



European Union



Technical Assistance Models for Greening the Manufacturing Sector

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Switch Africa Green Regional Sector Meeting on Green Manufacturing 26th -27th September 2019, Entebbe Uganda



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Background of project

- The industrial symbiosis is multi-country project implemented in six African countries namely: Burkina Faso, Ghana, Mauritius, Kenya, South Africa and Uganda.
- The Project commenced on January, 2016 and ended on 30th June, 2018.
- The project implementing agency/grantee is the Ghana National Cleaner Production Center, GNCPC and the partner is ARSCP
- Total budget: USD203,147.40.

Objectives



- **Overall Objective:**

Promote resource efficiency and environmental performance in MSMEs in Ghana through the concept of industrial symbiosis

- **Specific Objectives**

- Improved resource productivity and competitiveness in MSMEs
- Reduced cost of production
- Reduced industrial pollution
- Creation of 'green' jobs
- Improved revenue of the MSMEs
- Informed policy makers triggering policy reforms
- Improved environment for local communities

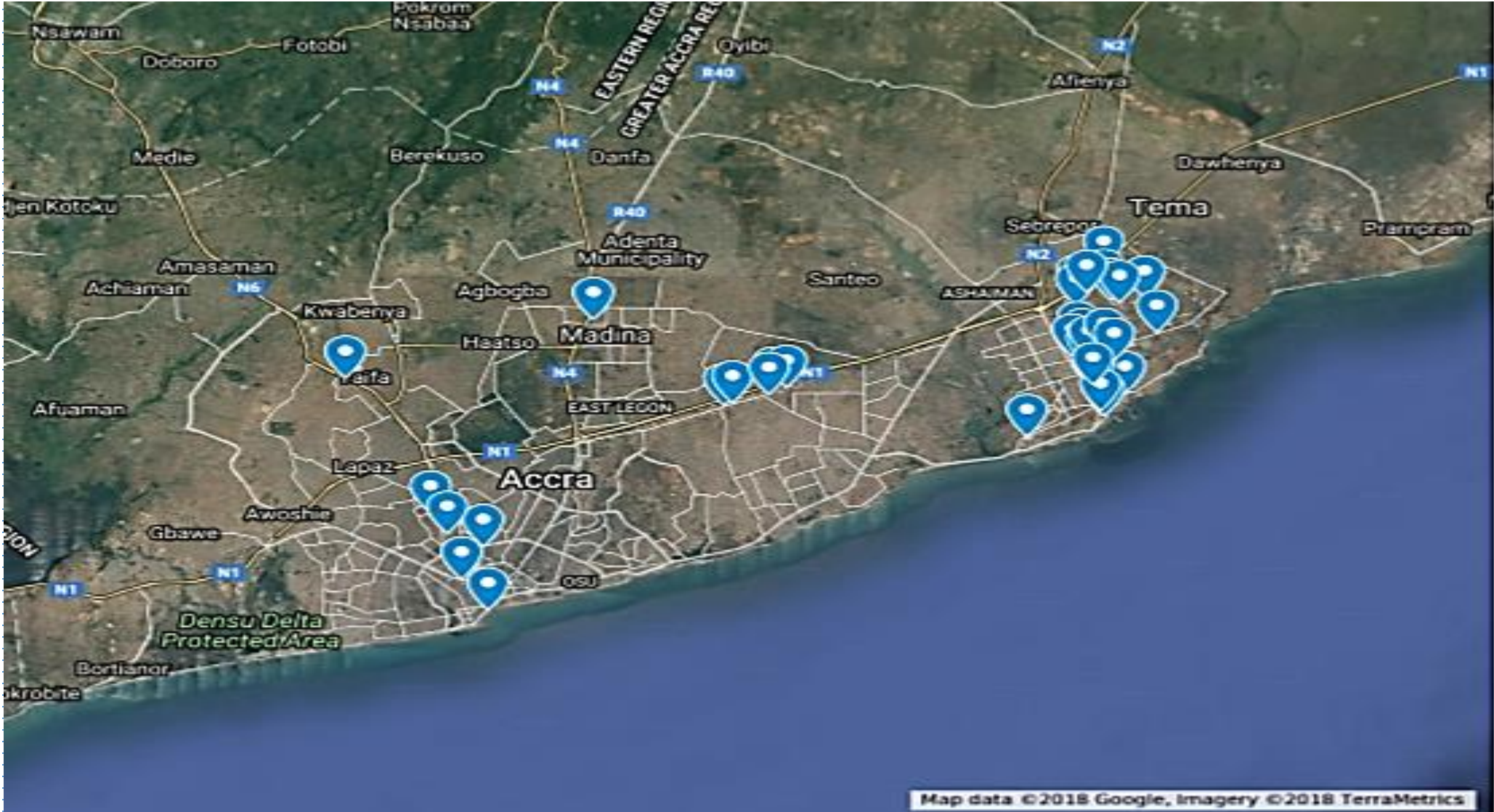
Drivers of Industrial Symbiosis for Integrated Waste Management

