

# Implementation of circular economy policies in the manufacturing sector – A case study of Sugar Corporation of Uganda Limited

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# Objectives

- To demonstrate the need of C.E policies
- To demonstrate how the policies inform the industries' strategies and self regulating policies & environmental legal framework
- Government involvement through lead agencies.



# Why CE policies in the Manufacturing sector

- Increases uptake of industrial symbiosis among enterprises.
- Provides a favourable enabling environment for adoption of industrial symbiosis.



# Introduction

- **Sugar Corporation of Uganda Limited**
- **Started in 1926**
- **Part of Mehta Group Of Companies**
- **Produces Sugar, ENA and Carbon-dioxide from Sugarcane.**
- **ISO 9001, 14001 and 45001 certified.**



# Products from sugar factory



# Preserve & extend what is already made

- The objective is that while resources are in use, manufacturers will maintain, repair and upgrade their systems to maximize their lifetime through take-back strategies.



- This will require the industry not to be satisfied with what is already in place but extend the opportunities available.
- In some cases this may require legislation and regulation depending on the expected outcomes of the extension.



# BAGASSE

- Originally a waste, with impacts to air and soil
- Now a source of fuel to the boilers to generate steam and electrical power for internal use.
- A 15MW co-generation project is being set up to generate power for sale to the National Grid.







# Use of Waste as a resource.

- The aim is to Utilise waste streams as a source of secondary resources and recover wastes



- **Manufacturers can set up internal systems whereby the waste streams are managed.**
- **An alternative could be by industrial symbiosis which can be internal or external depending on the extent.**
- **Frameworks should be set up to link the different actors to get this mutual benefit.**



• **“ By Products” not “Wastes”**

# MOLASSES

- Previously a waste and was being sold locally to local distillers.
- Social ills as well as pollution in cases of excesses that could not be controlled.





# SOLUTION 1

- Installation of a 30,000 litre distillery to produce Extra neutral alcohol.
- Processes involved

Dilution

Fermentation

Distillation





# FERMENTATION PROCESS

- Produces Carbon-dioxide which is a green house gas.
- CO<sub>2</sub> is captured, purified to make food-grade CO<sub>2</sub> and dry ice.
- The plant is FSSC certified as well as ISO 22001 certified.





# CO<sub>2</sub> gas & Dry ice Production



# DILUTION PROCESS

- Initially, dilution of molasses was done with demineralised water – i.e. a DM plant was installed.
- The distillation rectification columns produce spent lease.
- This is a mixture of aromatics which was formerly sent to the ETP as waste.
- It is now being used as the diluter for the fermentation process.
- There is a savings in water being used.
- This is one of the interventions from SAG project



<b>Loss of spent lease cubic meters per annum</b>	<b>18,921</b>
<b>Cost of pumping DM water \$</b>	<b>6650</b>
<b>Cost of implementing changes \$</b>	<b>50</b>
<b>Savings in water use</b>	<b>18,921</b>



