UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Ministry of Trade & Industry
وزارة التجـــارة والصـــناعة

GEIPP
EGYPT
GLOBAL ECO-INDUSTRIAL PARKS PROGRAMME

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
State Secretariat for Economic Affairs SECO

Eco-Industrial Parks in Egypt

Capacity Building Workshop

18th May, 2023

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Ministry of Trade & Industry
وزارة التجـــارة والصـــناعة

GEIPP
EGYPT
GLOBAL ECO-INDUSTRIAL PARKS PROGRAMME

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
State Secretariat for Economic Affairs SECO

Resource Efficiency and Cleaner Production
RECP

Dr. Ahmed Yahia
Chemonics Egypt Consultants

Contents

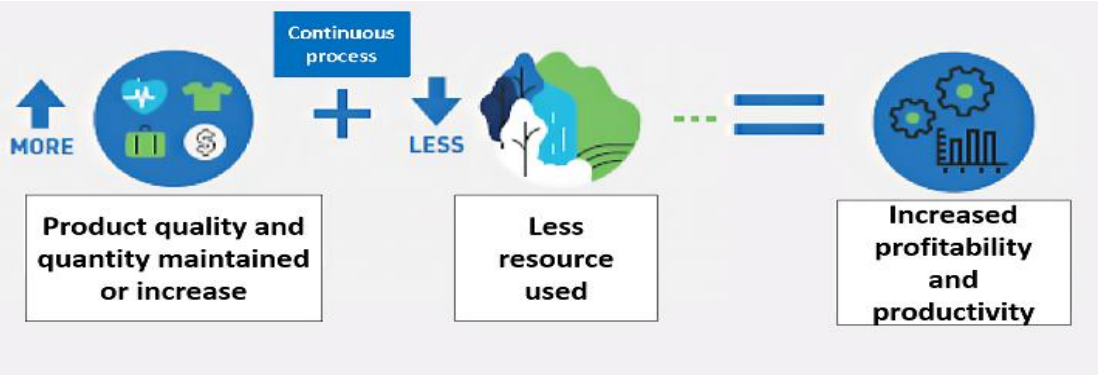
1. RECP introduction & benefits
2. Benchmarking & Methodology
3. Most common RECP measures in sectors of attendees
4. National and international case studies
5. Challenges and improvement (open interactive session)

Introduction

RECP - Introduction

- Resource Efficiency

Minimizing utilization of resources in industrial facility while maintaining, **quality**, **quantity,** and **safety** of production processes



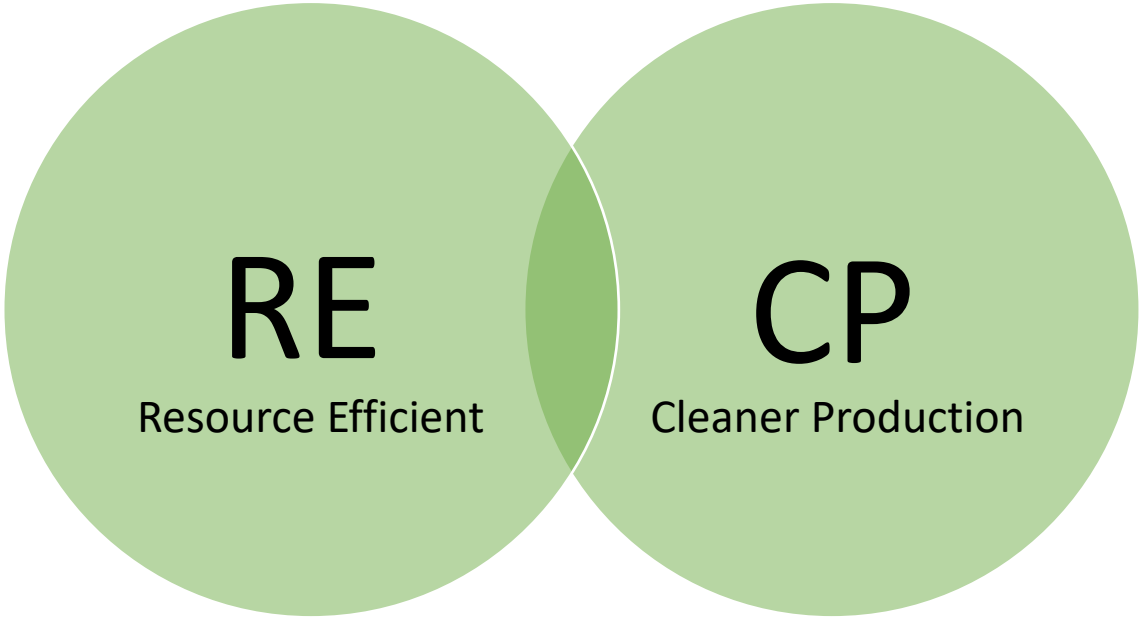
RECP - Introduction

- Cleaner Production

Continuous application of an **integrated preventive environmental strategy** to processes, products and services in order to increase the **overall** efficiency and to reduce risks to human life and the environment.

Cleaner production addresses the saving of raw materials and energy, the elimination of toxic raw materials and the **reduction in the quantities and toxicity of waste and emissions**.

