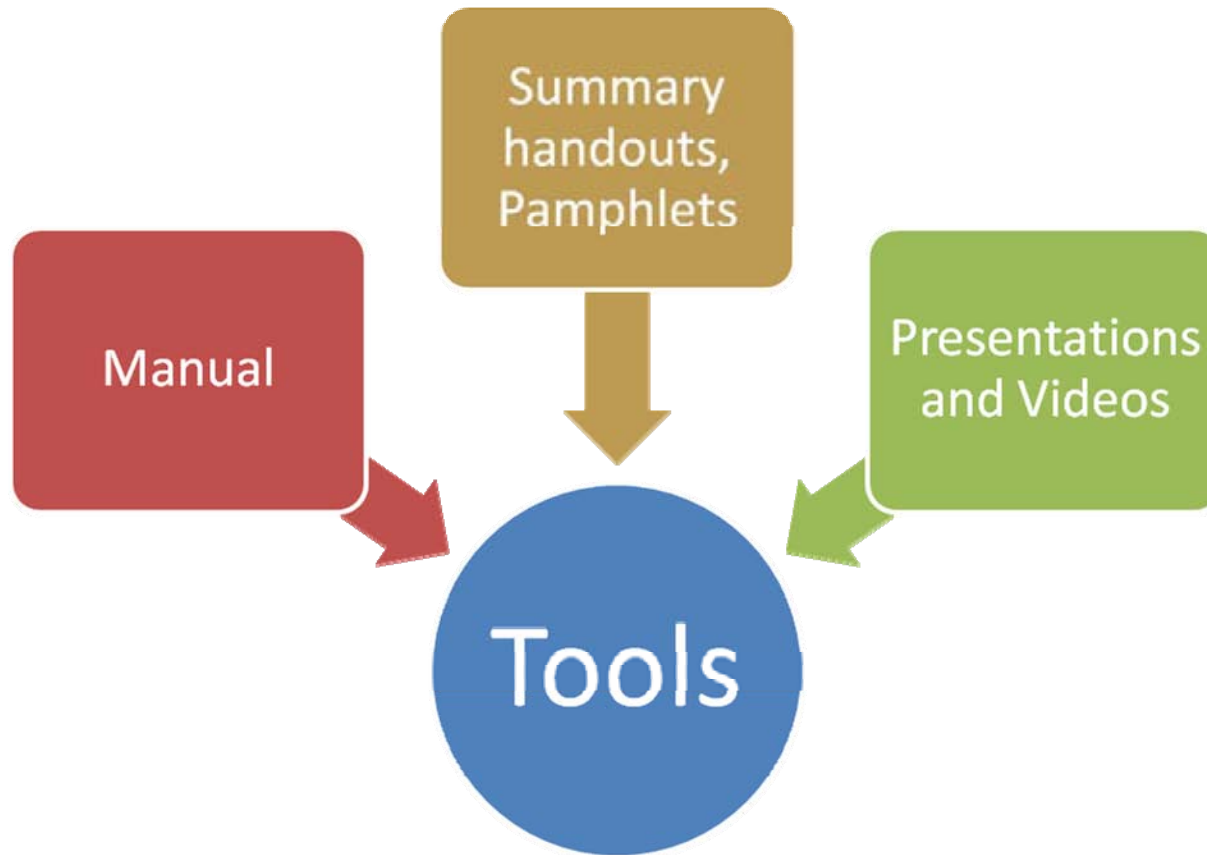


Intervention Schedule





Training Programme tools





Snapshot Training Manual

MODULE OVERVIEW

Adopting green practices for factory buildings will help in using resources efficiently, betterment of working conditions and enhanced productivity, thereby leading to substantial national benefits.

Green Factory

The Industrial sector is one of the most prominent sectors which drives the Indian economy. The industries have pursued their manufacturing operations without giving much attention to environmental issue. This has resulted in impact on resources, besides creating impacts on human health and wellbeing. This indicates towards a rampant need for the development and adoption of green building rating systems in manufacturing sector which will help in steering growth towards sustainable industrialization. This in turn can be accelerated by generating awareness amongst stakeholders of manufacturing sector to voluntarily adopt green practices for their factory buildings.

This module aims at generating awareness amongst stakeholders regarding the green factories with special reference to Indoor Environment Quality technologies. The module is targeted towards empowering the stakeholders to make potential improvements in the working conditions in their existing non-green factory buildings.



FINDINGS AND DISCUSSIONS



Case Profile - I

Grundfos Pumps Green Factory (Chennai)

- Registered for IGBC Green factory “Gold” certification in 2010
- It has applied for 80 points in total out of which 19 pertain to Indoor environment quality and Occupational Health

SKF India Factory, Haridwar

- Registered for IGBC Green factory “Gold” certification in 2010
- It has applied for 70 points in total out of which 9 pertain to Indoor environment quality and Occupational Health



IEQ Technologies

- A designated smoking room in the facility
- Use high efficiency filters at main HVAC intakes
- CO₂ sensors have been installed
- 95% daylight penetrates through windows for at least 95% regularly occupied areas
- Low emitting materials such as VOC sealant/ carpets/ composite woods/ paints used
- Facilities provided in the breakout spaces include- Canteen, sitting space, toilets, restrooms, locker facilities



Benefits

	Percentage	
	Grundfos	SFK
Reduction in Energy Consumption	20-30%	20%
Reduction in Incidence of sickness	10-20%	15%
Increase in Employee productivity	10-20%	20%
Reduced Incidence of employee absenteeism	5-10%	15%

The workers perceived that working green factories had a positive impact on them.



