Brief on FICCI-RCM Activities in Africa



WORK DONE IN KENYA:

- Resource Audits On Water & Wastewater Management
- Series Of Capacity Building Training Programme On Water And Wastewater Management

Resource Conservation and Management Group
Federation of Indian Chambers of Commerce and Industry
Federation House, Tansen Marg, New Delhi

Striving towards SUSTAINABLE future

Resource Conservation & Management (RCM) Group

About Resource Conservation & Management (RCM) Group

The Resource Conservation and Management (RCM) group is FICCI's initiatives to serve industries in a better way by promoting and providing integrated services in order to enhance their competitiveness, particularly through process optimization, sustainable use of the resources (Raw materials, Energy, Water etc.) and the effective management of wastes generated.

RCM Group of FICCI is Technical Wing of FICCI which is engaged in imparting consultancy services in the field of Energy, Water and environment Management areas in different sectors of Indian economy since its inception in 2005. RCM Group of FICCI has a Team of Accredited & Certified Energy Auditors, sector experts and qualified engineers with updated instruments to conduct Mandatory Energy Audits (MEA); Monitoring & Verification (M&V) Audits in DCs; Water & Wastewater Audits; environmental studies; policy level studies etc. for Industries, Government, International agencies and other stakeholders.

In addition to Industries, our Client includes Government and International Agencies like:

- *Bureau of Energy Efficiency (BEE)*
- *Energy Efficiency Services Limited (EESL)*
- *Ministry of Water Resources (MoWR)*
- *Central Pollution Control Board (CPCB)*
- *State Designated Agencies (SDA)*
- *UNDP, World Bank, SIDBI, GEF, WWF, UNIDO*
- *Shakti Foundation*
- *Kenya Association of Manufacturers (KAM)*

FICCI-RCM Group Services

A) **ENERGY MANAGEMENT SERVICES**
- ***Mandatory Energy Audits (MEA) For Designated Consumers***
- ***Monitoring & Verification (M&V) Audits under BEE-PAT Scheme***
- ***Detail Energy Audits and Green Building Audits***

B) **RESOURCE AUDITS ON 'WATER & WASTEWATER MANAGEMENT'**
- ***Water & Wastewater Audits***
- **Water Risk Analysis and Management Plan**

C) **ENVIRONMENT MANAGEMENT SERVICES**
- ***Performance Up-gradation of Air Pollution Control Devices (APCDs)***
- ***Human Health Risk Assessment (HHRA) Studies***

D) **NATIONAL POLICY LEVEL STUDIES FOR GOVERNMENT OF INDIA AND INTERNATIONAL AGENCIES**

E) **CAPACITY BUILDING SERVICES**

About 5300 officials across Industry sector and other stakeholders including Government and Regulatory Authorities has been trained in the Water, Energy and Environment Management areas since 2005-2016 by RCM Group of FICCI






Series of 3-Day Capacity Building Training Program
On

'Conducting Resource Audit for Water & Wastewater Management'

Broad Coverage

- Water Management – Overview
- Water Audit – Introduction, Scope & Methodology
- Water Circuit diagram – Sourcing, storage, distribution & use
- Water Consumption Pattern & Water Foot-Printing
- Specific Water Consumption & Benchmarking
- Water Audit instruments
- Water Metering & Accounting
- Leakage & water loss assessment
- Performance Evaluation of Pumps & Cooling Towers
- Identifying opportunities for water saving- 5 R's (Reduce, Recycle, Reuse, Regenerate & Recharge)
- Sector -specific water & wastewater management best practices
- Water Efficient Technologies prevalent in market
- Cost Benefit Analysis of water saving schemes
- Rainwater Harvesting
- Case Studies & Group Exercises

Objective

Capacity building of Kenyan Industries and Local Consultantson conducting water audits, improving water use efficiency, reducing water losses, improving water metering & accounting, water & wastewater management best practices, water efficient technologies, improving productivity and cost competitiveness.

Faculty Profiles

M.A. Patil, Sr. Director, FICCI: Over 30 years of experience in the area of water and wastewater management, cleaner production, conducting water conservation and audit studies, energy audits, industrial air pollution control studies.

Karishma Bist, Jt. Director, FICCI: Over 15 years of experience in Resource Conservation & Environment Management including Water Conservation & Audit Studies, Wastewater Management, Cleaner Production, RWH, etc.