- Disposal Costs
- Environmental regulations/performance
- Pressure on Landfill sites
- Improper waste disposal by collectors

Industrial Symbiosis Delivers

- Resource efficiency
- Demand-led innovation
- SME engagement
- Landfill diversion
- Water savings
- Carbon emissions reduction
- Virgin material savings
- Jobs
- Cascading of best practice Increased
- Reduced production costs (Profits)
- leading to tax revenues
- Energy savings
- Improve community relations/public image

Locations of MSMEs



Implementation Phases of Project

Training and Assessment

- Mapping of 175 MSMEs nationwide and 24 waste streams identified
- Training of NCPC staff on IS and RECP using the PRE-SME toolkit

Implementation

- One hundred (100) MSMEs trained **135** synergies identified with 3 straight synergies completed 1 each during 1st, 2nd & 3rd batch trainings
- Sixty (60) in-depth assessments completed
- Fifty-six (56) synergies completed with 4 waste streams moving out from source to other MSMEs

Evaluation

- Evaluation of results of project evaluation committee
- Evaluation of synergies to assess sustainability and success
- Evaluation of MSMEs performance during project implementation for award and certification

Implementation

- R & D Support
 - component analysis
 - new product formulation
- Downstream market linkages

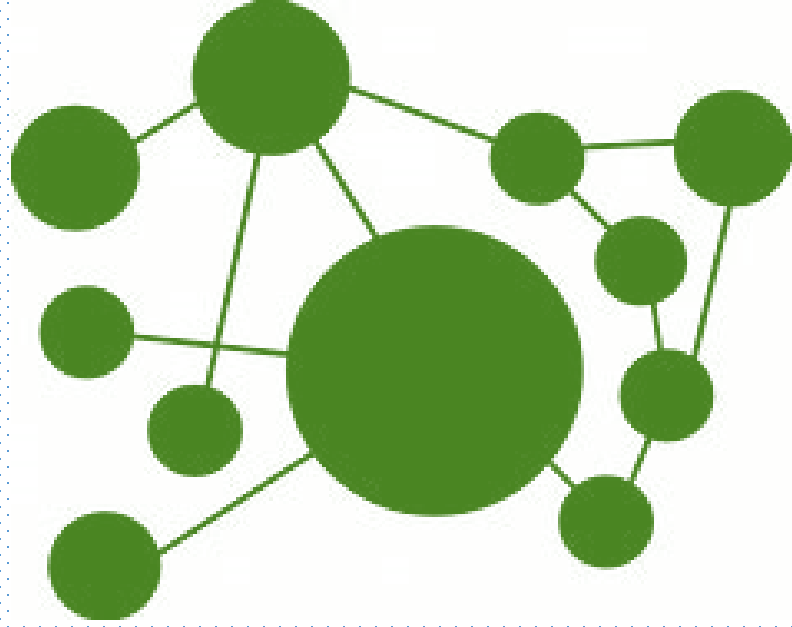
SUMMARY OF PROJECT OUTPUT

SMEs Trained = 100



In-depth Assessment Completed + 60

Synergies Identified = 135



Completed Exchanges = 56

KEY PROJECT OUTCOMES



804,924 kg

GHG Emissions Saved



98,107.18 tonnes

Landfill Diversion



Gh¢490,535

Cost Savings



1,623

Jobs Created

Other Outcomes



- 3 new SMEs starting up in the aluminium scrap sector
- 8 new product lines including biomass-to-energy within some plants
- Draft National IS Policy & National Implementation Strategy