RECP - Introduction



RECP - Introduction

RECP - Introduction

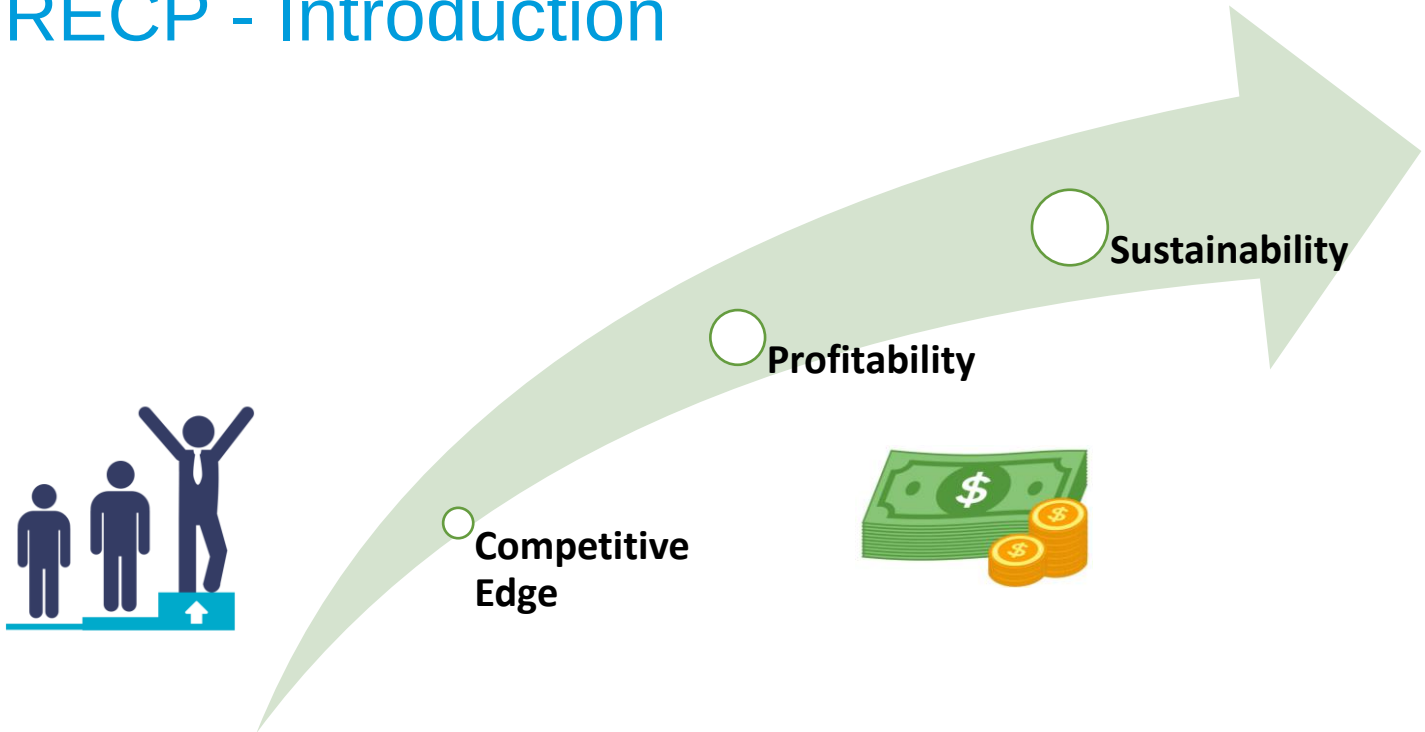
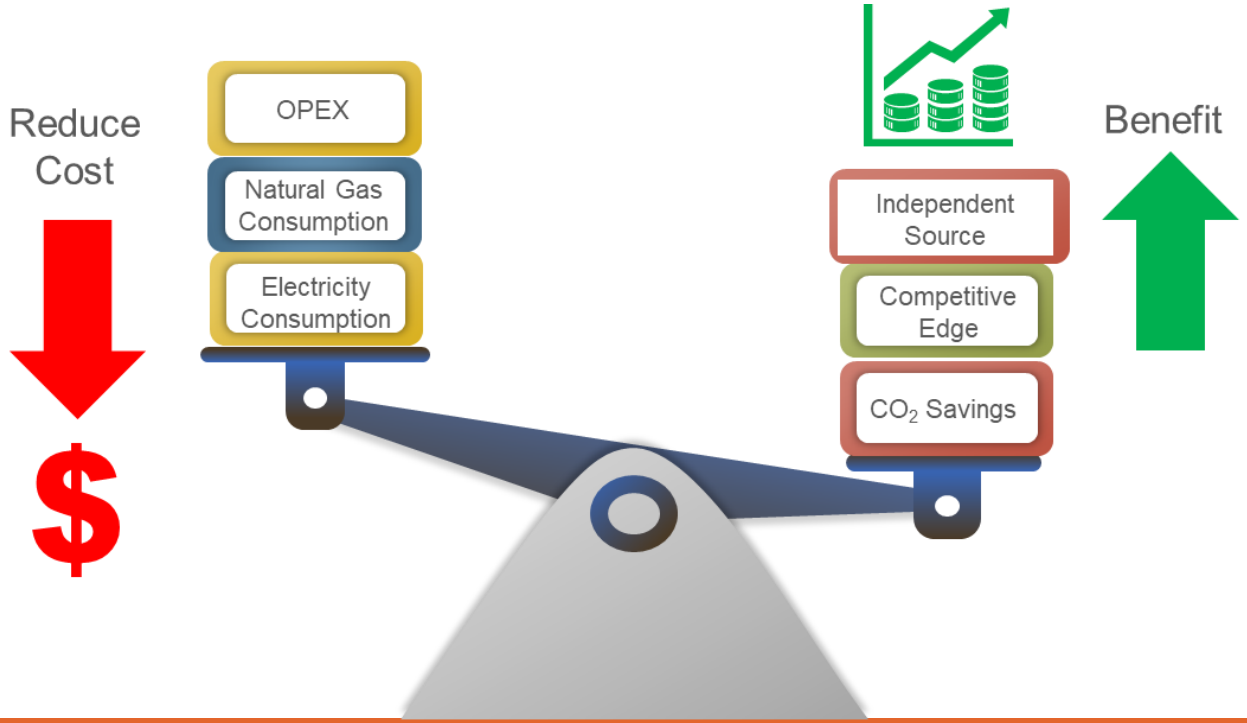


Figure developed by Chemonics Egypt Consultants

RECP - Benefits



RECP - Benefits

- Access to international clients who require sustainability targets to be achieved
- Improve brand value
- Contribution to meeting country climate target
- Contribution to improving local economy and quality of life
- Attracting more environmentally conscious clients

IEA, 2014

RECP - Benefits

Increased Productivity

- Better control over the production process and provision of services
- Flexibility in meeting requirements
- Reduce waste and losses

Improve Reliability

- Reducing critical/sudden breakdowns
- Longer equipment life time

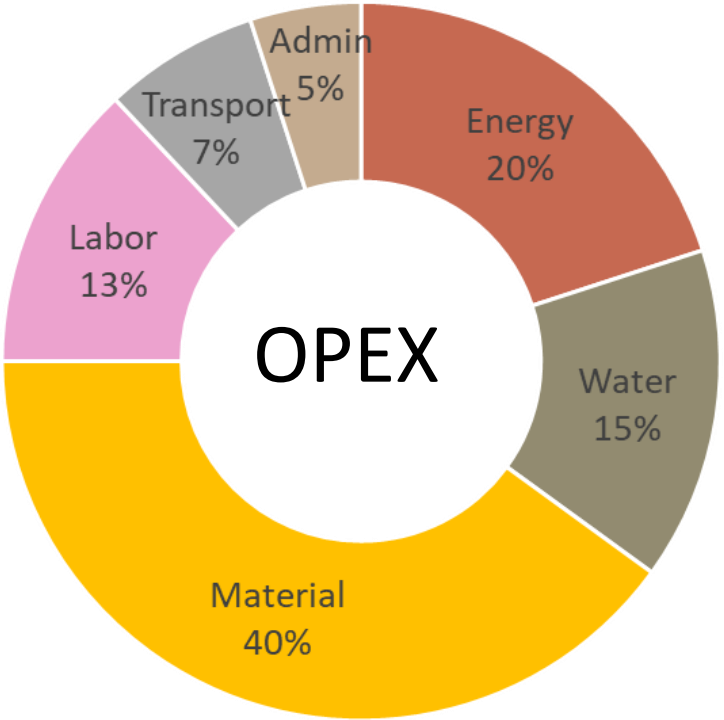
Reduce Costs

- More efficient operation
- Reduce maintenance costs
- Lower production and services costs