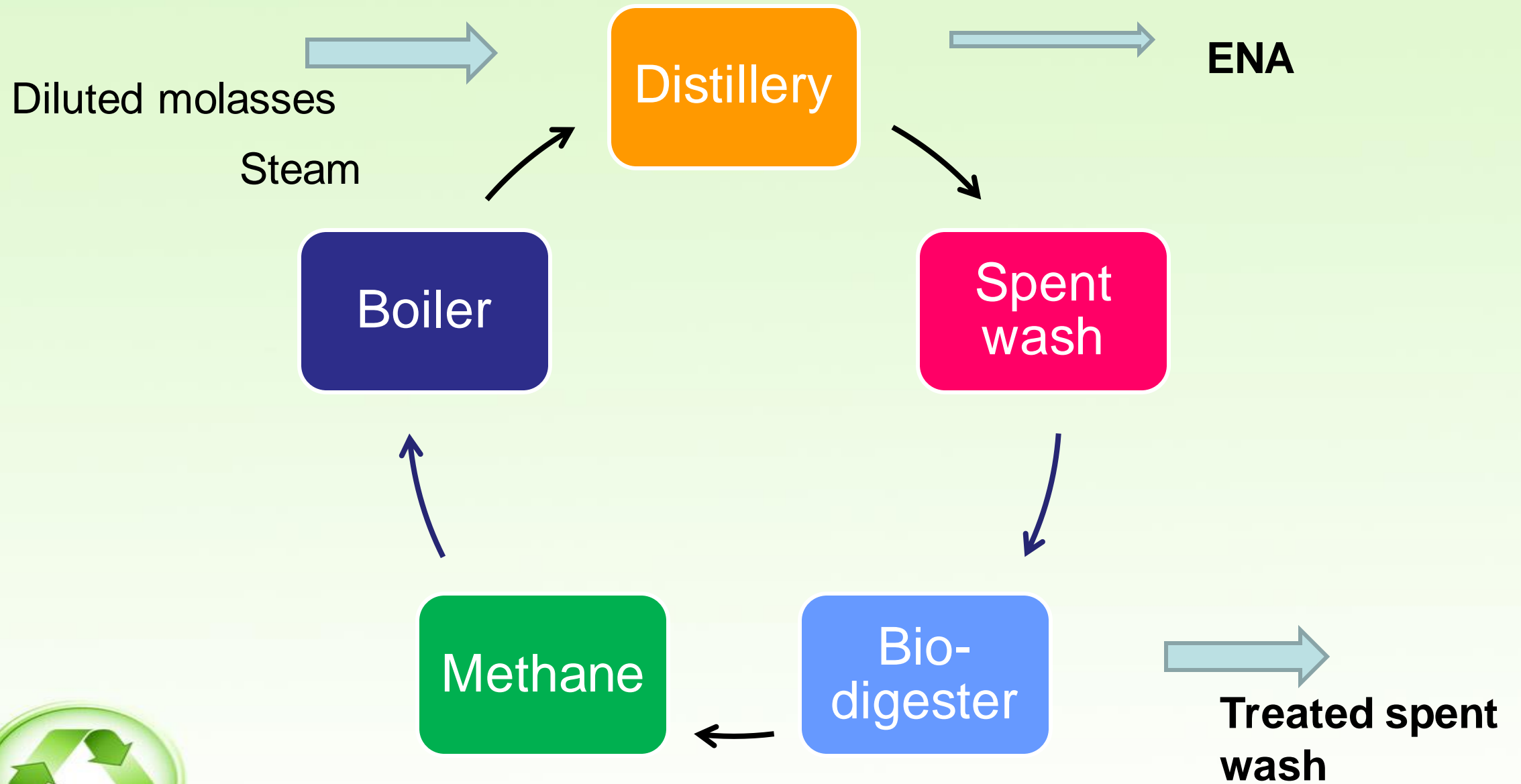
# DISTILLATION - 1

- Distillation produces spent wash.
- High BOD, COD, Colour, TDS and organics.
- Highly dangerous to soil and water.
- Many technologies not successful by many distilleries using molasses.



- Anaerobic treatment of spent wash t produce methane.
- Methane gas is burnt in a boiler to produce steam.
- Steam in turn runs the distillation plant.
- There is a saving in steam from the factory.
- The distillery becomes self sufficient.
- This is a CDM project and SCOUL earns carbon-credits.