Challenges

- Frequent non-availability of MSME key staff during audits
- MSME initial unwillingness to engage
- High Key staff turn-over in most MSMEs on programme
- Lack of funds to implement options
- Lack of data from MSMEs (not accurate & reliable if any)
- Reluctance to disclose transaction values (volume/money)
- Distance constraints
- Legal and contractual constraints - confidentiality and non-disclosure issues

Opportunities

Application of IS principles and methodologies has led to the attainment of a 'greener' venture through the following ways:

- Costs savings
- Increased profitability
- Employment opportunities
- Improved material security
- Improved resource productivity and competitiveness
- Reduced industrial pollution
- Access to innovation
- Introduction of new product lines
- Reduced risk due to diversification
- Support development of local technological innovations

Case Study-Pioneer Food Cannery

PFC

UTILITIES

REDUCTION

2020



Company Profile

Thai Union PCL
Pioneer Food Cannery



Location
Tema Fishing Harbour Ghana



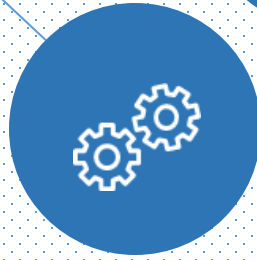
Employees
~ about 1,300 workers



Source of Raw Material
Local and Imported



Products
Canned precooked tuna, canned raw packed tuna, bagged precooked tuna loins, Fish meal, Fish oil.



Installed Capacity and Markets
Tuna Processing Factory-250MT per day, Local and Export



MEMBER OF
**Dow Jones
Sustainability Indices**
In Collaboration with RobecoSAM

Green Manufacturing Potential Saving, 2016-2018

Fishmeal



Fishmeal from fish scraps- for agri-business.

➤ Avg. US\$ 1,098 /Ton FG

Fish Oil



Fish Oil from the eye of fish- Omega III for babies foods and edible oil

➤ Avg. US\$ 1,195/ Ton FG

WWTP Sludge



Organic fertilizer for mulch and biogas culture

➤ Exploring for markets

Green Manufacturing Practice and Prozesse(s)



Use of Sky lighters



WWTP Biogas Production- Flaring



Effluent Treatment- Explore Return of Water Treated for Use



Use of LED lights (at 90% throughout the factory)