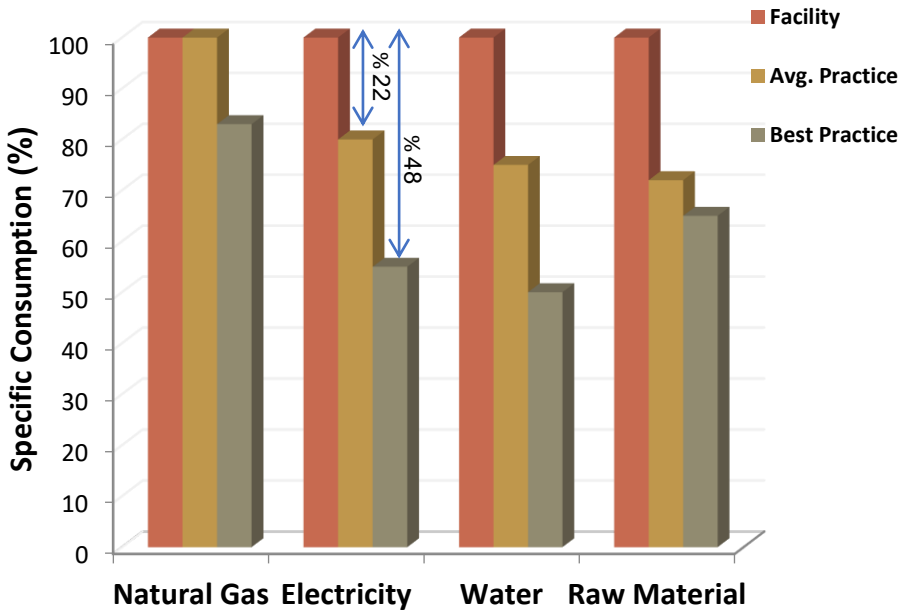
Benchmarking & Methodology

RECP - Benchmarking

- Benchmarking is the process of comparing one business to another one, by using key performance indicators.
- Applying benchmarking to resource efficiency, the relevant indicators relate to material and energy consumption, to waste generation and emissions.
- Consider the contribution of various resources to the unit cost.



RECP - Benchmarking



Sugar factory in Egypt

- The concept of relative consumption provides the expected amount of resource consumption per unit product
- Comparing relative consumption to the global average and to best practices provides a clear understanding of the potential savings
- Prioritize where there is the largest amount of expected savings

RECP - Methodology

The Systems approach

- A more holistic approach
- Aims to best-match the individual components of the system to each other and to the process needs, while also improving each separate component (ex: proper matching of equipment to loads)

The component approach

- Aims to improve the performance of a system by improving each individual component of the system by itself (ex: upgrading to a better component)

Thus system approach usually results in greater expected savings than component approach

RECP - Methodology

Data Collection

Mass flow	Energy flow	Costs and safety	Flow diagram

Reflection and Study

Where and why do we generate waste?	Develop material and energy balance	Assess root cause of inefficiencies and wastes

Developing Actions

Generate RECP options / interventions	Establish actions and priorities

Feasibility Analysis

Technical and operational evaluations	Economic and environmental evaluations	Monitor RECP benefits	Integrate RECP in management

RECP - Methodology

Production Efficiency

Environmental

Human Development

- Raw Material

- Energy
  (Electrical –Thermal)

- Chemicals

- Water

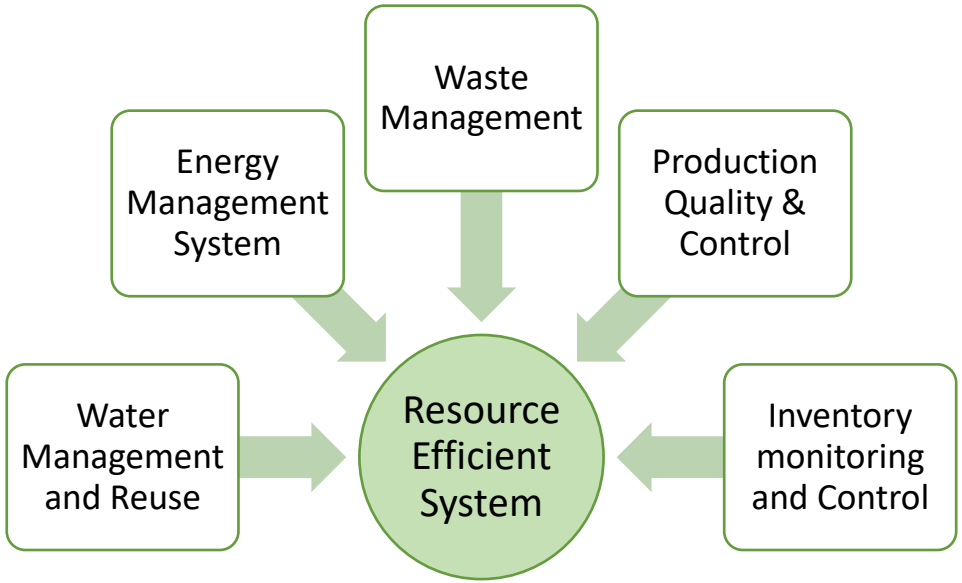
- Waste Material
- Waste water
- Waste Heat
- Waste Chemicals

Reduce – Reuse - Recycle

RECP - Methodology

- Resource Management System (RMS)

http://www.recpc.org/



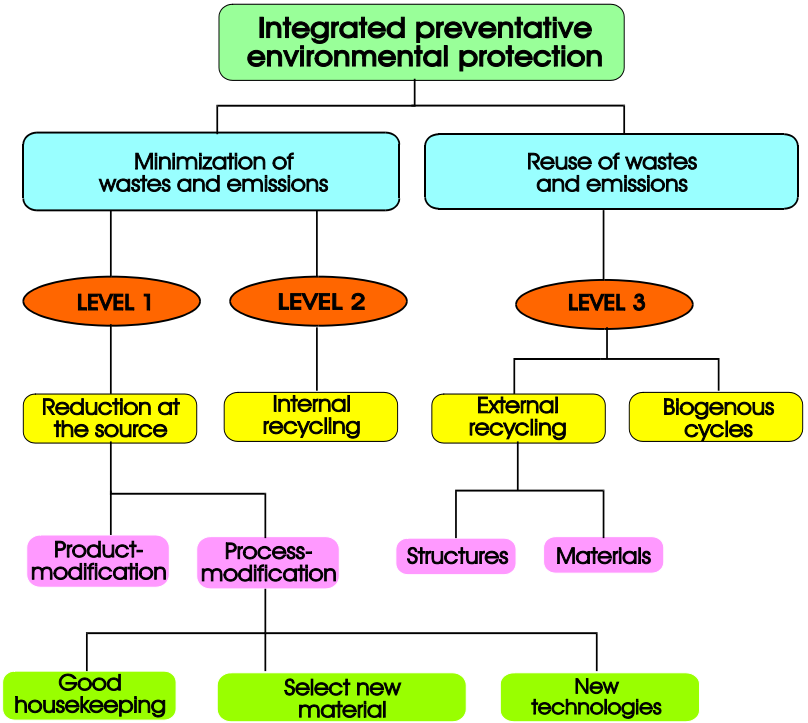
Common Best Practices

RECP - Materials Management

- Efficient raw materials use for **minimal** waste production contributes to productivity boost.
- Measures:
  - Well-organized input materials accounting and quality control
  - Replacing material components with alternative and less toxic but maintaining or even boosting final product quality
  - Using wastes as raw material in other manufacturing processes
  - Producing byproducts from material waste or remnants

RECP - Waste Management

- General waste management measures include:
  - Complete emptying of containers
  - Sealing of leakages
  - Automatic dosing of chemicals
  - Optimization and monitoring of set point parameters in process
  - Recycling of valuable materials in the company
  - Installing more efficient machines, best available and eco-innovative technologies

