



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



Ministry of Trade & Industry  
وزارة التجارة والصناعة



**GEIPP**

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



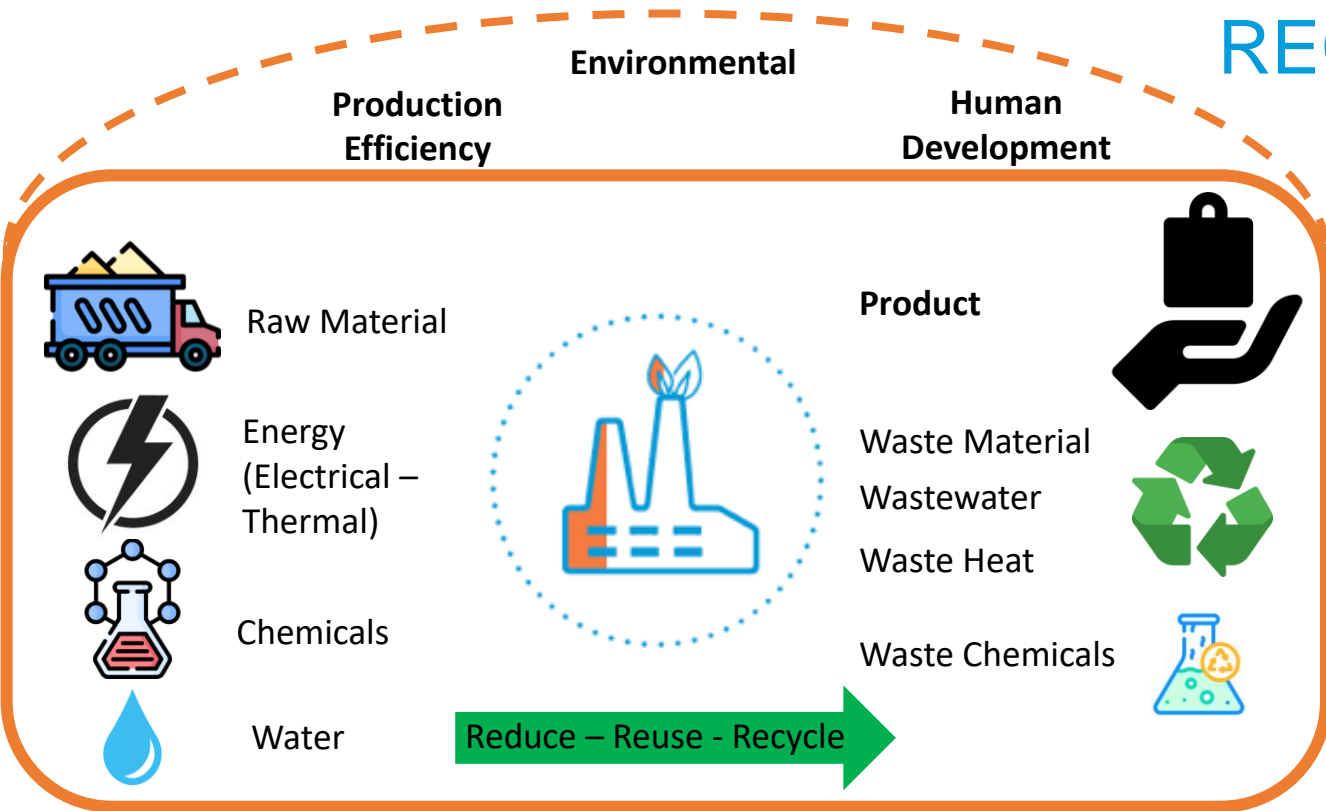
# Eco-Industrial Parks in Egypt - Workshop

## Resource Efficient and Cleaner Production (RECP)

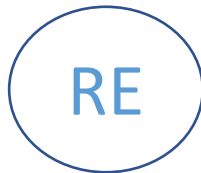
# Contents

1. RCEP Introduction & Benefits
2. Benchmarking
3. Most common RCEP measures in sectors of attendees
4. Interactive session on most relevant measures (menti-meter)
5. Challenges and improvement (open interactive session)
6. National and International Case studies