# Bio-digester & Boiler

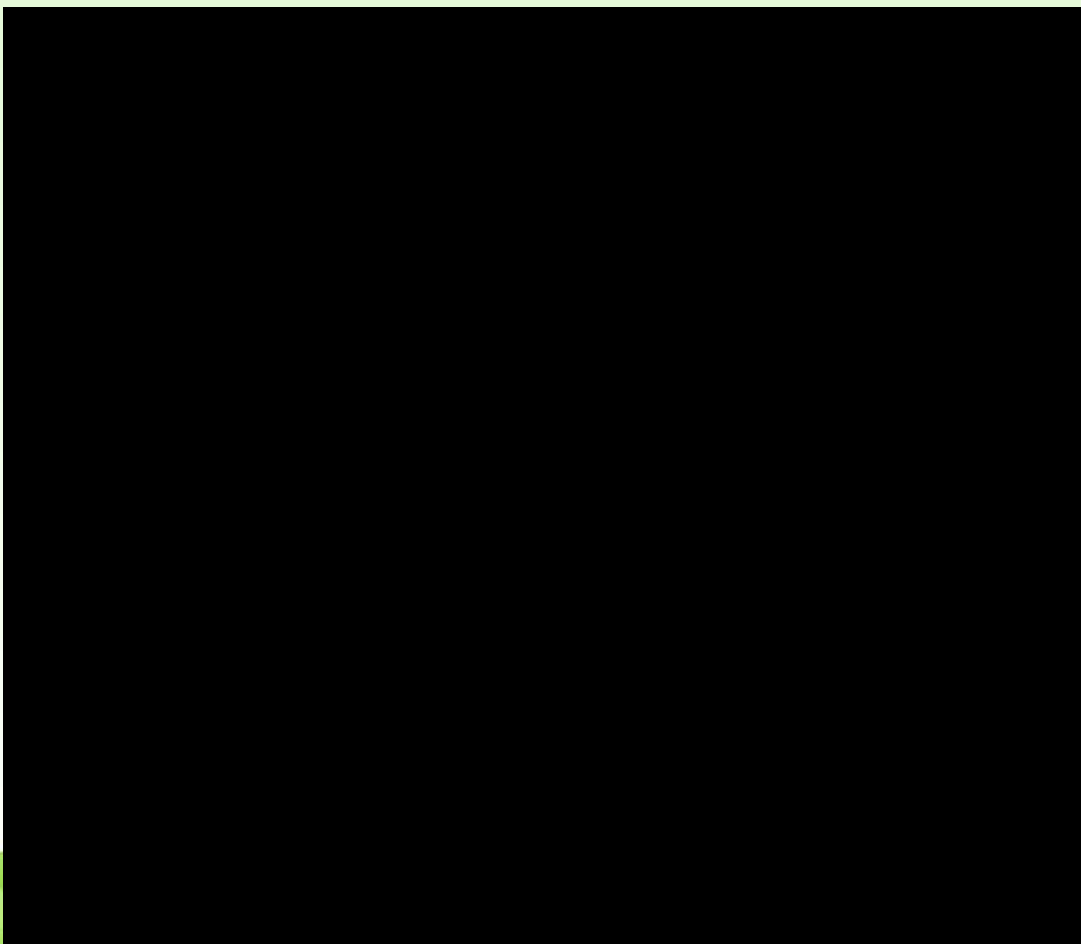


# DISTILLATION - 2

- The treated spent wash together with the filter mud from the sugar factory and boiler ash is used to make a manure - Bio-compost.
- It takes about 30 days to get a good compost.
- The manure is then fed back into the sugarcane fields.
- Research with an enzyme is on going.