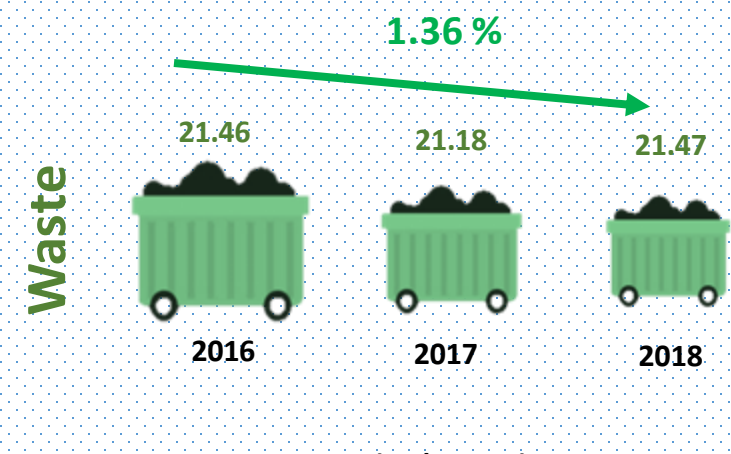
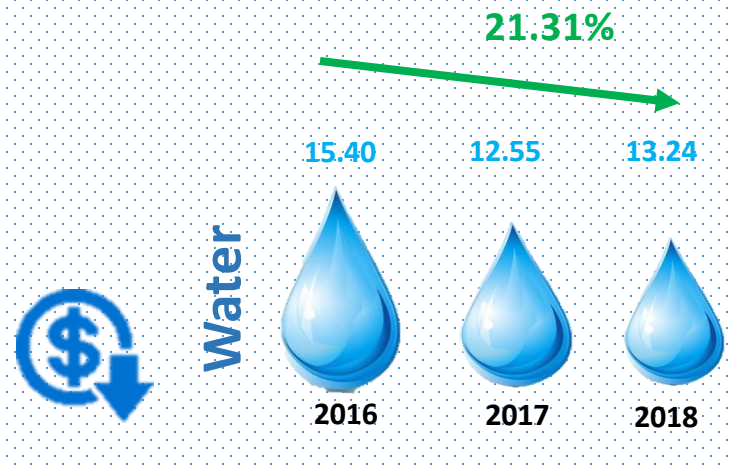
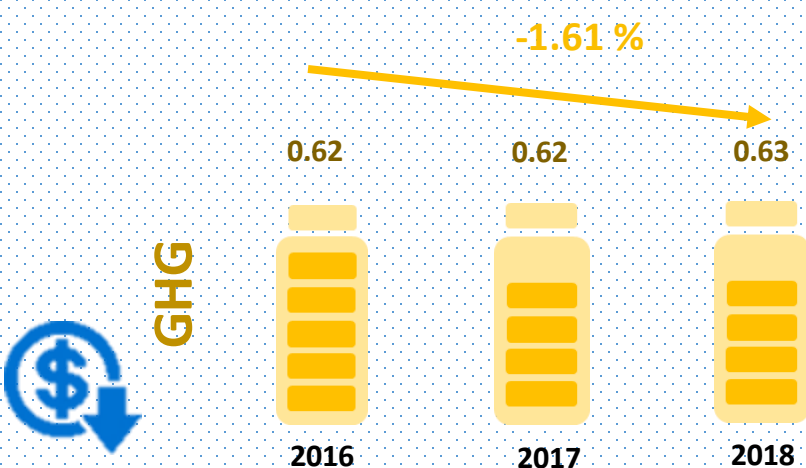
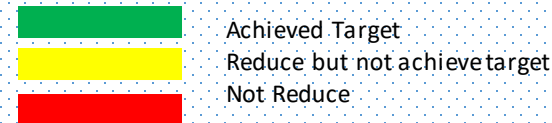


Photocell lighting systems



Water Pressure Guns, Water sensing taps and washrooms

Green Manufacturing Potential Saving, 2016-2018



**Avg. 9.3
€ / ton FG**

(Ton CO₂/Ton FG)

**Avg. 2.6
€ / ton FG**

(m³/Ton FG)

(kg/Ton FG)

GHG INITIATIVES

- Air compressor segregation and control (Ring main & receivers)
- Redesigning the steam distribution system
- Automatic switch system for lights & A/Cs in new office
- Phase 2- LED light replacement, sky lighters
- Installation of new electricity meters
- VSD control on some refrigeration compressors and evaporator fans
- Condensate return system and treatment from retorts.

WATER INITIATIVES

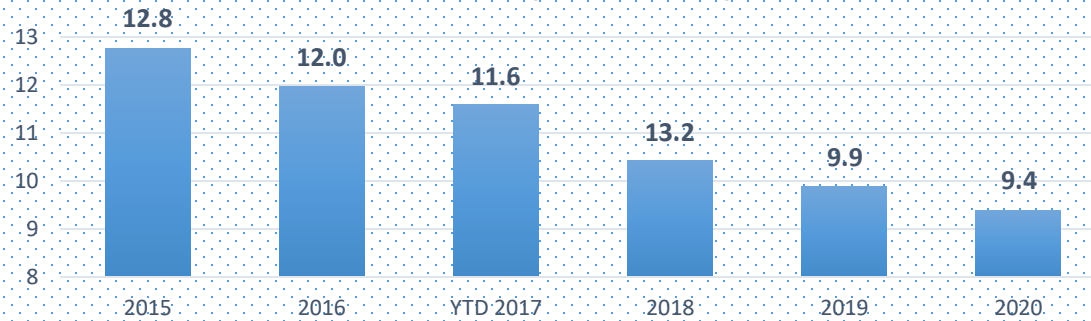
- Replacement of rusted pipes
- Replacement of precook & Chiller nozzles
- Replacement of PRC cooling tower
- Reuse of retort make-up water
- Water consumption monitoring system per section
- Water saving campaign