# RECP Introduction



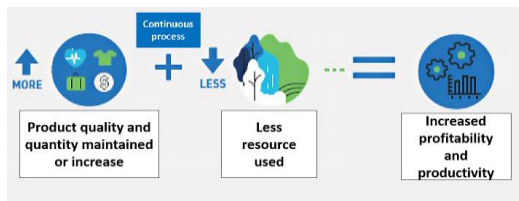
# RECP Introduction



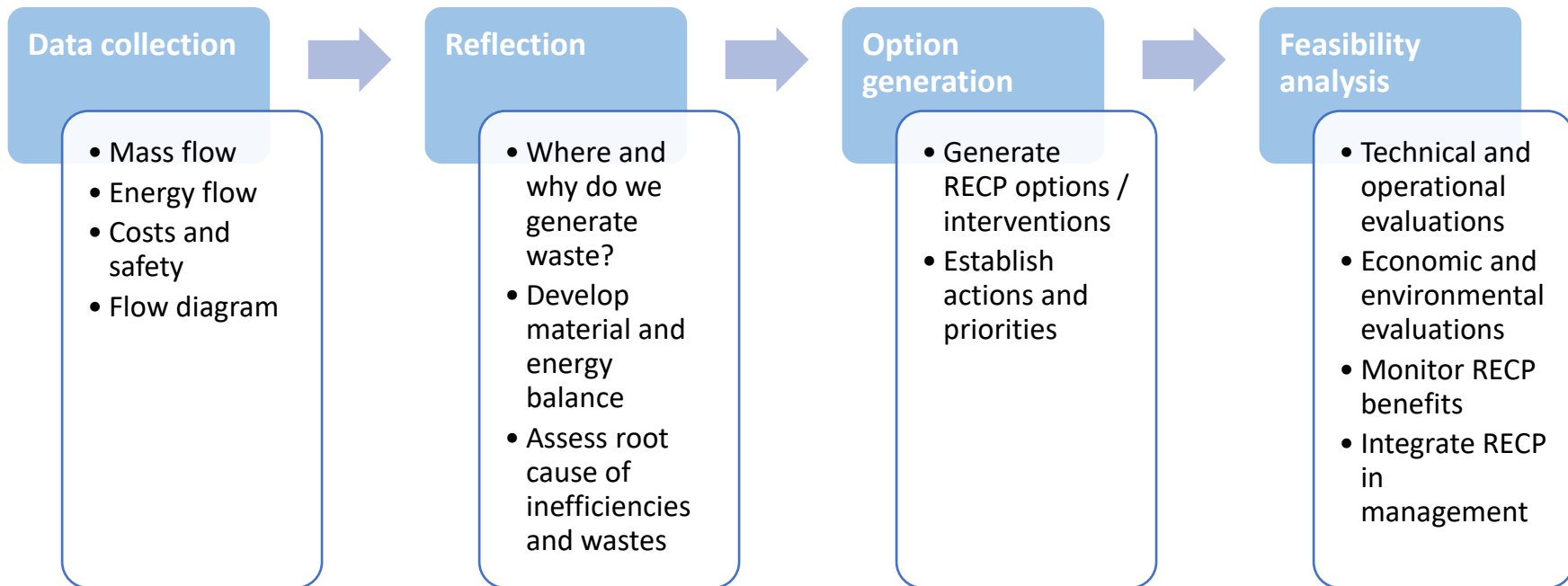
Utilizing less resources in industrial facility while maintaining safety, quality, and quantity of production processes



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.