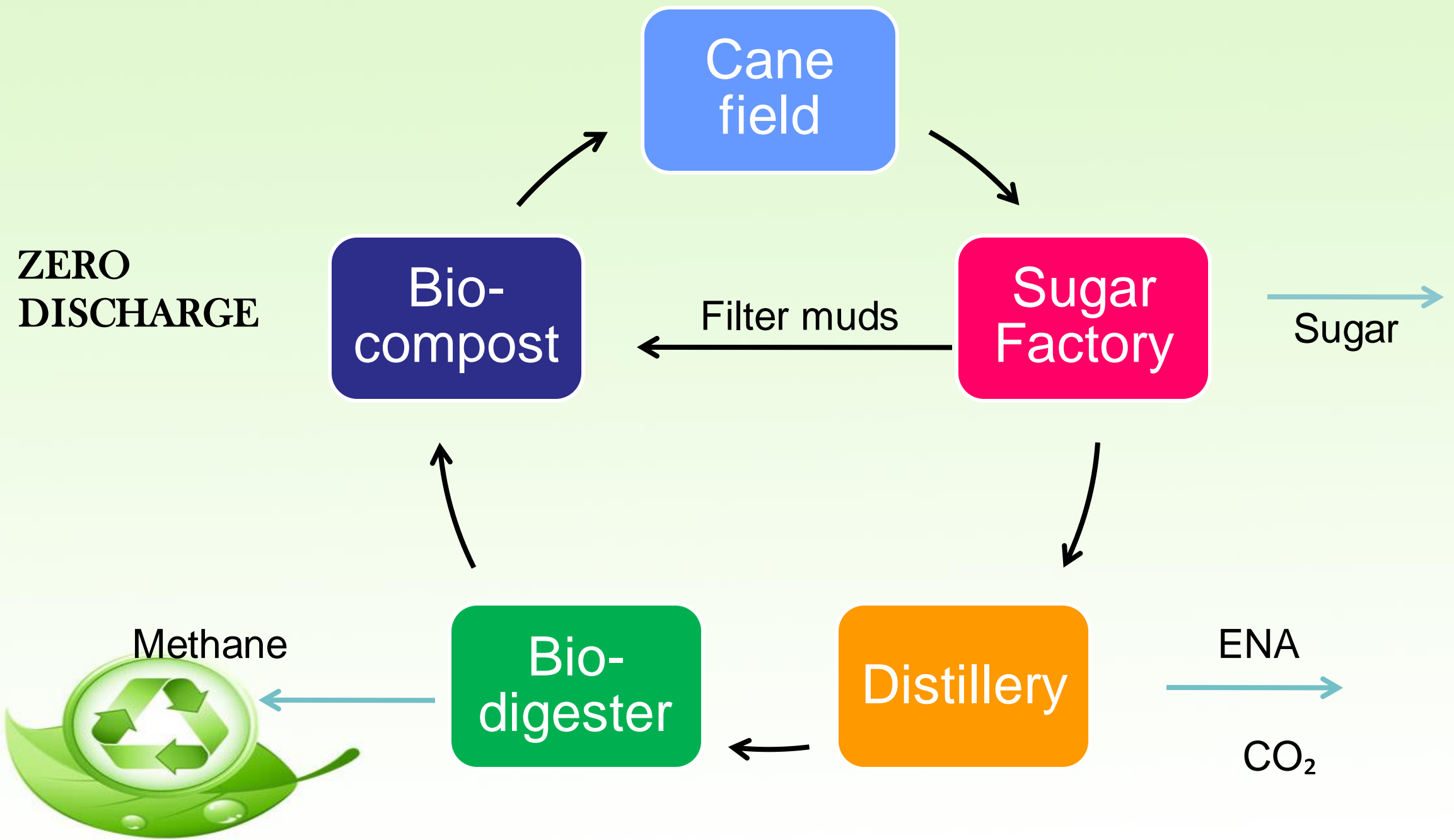




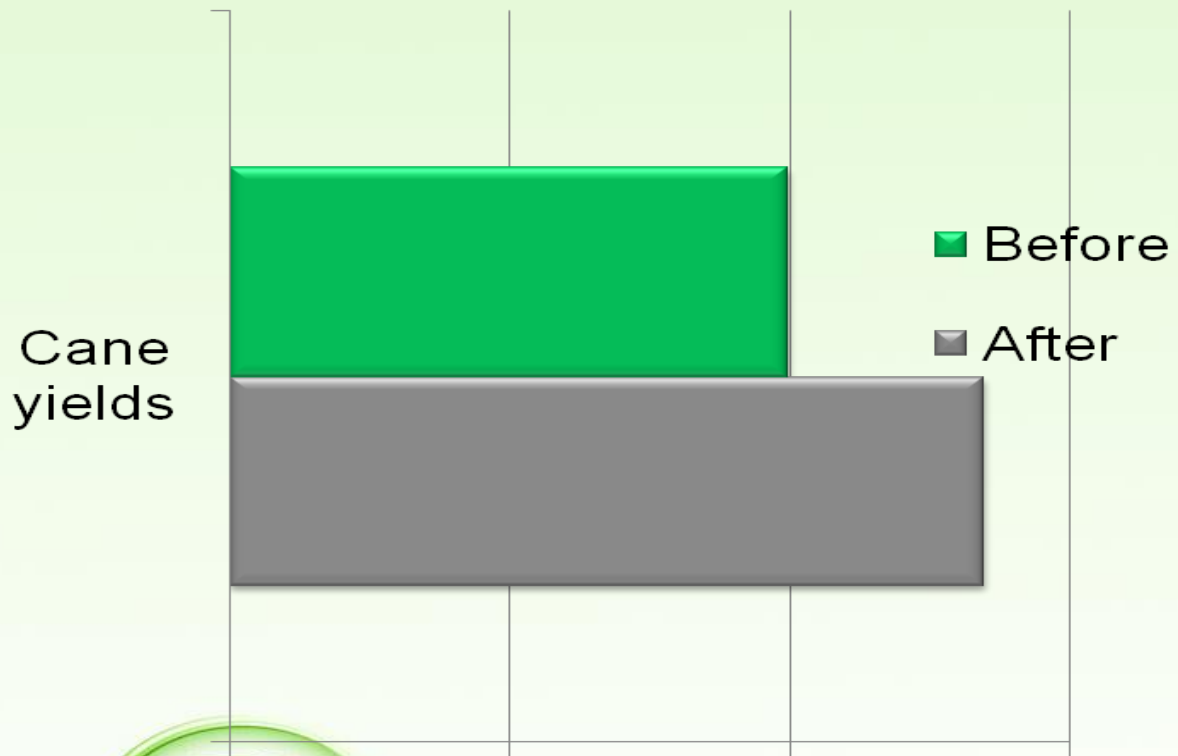




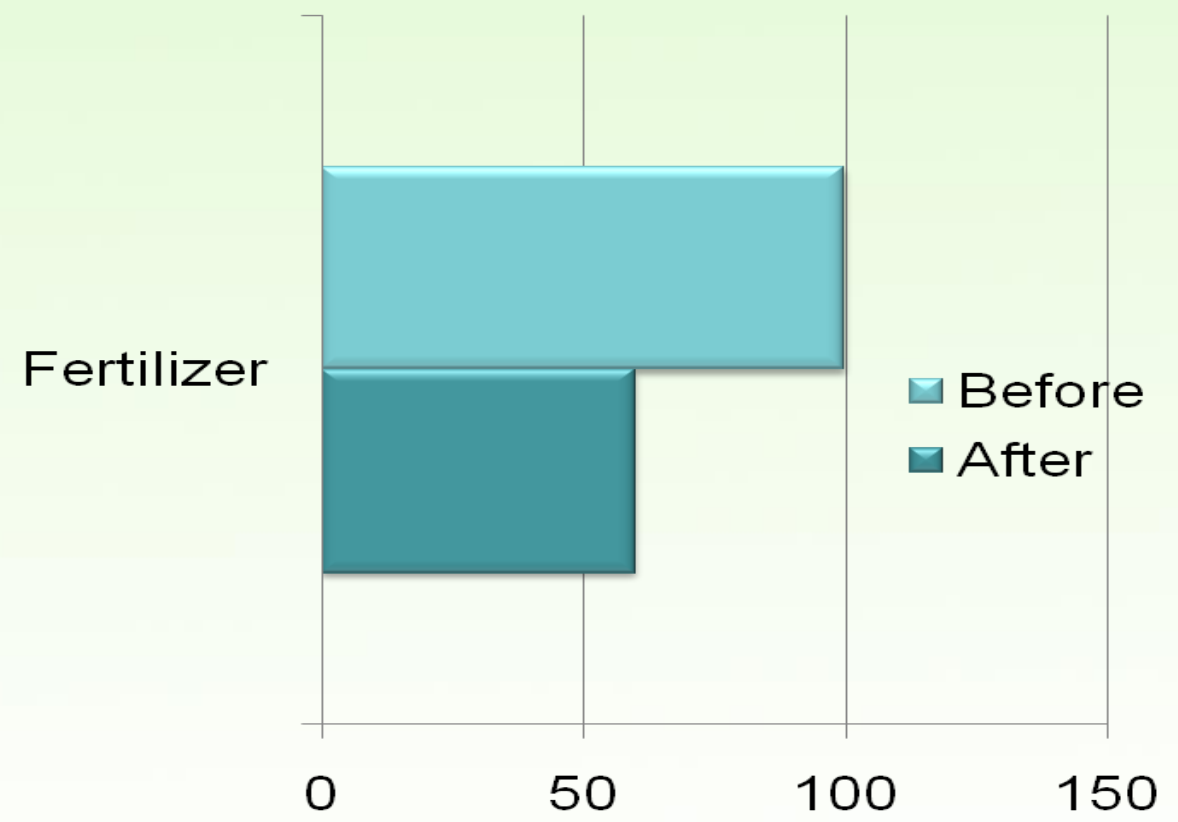
**ZERO  
DISCHARGE**



## Cane yields – 30% increase



## Fertilizer use – 40% reduction



- **SCOUL has achieved a zero discharge of the effluent.**
- **There is less pressure to acquire more land for expansion.**



# WATER - more SAG interventions

- SCOUUL abstracts water from a nearby river.
- At the same time SCOUUL discharges the treated effluent to the same river.
- This was not a comfortable situation.



# Intervention 1 - Recycling

- Mills, air compressors, sugar drier, Instrumentation equipment, vacuum pumps.
- All had a one-through cooling system.
- This is now collected and recycled.