Intervention



Intervention contd.

- Knowledge of the participants was tested on following

**Sustainable
development and
global warming**

**Green built
environment**

**Green rating
systems**

**IEQ credits of
green factory
rating system**



Intervention contd.

- In pretest majority of respondents misconceived green buildings to be associated with high cost construction and green in color. In post-test respondents were able to comprehend the health and productivity benefits of green buildings
- Percentage of respondents that could identify green rating systems increased from 10% in pre-test to 100% in post-test.
- The knowledge towards IEQ was seen to be quite low amongst respondents in pre-test.
- They were acquainted with these concepts and their importance by drawing examples from existing green factories



Intervention contd.

The perception of the respondents were sought on following heads :

- Sustainable development and climate change
- Towards self as a factor towards ecosystem
- Green built environment
- Indoor environment quality and occupational health

Perceived benefits of green factory

Perceived motivation towards green factories

• Motivation towards adoption of various aspects of Green Factory Rating System



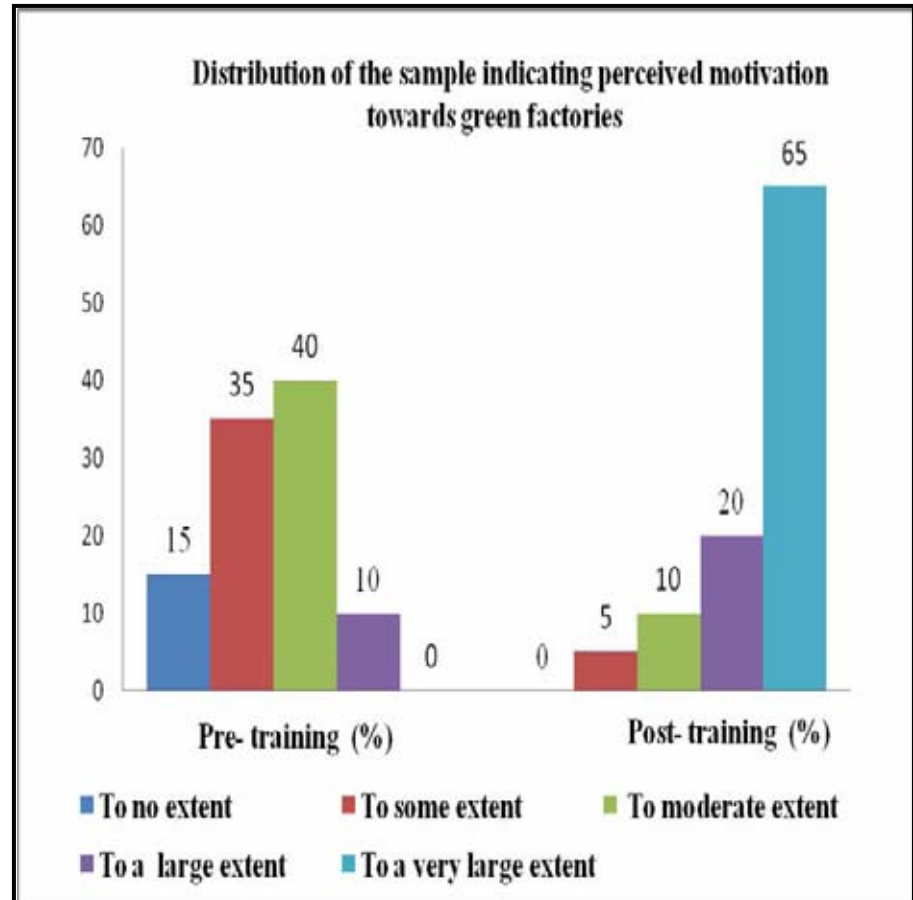
Intervention contd.

- Pre-training respondents were seen to be oblivious to the seriousness of climate change as they perceived it to be exaggerated.
- They also showed a positive perception post-training towards sustainable development as they were interested in knowing how they can access workshops, seminars relating to these issues.
- Post training more than three fourth (85%) respondents were motivated to adopt green factory certification to a large extent' as compared to only 10% prior to training.



Intervention contd.

- Pre-training respondents were seen to be oblivious to the seriousness of climate
- They also showed a positive perception post-training towards sustainable development
- Post training more than three fourth (85%) respondents were motivated to adopt green factory certification
- Respondents realized their duty towards the protection of environment which can be seen as the first step towards the initiation of green movement.





Intervention contd.

Pre and post training motivation- A comparison

- Post-training 90% of respondents expressed their willingness to adopt green factory rating system.