R. Paraman, Director, Devki Energy: Over 28 years of experience of providing consultancy services and capacity building to industries in the area of energy audits & water efficiency. He has conducted more than 600 resource audits for Energy Management in Aluminium, Steel, Fertilizer, Power Plants, Chemicals, Refineries, Petrochemicals, Synthetic yarn, Pharmaceuticals, Paper, Engineering, Distillery, Plastics, Infrastructure projects, Commercial Buildings etc.





Group Exercises

A highly interactive group exercise session is also conducted amongst participants on live industry cases. The session involves extensive discussions, evolving schemes for improvement and presentations by participants.









Participants Profile

Local Environment Consultants, Government Officials and Supervisors & Engineers from Process section, Environment management and Quality department, Production department, Operation & Maintenance, Water & Effluent Treatment Plant, etc.

HIGHLIGHTS OF TRAINING PROGRAMS CONDUCTED

Training Program 1

- Conducted during November 6-8, 2014 at Southern Sun Hotel in Nairobi, Kenya.
- About 56 no. of officials participated in the program.
- Participating Organizations included Libros Energy, KPRL, Kenya Power, WASREB, Kenyatta National Hospital, Diageo Group, Rencon, Sarova Hotels, Lean Energy, Dantom, Green Africa Foundation, THIWASCO, Bamburi Cement, Innovative energy, etc.





Training Program 2

- Conducted during April 12-14, 2016 at Southern Sun Hotel in Nairobi, Kenya
- About 35 no. of officials participated in the program.
- Participating Organizations included Brookside Dairy, Kaluworks, Chandaria Industries, Lean Solutions, Rencon Associates, Mzuri Sweets, Kenya Power, Energy Advisory Limited, etc.





Training Program 3

- Conducted during November 30 – December 2 , 2016 at Sarova Stanley Hotel in Nairobi, Kenya
- About 30 no. of officials participated in the program.
- Participating Organizations included Bata Limited, Andontech, UKL, James Finlay Kitumbe, Energy Regulatory Commission, Rencon Associates Ltd., Energy Advisory Ltd., Unilever Ltd., Chandaria Industries, Highlands Mineral Water Company, KEBS, Realtime Engineers Ltd., Unisource, etc.



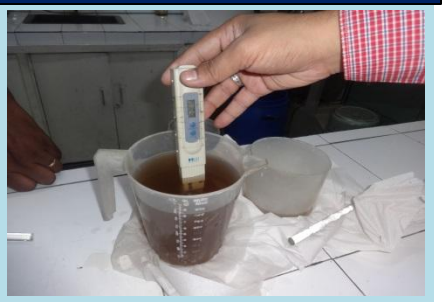


Onsite Training

Hands on training was also provided to local consultants on how to use of water audit instruments like Ultra-sonic flow meter, Doppler flow meter, Power analyzer and water quality testing instruments like TDS meter, pH meter, etc.







Resource Audits for 'Water & Wastewater Management' in Kenya

With the support from Kenya Association of Manufacturers (KAM), RCM Group of FICCI conducted Resource Audits for 'Water & Wastewater Management' in Kenya during 2014-2017 covering the 24 no. of Organizations representing Industries, Government Institutions like Water Service Board, Hospital and Institutional Buildings. The benefits of the Audits are highlighted below:

Partial List of Organizations Audited by RCM-FICCI in Kenya:

- *Kenya Brewery Limited (Brewery)*
- *Bata Limited (Tannery)*
- *Osho Chemicals (Pesticides)*
- *Mzuri Sweets (Confectionary)*
- *Kalu Works (Foundry)*
- *James Finlay (tea processing)*
- *Unilever Kenya Limited (FMCG)*
- *Kenyatta Hospital (Hospital)*
- *Kenyatta University (institution)*
- *THIWASCO (Water & Sewerage Company)*
- *SarovaWhitesands Resort (Hospitality)*
- *Brookside Dairy (Dairy)*
- *Chandaria Industries (Pulp & Paper)*
- *JKUAT (Institutional Building)*
- *Nyeri General Hospital (Hospital)*
- *Nairobi Bottlers (Beverage)*
- *New KCC (Dairy)*
- *Delmonte Kenya Ltd. (Food Processing)*