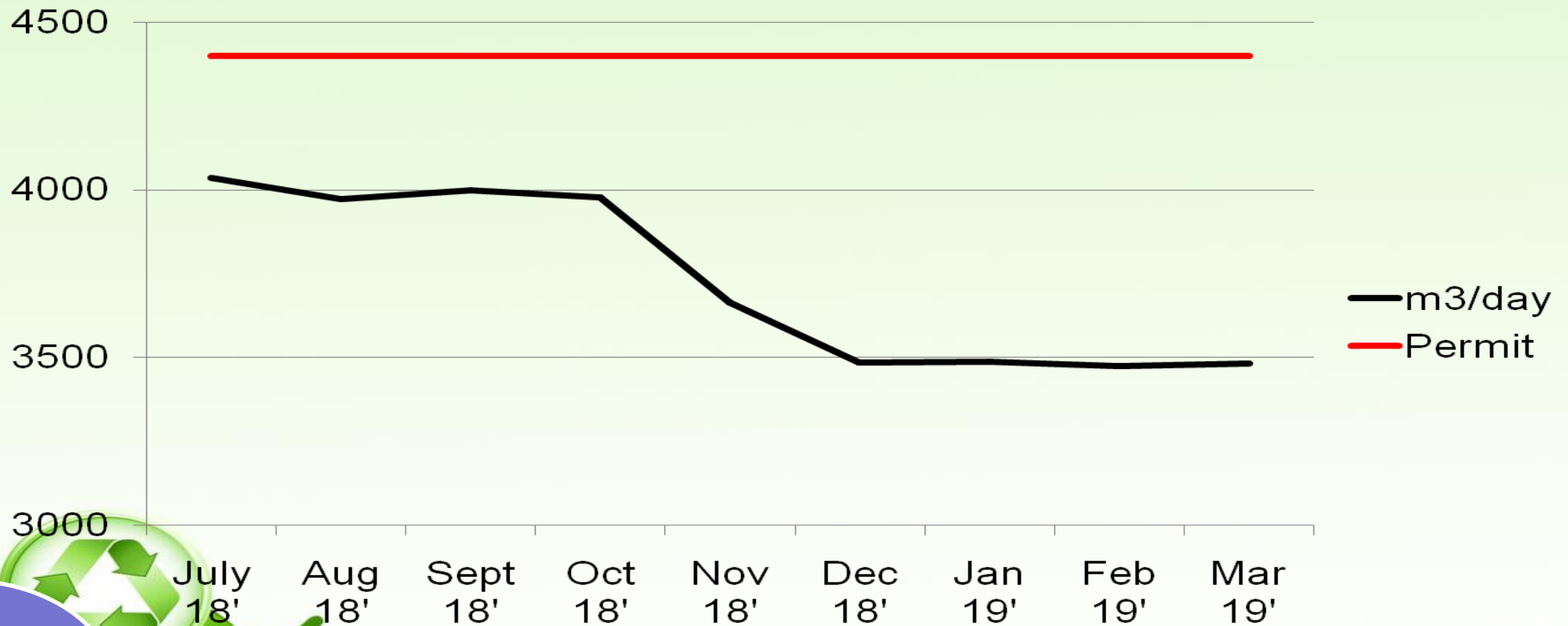
# Intervention 2 -

## Maintenance/Housekeeping

- Too much washing of the factory was being done due to leakages, spillages, overflows.
- Maintenance of equipment esp. pumps.
- Installation of suitable instrumentation.
- Installation of steam ejectors for quick efficient recovery.