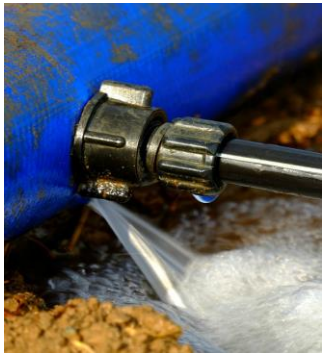


UNIDO-CP tool kit

RECP - Water Management & Conservation

- General water management measures include; recovery, reuse, and recycling practices
  - Automatic closing of cooling water circuits for equipment
  - Smart control of washing water by using high pressure water
  - Wastewater recycling techniques
  - Recovery and reuse of rinse water
  - Install Minimal Liquid Discharge plant

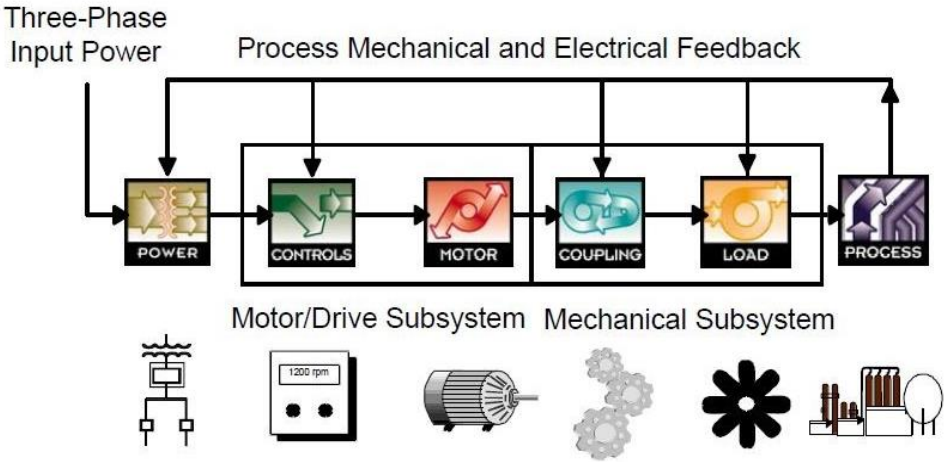
https://www.potatobusiness.com/



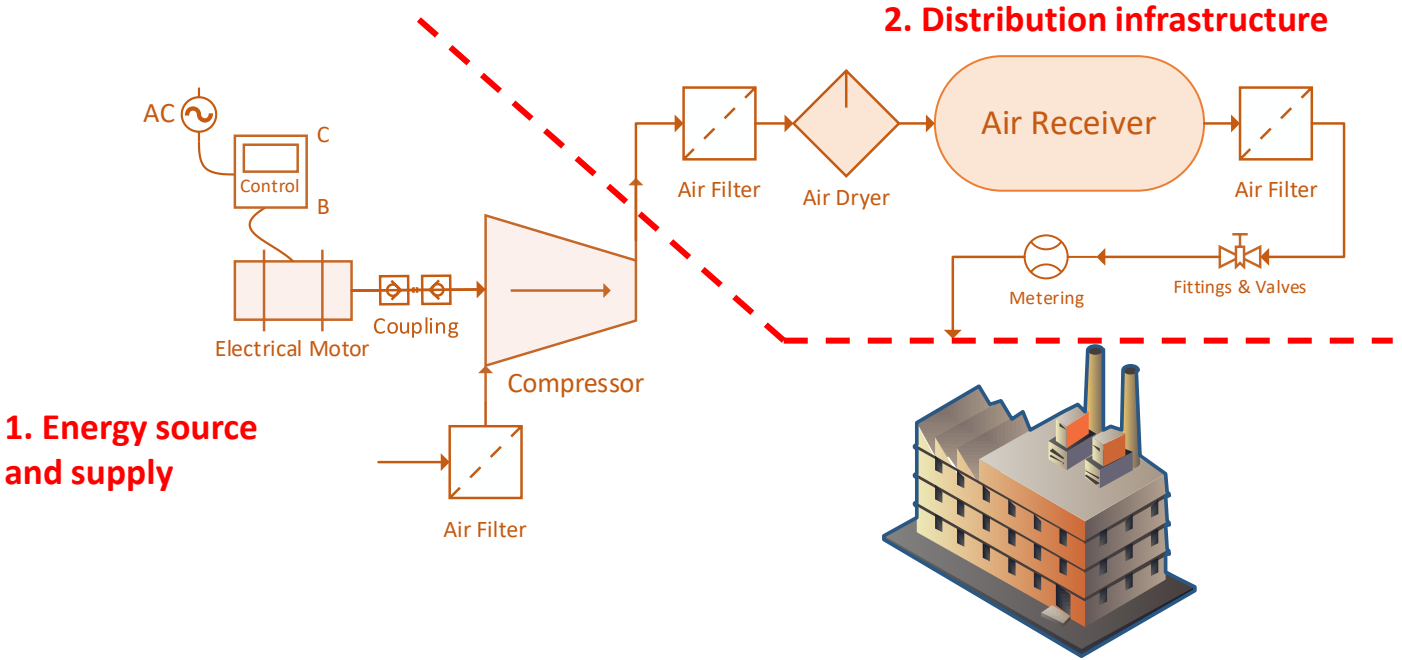
https://piperepair.co.uk/

RECP - System Optimization: Motor Systems

- Motors system represent almost all industrial applications
- For example, pumps, fans and air compressors make up 56% of industrial applications
- Since motors systems usually consist of several components, lots of saving opportunities exist

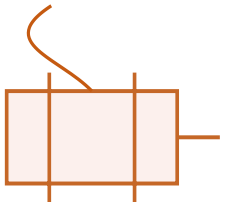


RECP - System Optimization: Compressed Air



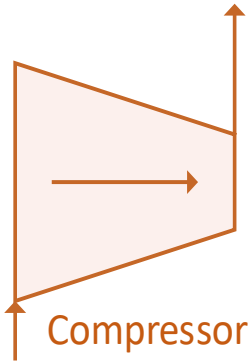
Developed by Chemonics Egypt Consultants-EID

RECP - System Optimization: Compressed Air



Electrical Motor

- Energy efficiency rating
- Quality of supply

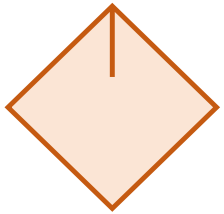


Compressor

- Oversize
- Type
- Lubrication & maintenance

Air Receiver

- Regular checks
- Proper sizing
- Cycling monitoring
- Pipework volume
- Condensate draining