PULP & PAPER SECTOR

10% water savings achieved which accounts to saving of water and wastewater management costs by 14%

Key Water saving opportunities identified by RCM-FICCI:

- *Regular Maintenance & Calibration of Existing Meters*
- *Increased Storage Capacity of Clarified water to enable its reuse in Pulping*
- *Replacing conventional flushes (12 liters/flush capacity) with Water Efficient Dual Flush system(3-6 Litres/flush Capacity) in Toilets*

DAIRY SECTOR

15% Water Saving in Largest Dairy in Kenya with discounted pay-back period of <1.5 years

Key Water saving opportunities identified by RCM-FICCI:

- Immediate repairing of Faulty valves in Sterilizers leading to chilled water leakages
- Recovering Caustic Rinse water for reuse in Pre-rinsing during CIP in Fresh Milk Processing Section
- Install Water Efficient Nozzles in the hose pipes used for cleaning & washing
- *Optimizing CIP water for small & Large Tankers of 6000 & 30,000 litres capacity*









WATER & SEWERAGE COMPANY

Increased treated water production by 10% and reduction in its energy consumption by 13%

Key Water saving opportunities identified by RCM-FICCI:

- Practicing precise dosing of Alum & Polymer through proper Jar Test for cost effective use of Chemicals
- Installation of submersible sludge pumps to dislodge deposited sludge in settling tanks
- Calibrate, maintain and replace inaccurate laboratory water quality testing instruments
- Repairing Leakages from 'Flow Control Valves' of Settling Tank outlet
- Replacement of identified inefficient pumps





HOSPITAL SECTOR

20% Water Saving in One of the Largest Hospital in Kenya with discounted pay-back period of <2.5 years

Key Water saving opportunities identified by RCM-FICCI:

- Controlling high flow rates in the taps of Wards & Kitchen
- Regular inspection, Maintenance & Repair of Water Fixtures & pipelines and Stop leakages
- Providing Awareness & Training to Staff/Visitors
- Use of counter current washing in the laundry
- Replacing existing inefficient flush tanks (12 Lit/flush) with water efficient dual flush Cistern (3-6 lit/flush)





HOSPITALITY SECTOR

25% Water Saving in Five Star Beach Resort in Kenya with discounted pay-back period of <3 years

Key Water saving opportunities identified by RCM-FICCI:

- *Plugging Leakages in the Swimming Pools*
- *Use of Optimum water for Backwashing of Pressure Sand Filter and Activated Carbon Filter in RO Plant*
- *Installing 'Ozone Laundry System' to reduce overall Laundry costs to 25% by reducing water, chemicals & energy consumption in the Laundry*
- *Installing 'low flow aerated taps (3 lpm)';water efficient dual flush Cistern (3-6 lit/flush) and water efficient showers (7 lpm) in all guest rooms*
- *Using Sprinkler system for landscaping and gardening*






FOUNDRY SECTOR

20% water saving in one of the Foundry with a discounted payback period < 2 years, which accounts to saving of water and wastewater management and associated Energy management costs by 30 %.

Key Water saving opportunities identified by RCM-FICCI:

- *Optimizing water use in Canteen by installing water efficient taps/nozzles and building awareness & hygiene practices*
- *Best Practices for Cooling Tower Operation and Blowdown to Maintain Desired Cycle of Concentration (COC)*
- *Using treated Sewage water for flushing the toilets in the Plant*
- *Replacement of the Cooling Water pumps with appropriately sized pumps to improve efficiency from 34% to 82%*
- *Skimming of oil and grease regularly from the caustic tank and rinsing tank in process to reduce load on the Effluent Treatment Plant (ETP)*






POLICY RECOMMENDATIONS
FOR EFFICIENT WATER & WASTEWATER MANAGEMENT IN KENYA

(Based on Resource Audits conducted by FICCI in Kenya supported by KAM)