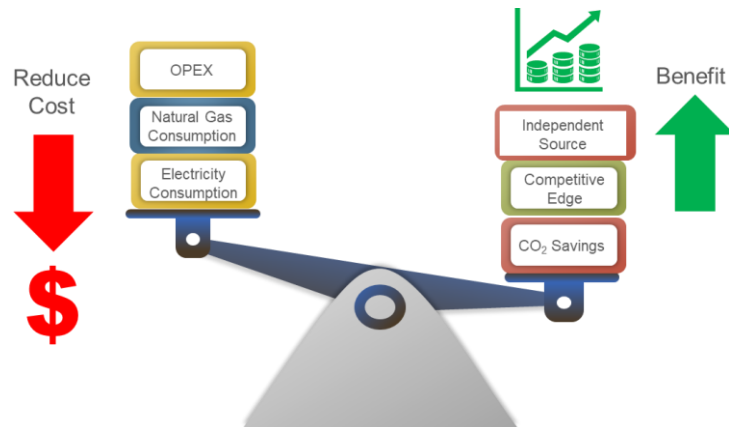
# RECP Methodology





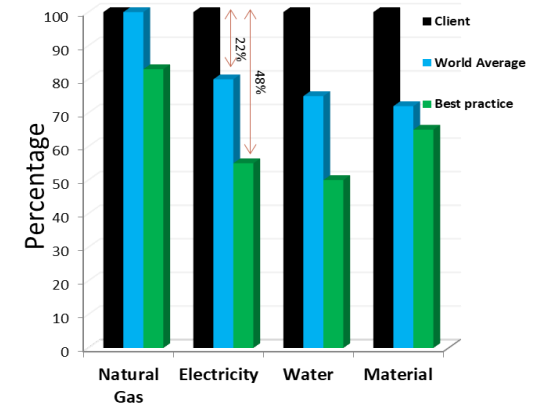
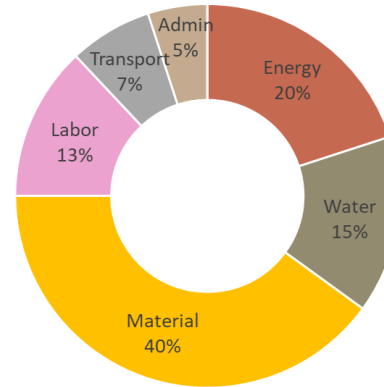
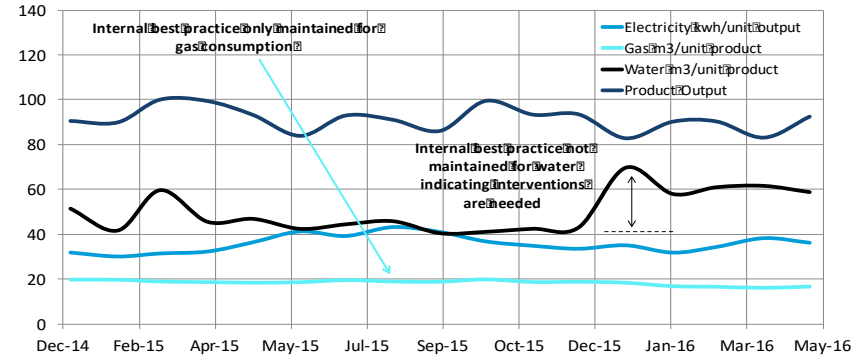
# RECP Benefits

- Benefits
  - Increase productivity
  - Increase competitive advantage
  - Increase degree of utilizing material
  - Decrease resources and costs
  - Continuous environmental improvements
  - Improve company image
  - Improve worker's health and safety



# 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.



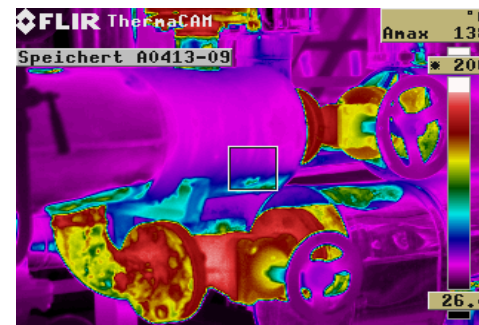
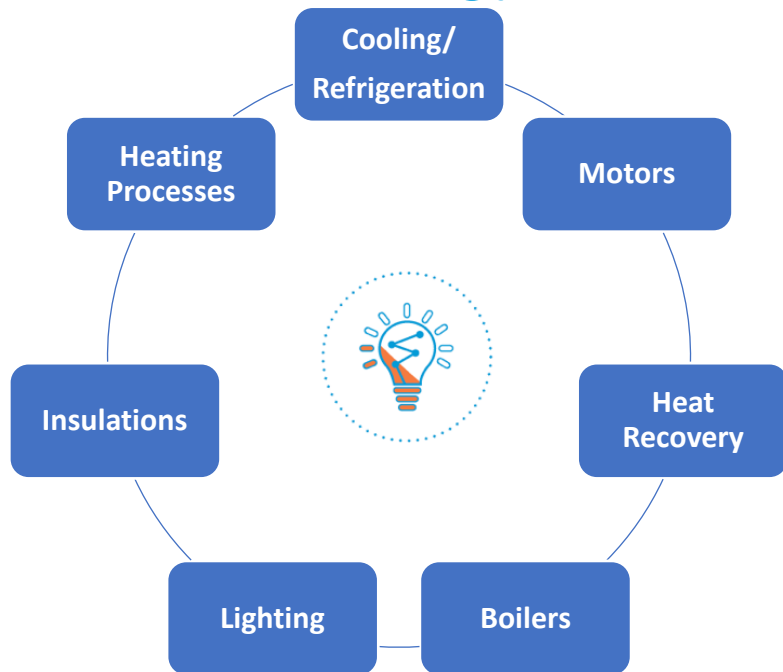
# RECP - Materials Management