Air Dryer

- Required air quality
- Type of dryer

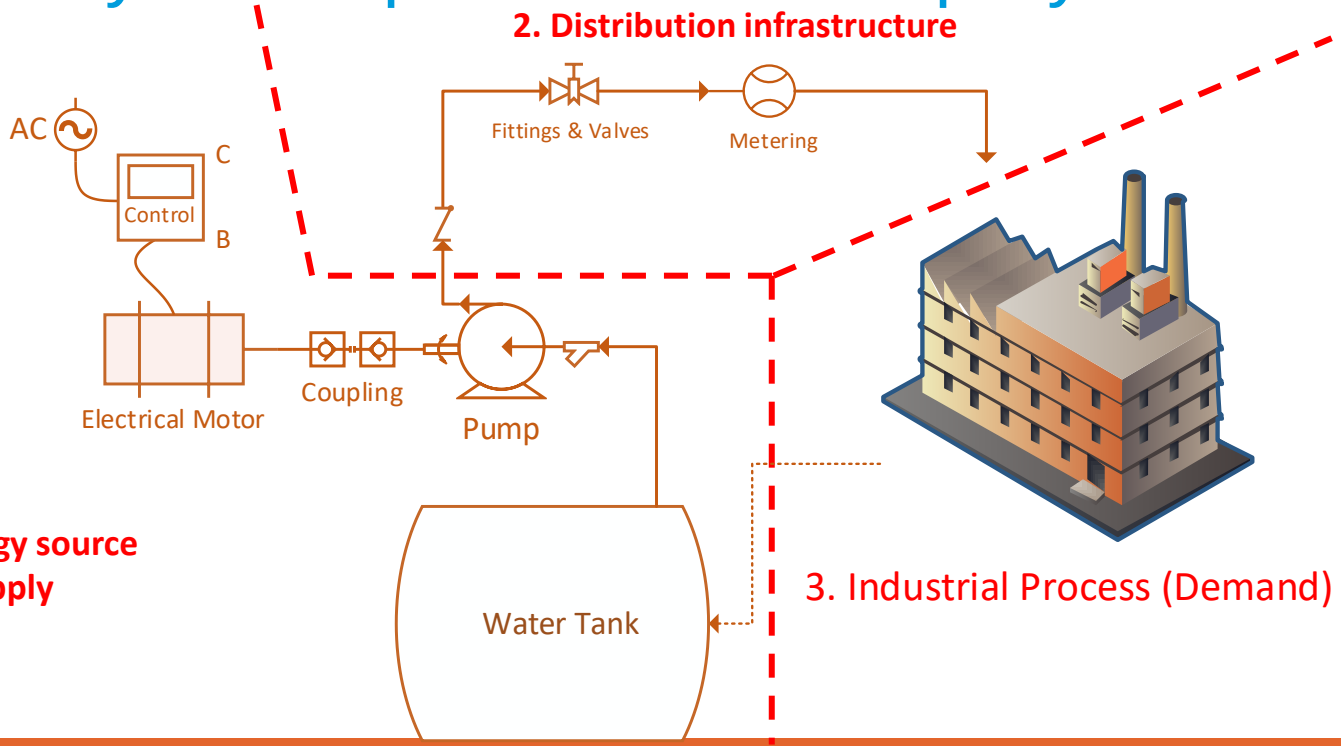
Fittings & Valves

- Proper pipe sizing and selection
- Poor pipe routing
- Excessive Pressure drops
- Leakages

UNIDO-CASO

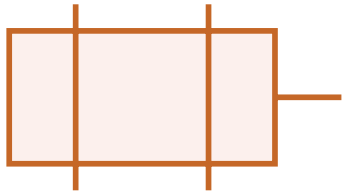
Developed by CHEMONICS Egypt Consultants-EID

RECP - System Optimization: Pump System



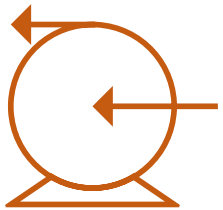
Developed by Chemonics Egypt Consultants-EID

RECP - System Optimization: Pump System



Electrical Motor

- Energy efficiency rating
- Quality of supply



Pump

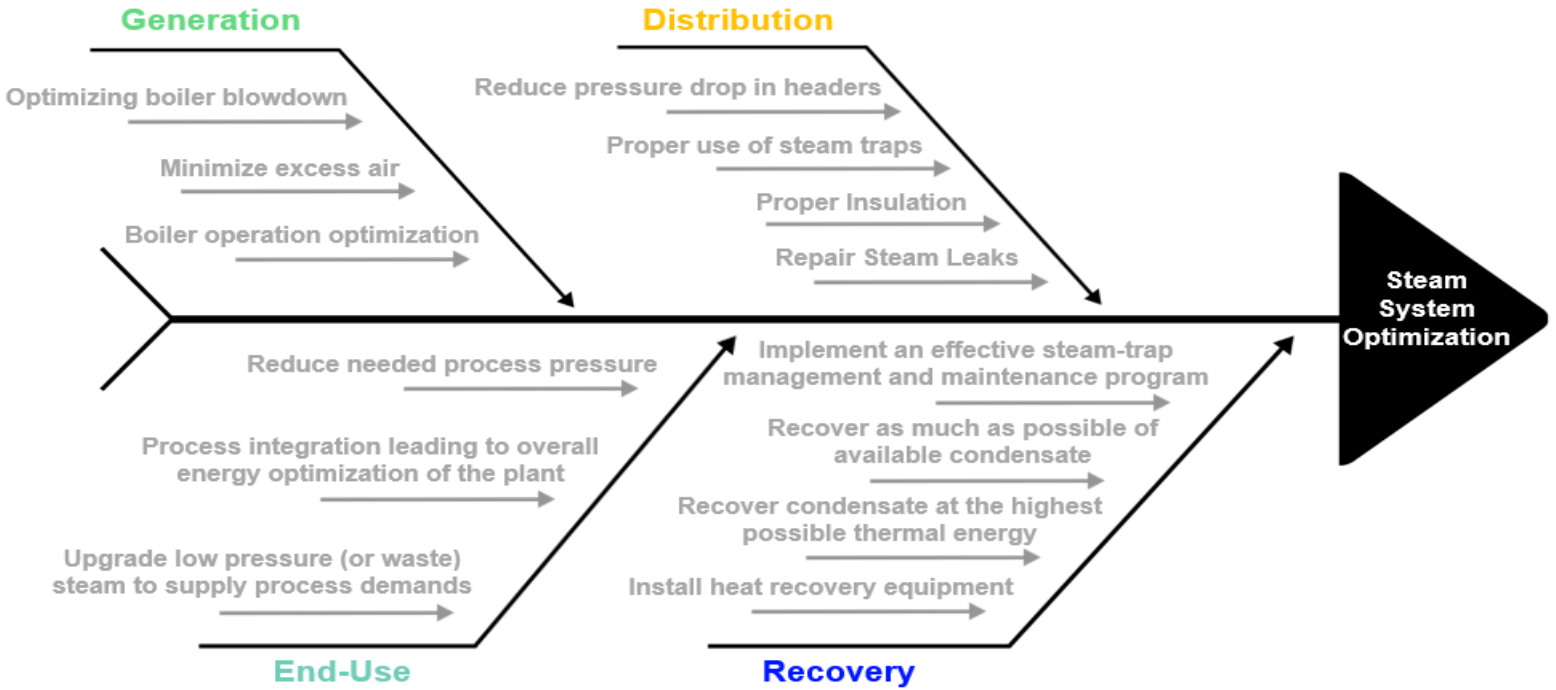
- Pump selection and sizing
- Pump fittings