SOLID WASTE INITIATIVES

- Metallic scraps, plastics recycling by approved EPA vendors.
- Investment to procure industrial papers shredders and recyclables sold to paper factories.
- Organic sludge waste use as fertilizers

WATER

WATER (M3 / NWT)



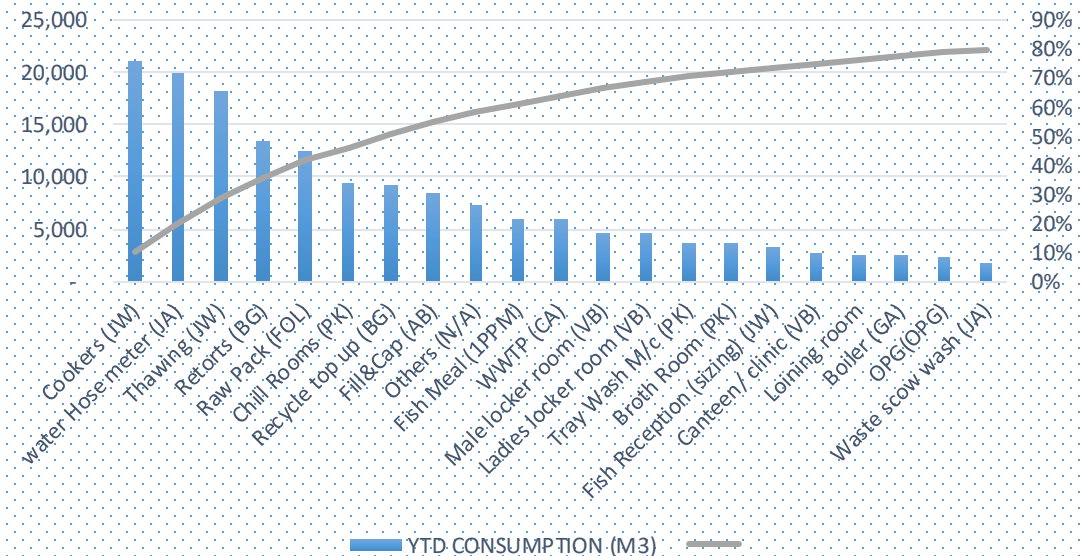
YEARLY REDUCTION	
2016	-6%
YTD 2017	-3%
Target 2018	-10%
Target 2019	-5%
Target 2020	-5%

Implemented Initiatives:

- Flood valves can washer
- PRV cookers
- New pump for PRC
- New water spray standard time – cookers
- Panel control for chillers
- Water saving campaign
- Night sanitation monitoring

Metering and daily management (32 meters) – 85% of consumption covered

PARETO WATER CONSUMPTION



WATER CY18 CAR

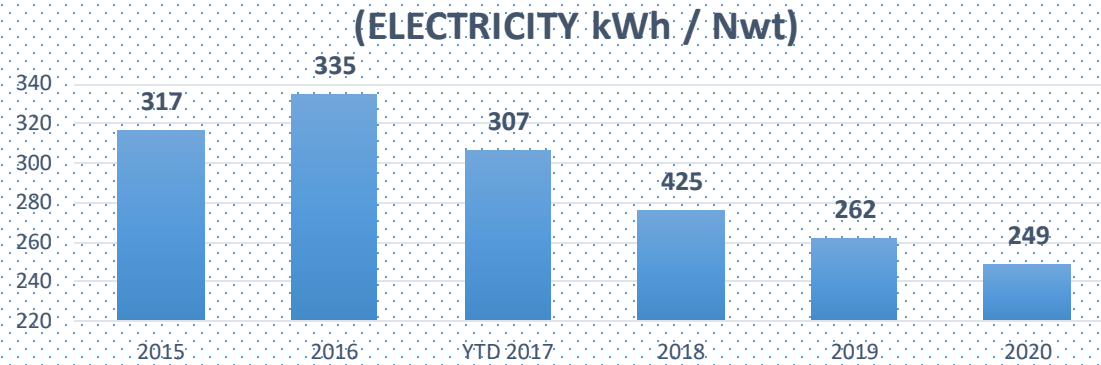
NEW INITIATIVES :