S. No.	Key Issue	Analysis	Suggested Intervention
1.	**Rationalizing Water Tariffs**		
	The water tariffs of various Water Service Boards varies substantially	Organizations end up paying water & sewerage charges of about 94 to 212KSh /m3 for the same quality of water supplied through various service boards. However, the energy (water pumping) & treatment costs of Water Service Boards is about 8-10 KSh/m3. Therefore, there is a potential to lower the Water Tariffs.	The government should ensure fair pricing and equitable access to water for all for drinking and other uses. Pricing of water should ensure its efficient use and reward conservation.
2.	**Training, Capacity Building & Awareness Raising**		
	Organizations lack awareness & training on water & wastewater management issues	The employees especially the shop floor workers and operators of the RO plant, Water Treatment Plant and Effluent Treatment Plant of the audited organizations lack technical competence and training required on 'Water & Wastewater Management'.	The 'Awareness & Training Programs' should be conducted for capacity building of staff/employees/visitors at all levels including their 'supply-chain' and consumers. The government should promote Training & Awareness Raising programs for all the stakeholders.
3.	**Promoting Adoption of Best Practices & Water Efficient Fixtures forDemand Side Management**		
	The 'water demand' is constantly high due to inefficient water fixtures and inefficient water use practices	Most of the organizations have inefficient water use practices and conventional fixtures with high flow rates i.e. hand washing taps (12-20 lpm), showers (10-12lpm), flushes (12-15 liters/flush), gardening/cleaning hose pipes (30-55 lpm) etc. which leading to substantial water wastages. High Pressure in water supply lines, frequent leakages and overflows from Over Head Tanks (OHTs) were observed. It is estimated that the adoption of Best Practices and Water Efficient fixtures can save about 20-40% of water easily.	The Government should promote best practices and subsidies the 'water efficient fixtures' to reduce the 'Water Demand' significantly. The following best practices are suggested: • Regulating unnecessary high pressure in the water lines/Ring-main • Plugging all Water leakages on priority basis • Installation & maintenance of float valves/ Automatic Water Level Controller (AWLC) to avoid frequent overflow from OHTs • Use of water efficient dual flush systems (flushes 3-6 liters/flush) • Use of water efficient taps (flow rate of 3-5 lpm) • Use of water efficient nozzles (flow rate of 8-10lpm)in the hose pipes used for cleaning

S. No.	Key Issue	Analysis	Suggested Intervention
4.	**Developing Water Use 'Benchmarks'**		
	Kenya does not have National 'Water Use Benchmarks' for various water consuming sectors	The national 'Benchmarks' helps the organizations to compare their performance with the 'Best Performance' and best practices. The 'Benchmarks' are the way to track, measure the utilization of the water resource and minimize the same.	The Government should evolve a system to develop 'National Water Use 'Benchmarks' for different industrial sectors especially for water intensive industrial sectors like Brewery, Tannery, Food processing; Hospitality; Dairy; Pulp & Paper etc.
5.	**Up-gradation and Efficient Operation & Maintenance of Existing Water Treatment Plants (WTP)**		
	Substantial water losses in most of the 'Water Supply & Sewerage Boards' in Kenya	It is observed that more than 20% of water gets lost in the WTP of Water Service Boards due to inefficient O&M of the system. The WTP also needs to be upgraded to improve its productivity to meet the increasing demand.	The government should support 'Water Service Boards' to upgrade their WTP with available best technology so as to improve its productivity and to reduce water losses. The staff needs to be trained for efficient operation & maintenance of the WTP.
6.	**Installation of Double plumbing system in buildings to enable 'reuse of Treated wastewater' and avoid use of 'Potable Water' in toilet flushing**		
	The 'Potable Water' is used for flushing toilets, floor washing, gardening etc. that could utilize water of much lower quality, such as treated wastewater	'Potable water' is used for flushing in the toilets, gardening etc.Out of total water use, about 40-60% of potable water gets wasted every day. To avoid use of potable water in toilet flushing, the water supply to toilet flushes should be separated from the water supply to the other parts of the building through 'double plumbing' system wherever techno-economically feasible.	The government should promote 'double plumbing' system especially for upcoming new buildings. The new buildings should be constructed with the option of use of treated wastewater in toilets. This will ease the use of treated/recycled water in the buildings for toilet flushing leading to 40-60% of freshwater savings.
7.	**Promoting Rainwater Harvesting (RWH) and Groundwater Recharge**		
	Most of the organizations use borehole water for their processes and the groundwater table is decreasing day by day	The depth of groundwater table in Kenya is more than 200 feet and is increasing day by day. The TDS levels have increased upto 500 ppm or more. The rainwater is a natural & clean water resource which should be stored for direct consumption and for groundwater recharge. The rainwater can supplement the freshwater use for various domestic and industrial water uses for activities like flushing, steam generation, laundry, etc. after suitable treatment.	The government should encourage organizations for implementing RWH and use of rainwater so as to reduce pressure on boreholes. The artificial recharge of boreholes should also be promoted to improve the water quality & quantity of groundwater table. The RWH should be made mandatory for new buildings having roof-top area of $\geq$ 100 meter square and surface area of $\geq$ 1000 meter square.
8.	**Resource Audits on 'Water & Wastewater Management'**		
	The organizations are not aware of their water& wastewater management system inefficiencies and associated losses in terms of water, energy, chemicals etc.	The water & wastewater audits help the organizations in establishing the baseline; assessing the water losses; estimating the saving potential; preparing cost-effective schemes; estimating investments. The audits can help organization to identify opportunities for reducing their water losses and operational costs by 10-30% with low/medium investment schemes having payback period less than 2 years.	The government should make 'water & wastewater audits' compulsory for water intensive industries, large hospitals, commercial complexes, hotels, institutions and for water service boards. The audits should be done at least once in 3 years by an experienced Audit Team.