Fittings & Valves

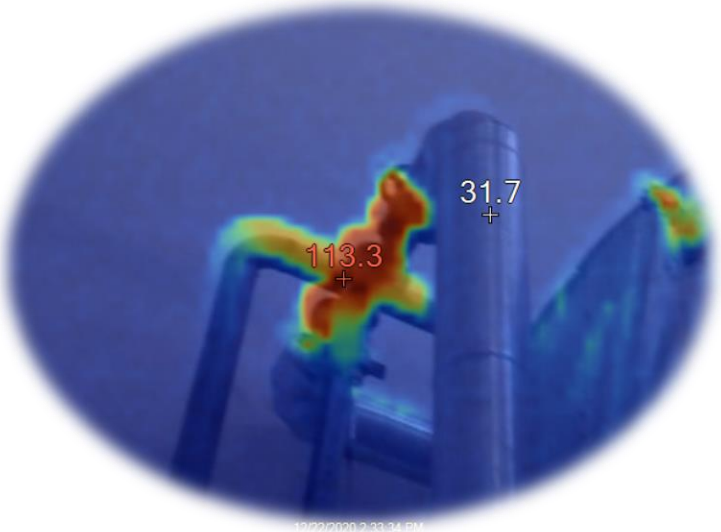
- Proper sizing and selection of pipes and fittings
- Removal of fouling and blockage
- Proper pipe routing
- Leakages

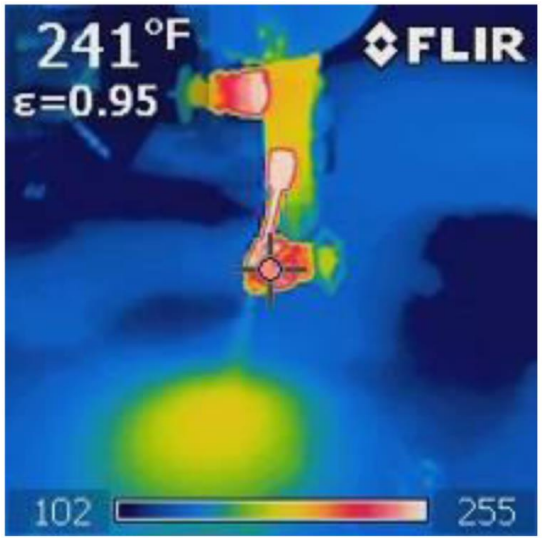
- Regular checks
- Proper tank sizing

RECP - System Optimization: Steam System



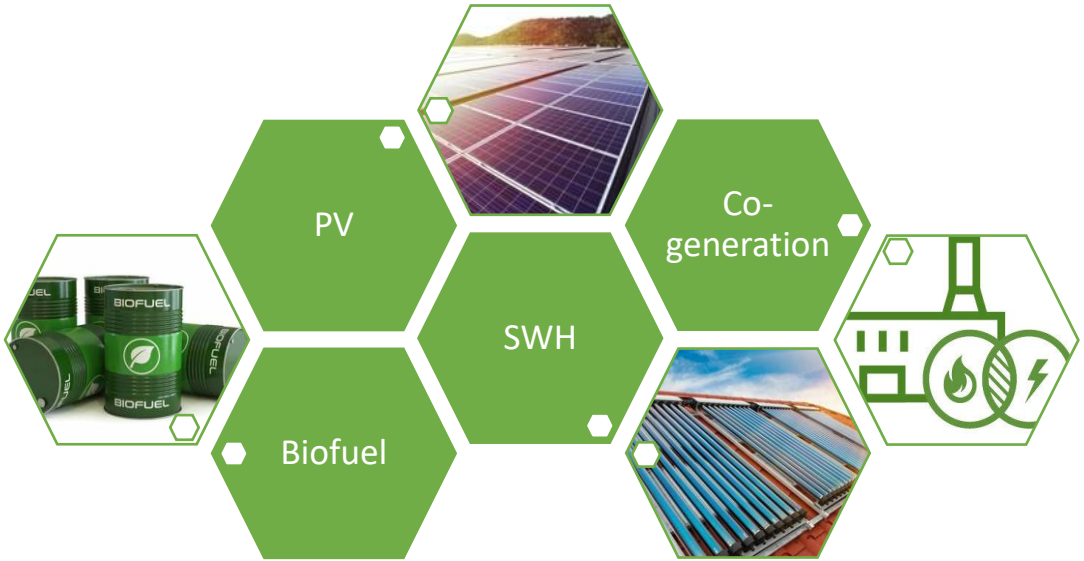
RECP - System Optimization: Steam System





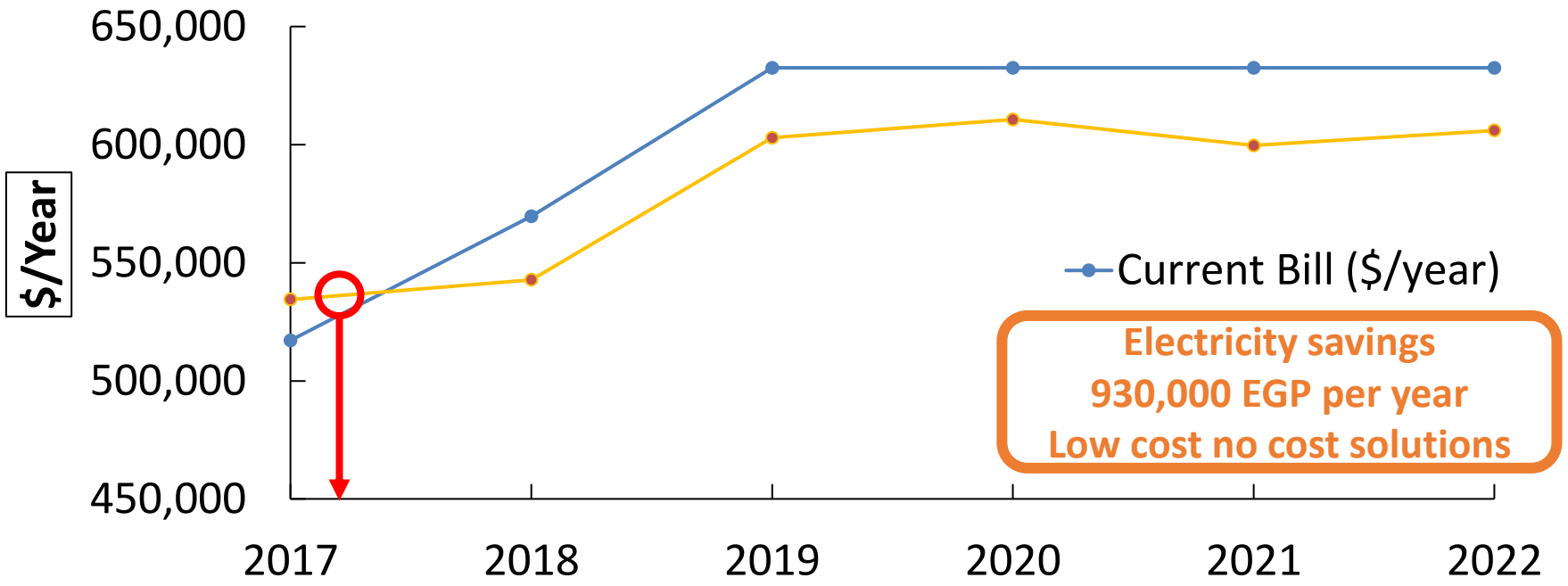
RECP – Renewables & Low Carbon Alternatives