Action	Actual consumption [M3/year]	Actual cost	Future consumption [M3/year]	Future cost	Investment	Saving	Saving / year	Pay back
Replacement of rusted pipes	5,864	\$10,555	-	\$0	\$60,000	5,864	\$10,555	5.7
Replacement of cookers nozzles	30,185	\$54,333	22,639	\$40,750	\$20,000	7,546	\$13,583	1.5
Replacement Chillers nozzles	13,433	\$24,179	10,075	\$18,135	\$15,000	3,358	\$6,045	2.5
Replacement of PRC cooling tower	19,727	\$35,509	14,795	\$26,632	\$60,000	4,932	\$8,877	6.8
Thawing water recycling	25,927	\$46,669	18,149	\$32,668	\$70,000	7,778	\$14,001	5.0

Environmental Goals 2020

Year	Target	YTD
2016	11.0	12.0
2017	10.3	11.6
2018	13.2	13.3 Mar.
2019	12.5	
2020	12.5	

ELECTRICITY

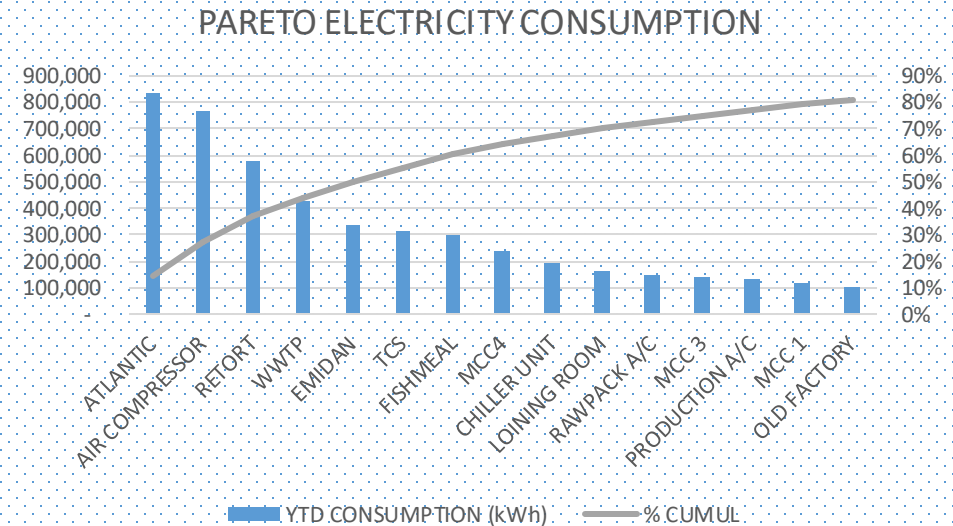


YEARLY REDUCTION	
2016	6%
YTD 2017	-8%
Target 2018	-10%
Target 2019	-5%
Target 2020	-5%

IMPLEMENTED INITIATIVES :

- Phase 1 LED
- Atlantic Coldstore new condensor
- New air compressor for WWTP
- Production A/C better managed
- New panel to control the chiller room

Metering and daily management (23 meters) – 91% of consumption covered



ELECTRICITY CY18 CAR

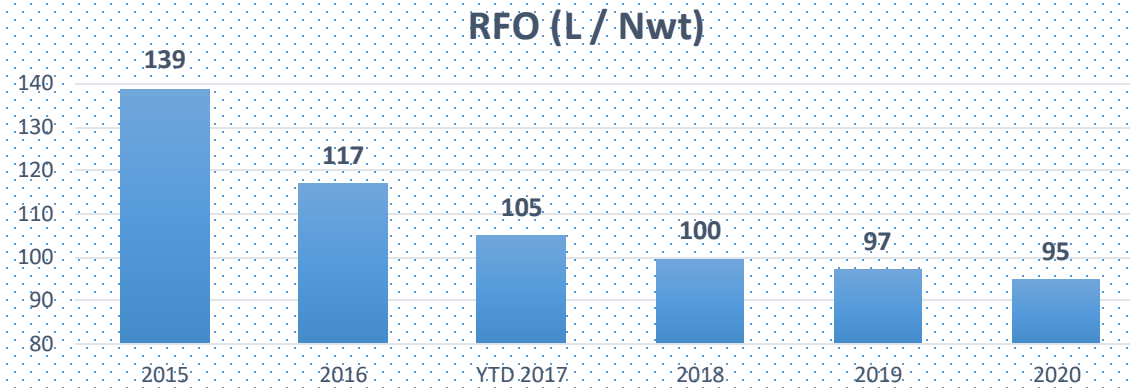
NEW INITIATIVES :