S. No.	Key Issue	Analysis	Suggested Intervention
9.	**Installation and Maintenance of Water Meters**		
	Lack of Water Metering and Water Accounting System in most of the Organizations	Most of the organizations have not installed meters at the various water use locations. The meters are mainly installed at the source only. Even the installed meters are not maintained and calibrated periodically. The organizations also do not maintain the log-book for pump operating hours.	The Government should promote water accounting system through installation of Water Meters at major water use locations. Regular water meter reading should be taken and analysed for water usage. In addition to meter readings, Log-Book for Pump operating hours should also be maintained for water use accounting.
10.	**Domestic Sewage Collection, Treatment&Safe Disposalto Prevent Groundwater contamination and Health Hazards**		
	Lack of proper 'Sewage Collection &Treatment Facilities' posing risk to groundwater contamination and human health	Most of the organizations lacksproper 'Sewage Collection &Treatment Facilities' and are discharging untreated/partially treated sewage into the water bodies/environment posing risk to human health. Due to lack of 'sewer collection systems'in many towns, the sewage is mainly disposed in septic tanks and soak pits which potentially can contaminate the groundwater table. The septic tanks are periodically extracted to avoid overflow and extracted sewage is disposed in nearest available sewage line. The septic tank extraction costs substantial amount of expenses to the users.	The Government should lay sewer lines for proper collection of sewage from towns/organizationsso as to minimize use of Septic Tanks and Soak Pits and to prevent Groundwater Contamination and Human Health Hazards. The collected sewerage should be treated in 'Sewage Treatment Plant' before disposal. The treated sewage water should be reused for landscaping applications.
11.	**Promoting Industrial Wastewater Treatment and Reuse/Recycle**		
	Non-Compliance of 'NEMA Discharge Standards' by most of Industries due to lack of proper 'Effluent Treatment Plant'	About 70-80% of water after use is generated as 'Wastewater' in an industry.Most of the industries in Kenya lack effective 'Effluent Treatment Plant (ETP)' for treating this wastewater and discharge its untreated/partially treated wastewater into the water bodies leading to environmental pollution and posing risk to human health. The industries are not being able to meet the prescribed 'NEMA Discharge Standards' due to inefficient treatment on wastewater.This wastewater is a 'resource' which can be suitably treated and reused for various applications like toilet flushing, cooling tower make-up, steam generation etc.	The Government should ensure that the organizations meet the applicable regulatory standards on 'Effluent Treatment & Disposal'. Considering the fresh water scarcity, it is therefore necessary for Kenya Government to recognize 'Wastewater' as a resource and then specify necessary requirement with specific standards for it to be reused in industry, agriculture or any other purposes. Recycle and reuse of wastewater by individual organizations, after treatment to specified standards, should be incentivized through a properly planned tariff system.

CONTACT DETAILS:

Mr. M.A. Patil
Sr. Director -Resource Conservation & Management Group
Federation of Indian Chambers of Commerce & Industry (FICCI)
Federation House, Tansen Marg, New Delhi - 110 001
Tel.: (011) 23487469 / 23487510 Mobile:9818260682
Email: ma.patil@ficci.com, karishma.bist@ficci.com
Website: www.ficci.in