- Efficient raw materials use within minimal waste production contributes to productivity boost.
- Recycled materials use plays a significant role in high-quality and economically attractive products manufacture.
- 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



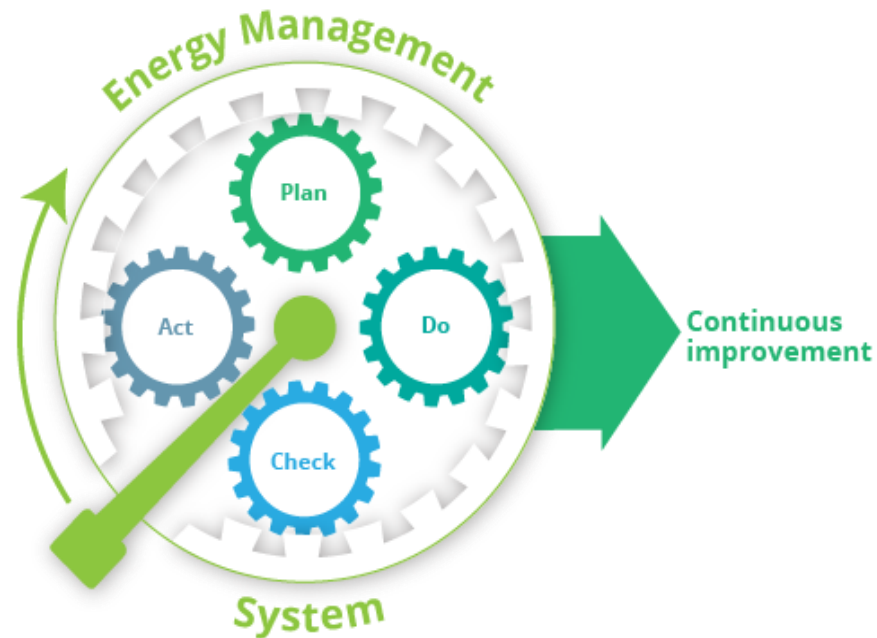


# RECP - Energy Efficiency



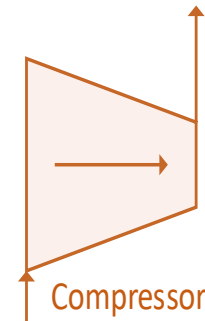
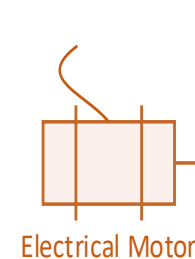
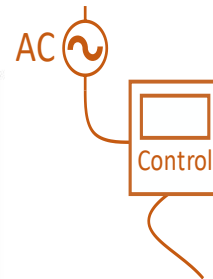
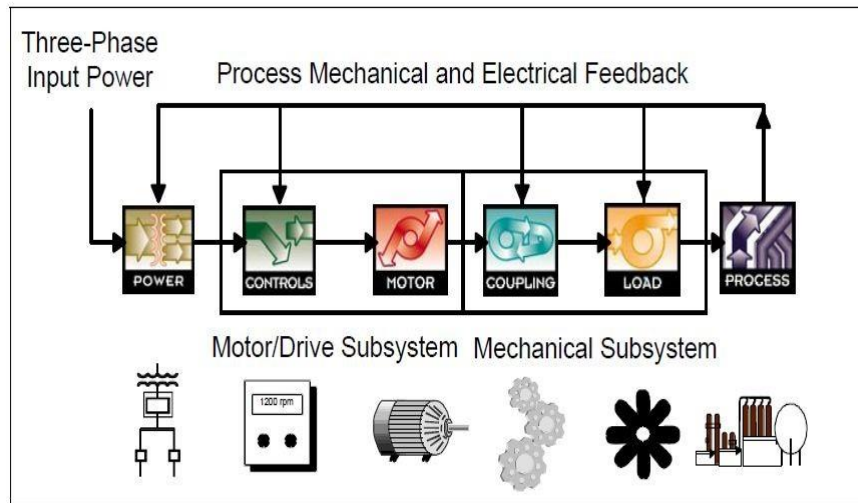
# RECP - Energy Efficiency