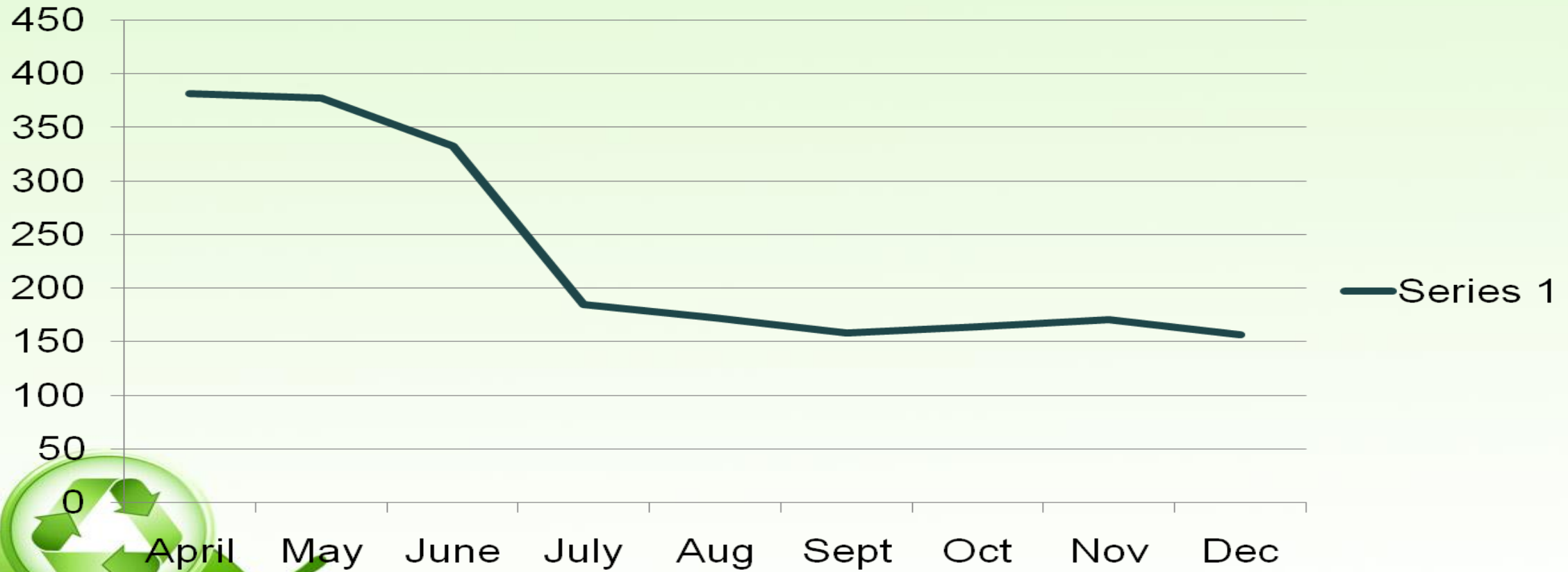
# WATER ABSTRACTION



Waste  
water

# Waste water Discharge Rate

Series 1



Indicators	Change (%)	Indicators	Change
Water productivity	1.36	BOD5 Load (X103)	-13.94
Variation from Benchmark	12.12	COD Load (X103)	-59.24
Waste-Water Intensity	-66		
Water productivity/change in product output	0.26		
<b>OTHERS</b>			
Total Investment		29,000,000	UGX
Total Annual Vol of Water Saved		14,893	m3

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- **Improvement in discharge quality**
- **Lower costs of pumping**
- **Reduction of permit fees**
- **Improved housekeeping**
- **Recognition**





# Water sector

- Government through the lead agencies DWRM has put up permits for abstraction, use, and discharges.
- These state what should/should not be done.
- Inspections and interactions are thus carried out.
- UCPC – through arrangements like SAG, tackles directly the issues to do with efficiencies & utilization – recycling, reuse.
- Water audits are also carried out to make a thorough assessment.



- The permits are mandatory, but the interventions, which go on to achieve the objectives are optional to the manufacturer.
- Policies are required to marry the two.
- Policies that require the manufacturer to utilize the resources efficiently to achieve the standards embedded in the regulations.
- That is to say, C.E. to be a component of the permits.





# Legislation & Regulations

- Environment Act - Part IV Environment Planning
- Parts VI, VII & VIII on control of pollution, manage, control of products & minimize wastes and hazardous wastes
- Regulation 52/1999 Waste Management -  
Cleaner production methods



# Design for the future

- The starting point should be in the set-up plans and arrangements for the manufacturer.
- Incorporation of C.E. in the EIAs, permits and licences or at least the elements.
- For those already in operation, C.E. can be introduced in form of improvement notices.



# CONCLUSION

- In most cases the industries have worked under the stick (regulations, fines, shutdowns etc).
- But where is the carrot?



- If the stick is the only option, there will be slow progress as far as C.E is concerned.
- The manufacturer will follow the “polluter pays” principle and will make provision of the fees in his budget.
- In addition, the manufacturer will opt for the licensed transporter of the waste.



# Conclusion

- **There is indeed a need for Circular economy policies in the manufacturing sector and it will take the active participation of all stakeholders to achieve this goal.**



# SPECIAL RECOGNITION

- Uganda Cleaner Production Centre



# Thank you!



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