- Solar PV System
- Solar Heating Solutions
- Biofuels
- …

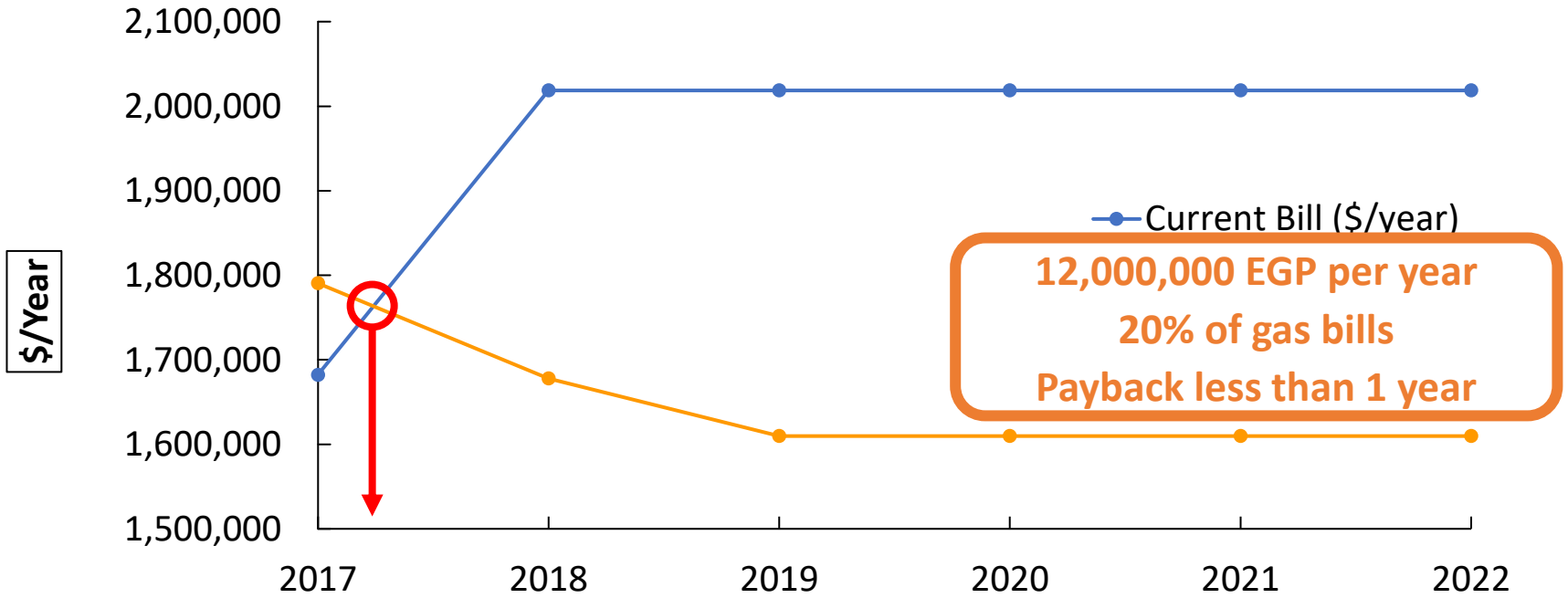


https://ballaratsolarcompany.com.au/why-install-solar/commercial-solar-panels-ballarat/
https://clipground.com/combined-heat-and-power-plant-clipart.html
https://okcredit.in/blog/what-is-biofuel-energy/