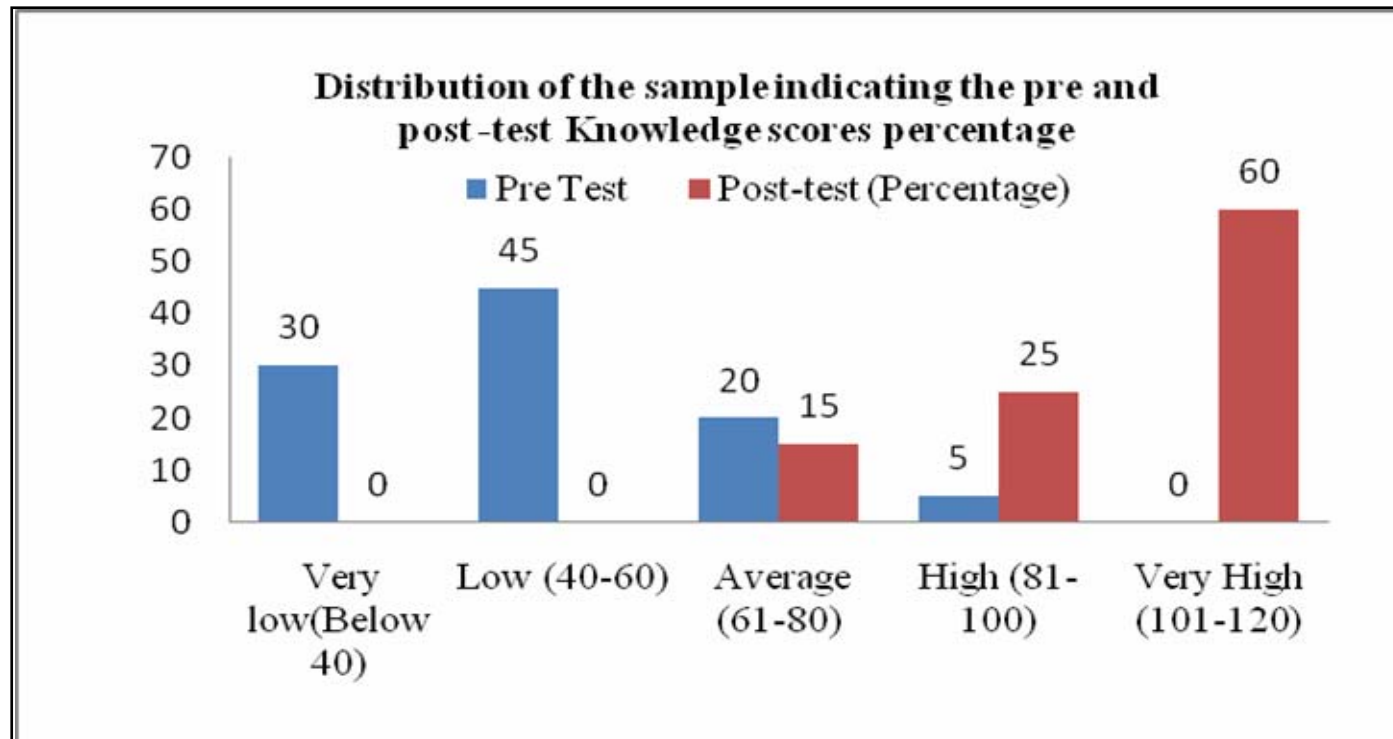
Perceived barriers for adoption

- Majority responses (90%) indicated towards the lack of knowledge and awareness as being the major barrier towards adoption of green factories.
- 70% responses were received for the lack of institutional framework for effective implementation of green factories



Intervention contd.

Pre and post training knowledge scores



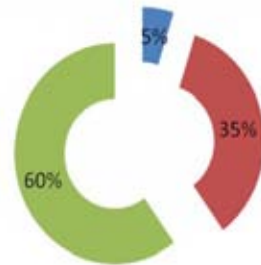
The training was found to have statically significant impact on knowledge level and perception of managers.



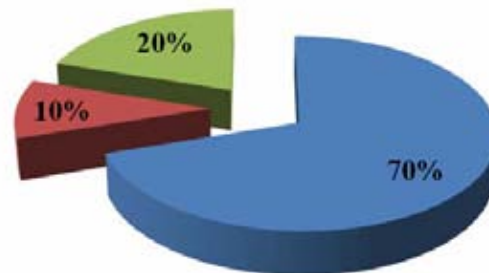
Training programme appraisal

Distribution of the sample as per the usefulness of the program

■ Not Useful ■ Useful ■ Very Useful



Distribution of the sample ranking the overall content and delivery of the Program



■ Satisfactory
■ Unsatisfactory
■ Exceeded expectations



Summary and Conclusions

- IGBC green factory helped both the factories to venture into green manufacturing.
- Hence such rating systems should also be formulated by other leading rating programmes i.e. LEED, CASBEE, BREEHAM etc.
- Such interventions can be taken up at a wider scale to motivate stakeholders.
- Incorporating the knowledge regarding the same school curriculum
- Green factory rating system can be incorporated in policy framework to promote greater willingness on part of industries.



THANKYOU