- Energy Management System (EnMS)
- System optimization
- Low carbon alternatives
- Renewable energy integration



# RECP - Energy Efficiency

- System optimization



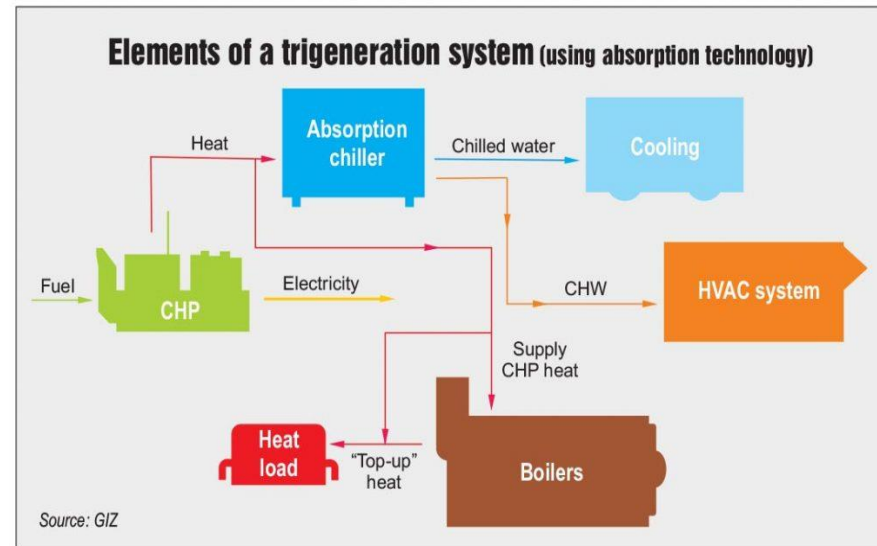
- Load/Unload, VSD, IGV, ...
- Multiple compressors operation and coordination

- Energy efficiency rating
- Quality of supply

- Oversize
- Type
- Lubrication & maintenance

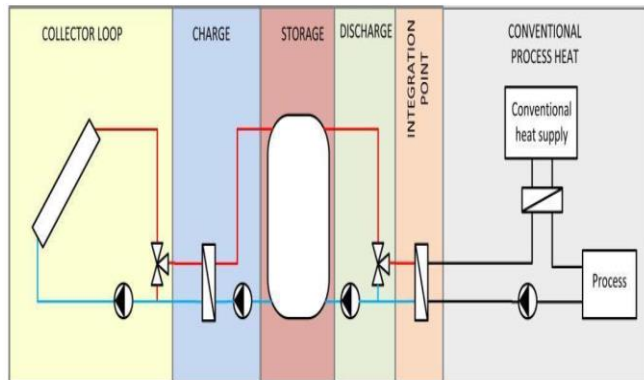
# RECP - Energy Efficiency

- Low carbon alternatives
  - Increases the flexibility of waste heat utilization as the process can be adapted to seasonal variations of heating and cooling energy demands
  - Cost-effective and environmentally responsible way.
  - Distributed energy resources
  - Includes high-efficiency cogeneration



# RECP - Energy Efficiency

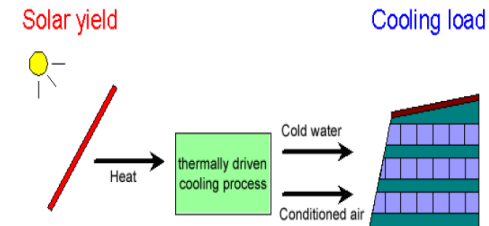
- Renewable energy integration
  - SWH System
  - Solar PV System



Source: IEA SHC Task 49/IV 2013



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





# 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
  - Waste water recycling techniques
  - Recovery and reuse of rinse water
  - Install Zero Liquid Discharge (ZLD) plant