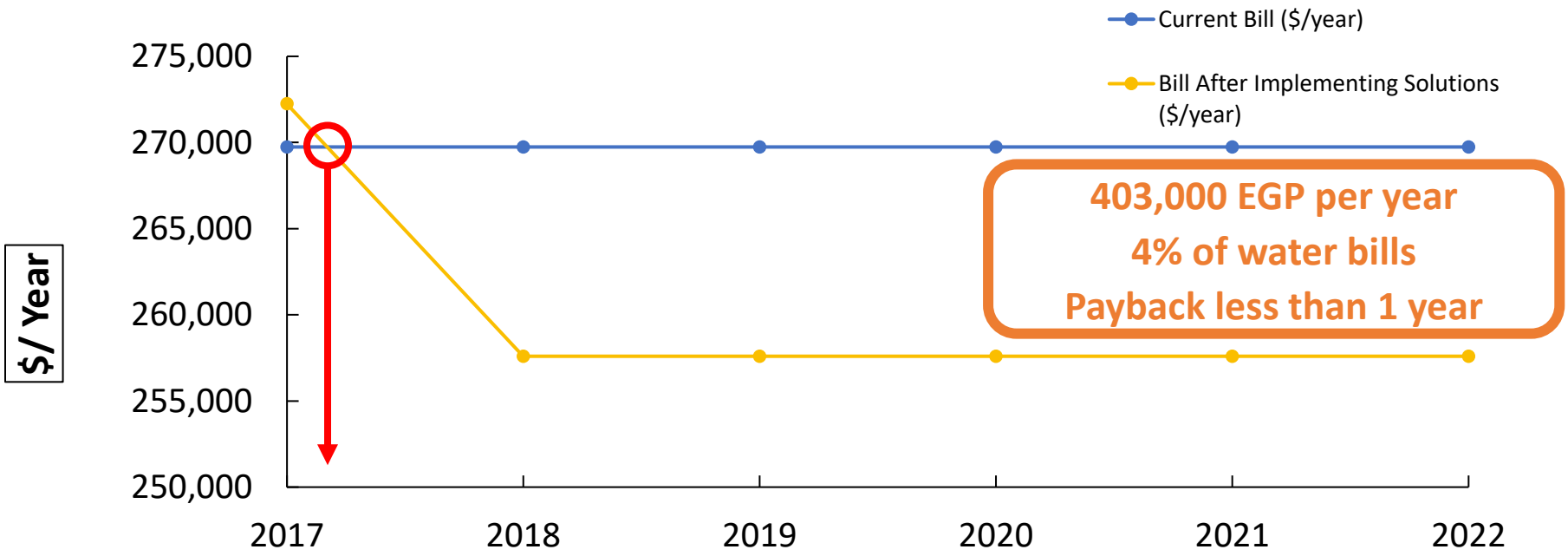
RECP - Energy Savings



RECP - Energy Savings

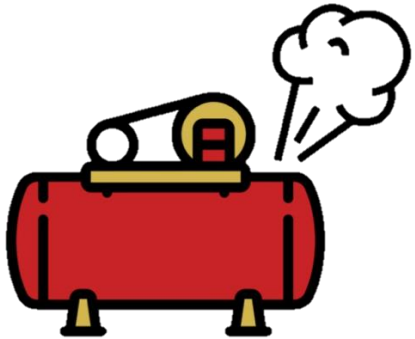


RECP - Water Saving



RECP – National Case Studies: CASO and SSO

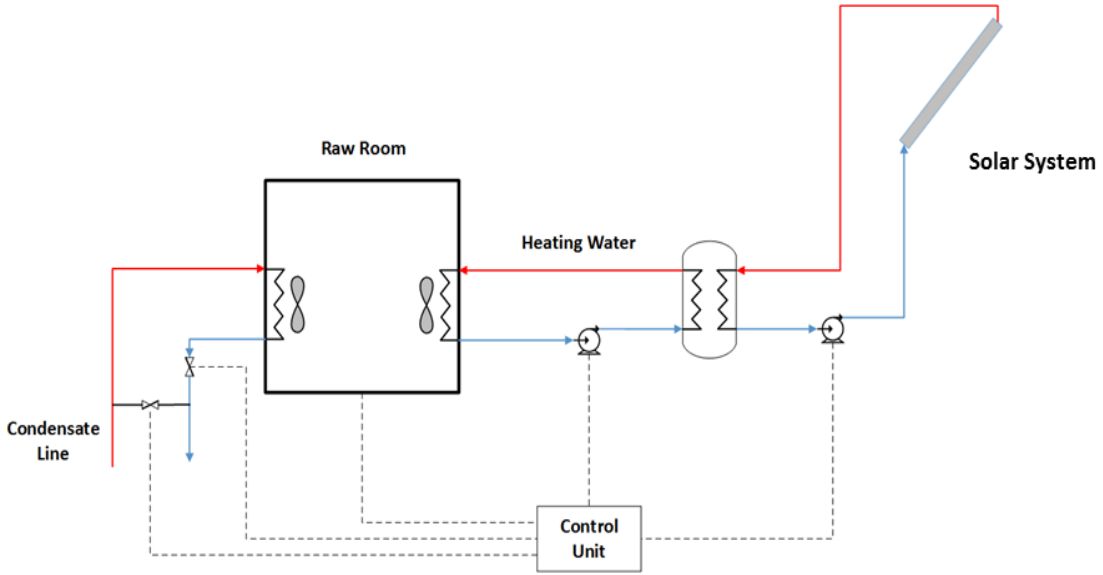
- A Textile factory focused on implementation of **quick-wins** in the compressed air and steam system.
  - Leakage of compressed air,
  - Optimization operation compressors,
  - Optimization operation of boilers,
  - Leakage of steam,
  - Optimization of burning efficiency,
  - Ensure all condensate return,



- **Total Savings 60 Million EGP in 8 months**

RECP – National Case Studies: SHIP

- A Cosmetic Factory installed solar system for preheating of waxy raw materials heating waxy raw material up to 40 ºC.
- CAPEX: 6,000 USD
- **System payback is 4 Years**



RECP - National Case Studies: Solar PV System

- A Textile Factory, installed solar PV system of **480 kW**.
- CAPEX: 575,000 USD
- **System payback is 7 Years**

https://ballaratsolarcompany.com.au/why-install-solar/commercial-solar-panels-ballarat/

RECP - National Case Studies: ZLD – Waste Water

The technology provided is a microfiltration system, a High Efficiency Reverse Osmosis (HERO™) system, followed by Fractional Electrodeionization (FEDI™) and a brine concentrator, with finally a crystallizer and sludge treatment system

ETHYDCO

- Reduced fresh water demand by 70 %, from 2,600 m³/h to 800 m³/h.
- The ZLD plant designed and installed will treat wastewater discharge and cooling tower blowdown to get cooling tower makeup water, boiler feed water and achieve ZLD.

RECP - National Case Studies: Textile Waste

Custom Fabric Waste Recycling Machine

Input

Wasted raw material

Output

Cloth, wool spinning, non woven fabrics

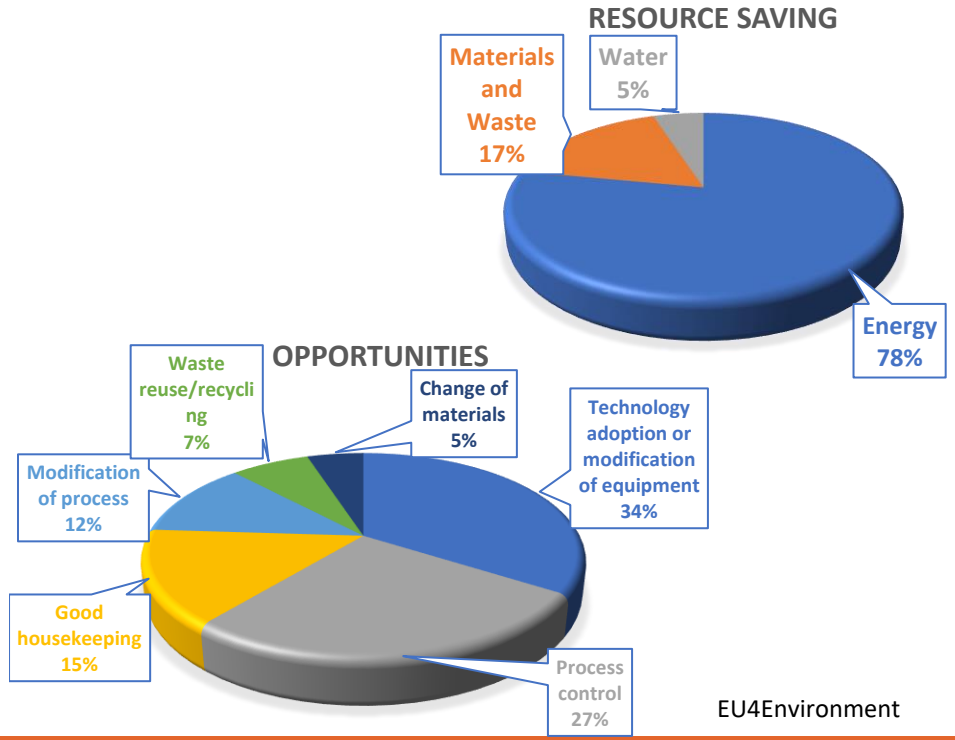
Key Benefits

- ✓ Environment Protection
- ✓ long service life
- ✓ reduce the damage brought to fiber.

RECP – International Success Stories

Case study from UKRAINE

- EaP GREEN (2013-2017) and EU4Environment (2019-2022)
- Establish four RECP Clubs in the Chernihiv and Kharkiv regions
- Most of the implemented measures were **low-cost**. On average, the companies spent 10% of the planned investments on their RECP action plans.
- Total savings in 10 sampled companies amounted to **€620,000 a year**, with around **80%** of the implemented options being related to energy savings.



EU4Environment

Success Story – Speaker

Content is in progress with the company

5-10min

RCEP - Summary

Objectives

Resource efficiency
Environment impact minimization
People's well-being

Challenges

Efficient materials
Water and energy use
Reducing waste, sewage water and air emissions.

RECP

Techniques

Good housekeeping
Better process control
Technology change
Onsite reuse and recycling
Production of useful byproducts
Input material change
Equipment modification
Product modification

Steps

Data collection and analysis
Detailed assessment
Developing resource efficient options
Feasibility studies
Implementation

Challenges to Develop RECP and How to Overcome Them (Open Discussion)

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Ministry of Trade & Industry
وزارة التجـــارة والصـــناعة

GEIPP
EGYPT
GLOBAL ECO-INDUSTRIAL PARKS PROGRAMME

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
State Secretariat for Economic Affairs SECO

VISIT THE **UNIDO KNOWLEDGE HUB** FOR MORE RESOURCES ON ECO-INDUSTRIAL PARKS