Action	Actual consumption [kwh/year]	Actual cost	Future consumption [kwh/year]	Future cost	Investment	Saving (kWh)	Saving/year	Payback
Air compressor segregation and control (Ring main & receivers)	1,090,249	\$231,133	981,224	\$208,019	\$100,000	109,025	\$23,113	4.3
Phase 2- LED light replacement	175,200	\$37,142	26,280	\$5,571	\$50,000	148,920	\$31,571	1.6
Extracting room upgrade (new fans controlled by VSD + probes)	277,411	\$58,811	221,929	\$47,049	\$30,000	55,482	\$11,762	2.6
Phase 2 Atlantic (Split evaporators (room 1 & 3), Install VSD evaporative condenser, Install VSD on evaporator fans)	1,192,639	\$252,839	1,073,375	\$227,555	\$220,000	119,264	\$25,284	8.7
Automatic switch system for lights & A/Cs in new office	46,800	\$9,922	44,460	\$9,426	\$10,000	2,340	\$496	20.2
Installation of new electricity meters	-	-	-	-	-	-	-	-
Sensors to switch of lights	-	-	-	-	-	-	-	-

Environmental Goals 2020

Year	Target	YTD
2016	344	335
2017	377	307
2018	425	466 Mar.
2019	404	
2020	404	

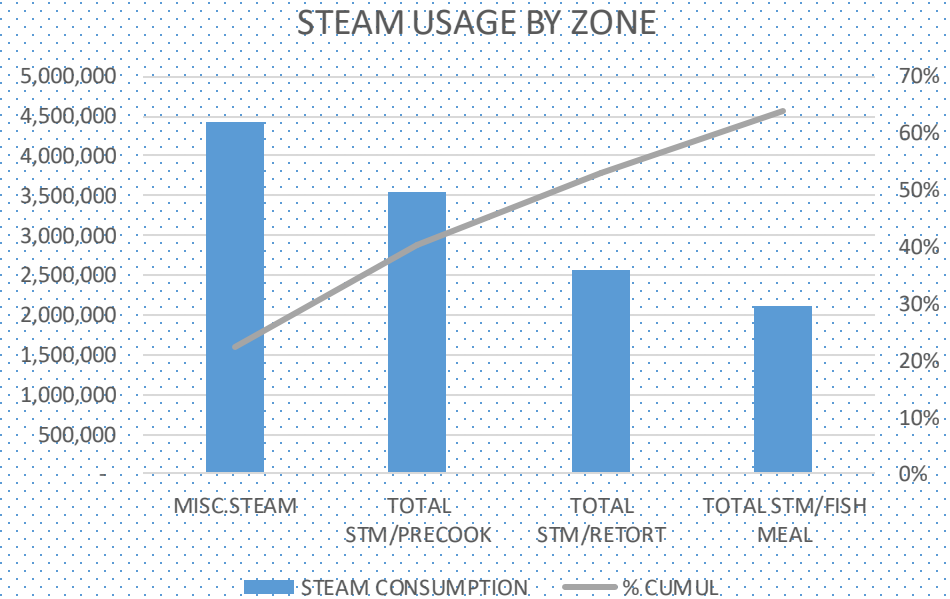
RFO



YEARLY REDUCTION	
2016	-16%
YTD 2017	-10%
Target 2018	-5%
Target 2019	-2.5%
Target 2020	-2.5%

Implemented Initiatives:

- Mapping of fuel suppliers
- Improve communication between internal customers and boiler
- Retort sensors for steam generation



RFO CY18 CAR

NEW INITIATIVES :

- Conditioning monitoring of all steam traps and replacement
- Condensate return system and treatment from retort
- Redesigning the steam distribution system by reducing pipe size from 6in to 4in from the main manifold.

Thank you