<https://www.potatobusiness.com/>

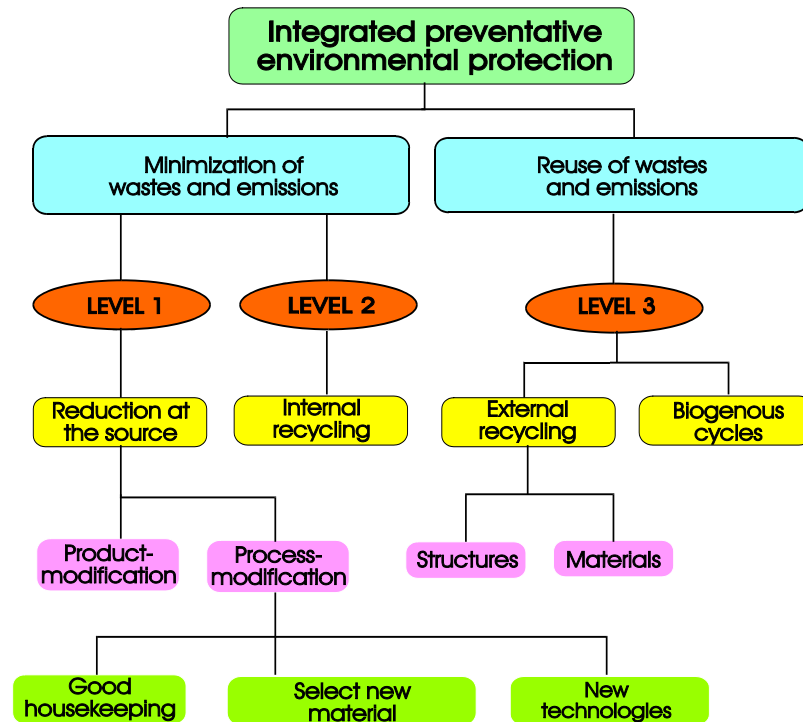


<https://piperepair.co.uk/>




# 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 - Measures

Resource	Measure Example	Challenges
Material	<ul style="list-style-type: none"> <li>✓ Sealing of leakages</li> <li>✓ Automatic dosing of chemicals</li> <li>✓ Optimization and monitoring of set point parameters in process</li> </ul>	<ul style="list-style-type: none"> <li>• Conceptual and motivation</li> <li>• Organizational and commitment</li> <li>• Economic and investment</li> <li>• Policy and enabling</li> <li>• Focus on end of pipe solutions and short time profits</li> </ul> 
Energy	<ul style="list-style-type: none"> <li>✓ Proper thermal insulation of steam pipes, condensate pipes and tanks</li> <li>✓ Replacing incandescent bulbs by LED</li> <li>✓ Retrofitting existing production line for waste heat recovery</li> </ul>	
Water	<ul style="list-style-type: none"> <li>✓ Cleaning in Place (CIP) automation</li> <li>✓ Smart control of washing water by using high pressure water</li> <li>✓ Waste water recycling techniques</li> </ul>	
Waste	<ul style="list-style-type: none"> <li>✓ Recycling of valuable materials in the company</li> <li>✓ External recycling of general waste to recyclers</li> </ul>	



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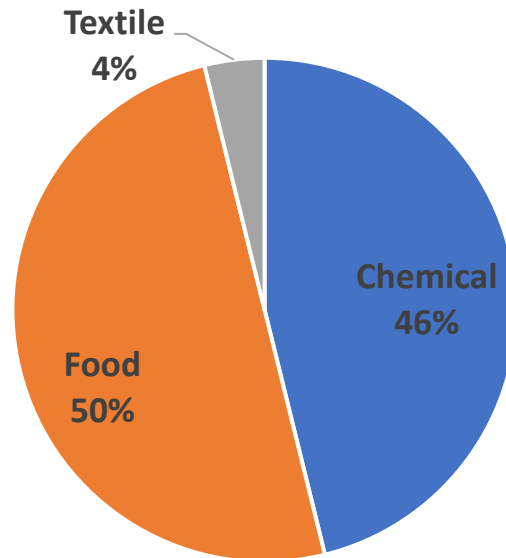
# RECP - Measures (Open Discussion)

<https://www.mentimeter.com/>

# RECP – National Case Studies

## Egypt / MED-TEST-II

- SwitchMed program Funded by the European Union.
- Implemented by UNIDO in Egypt from 2015 to 2018 and Led by ENCPC.
- 255 total measures were identified in 26 companies in chemical, food and textile sectors.



SwitchMed MED-TEST-II Report, Plan for implementation in 2018

# RECP – National Case Studies

## Egypt / MED-TEST-II

### Main Outcomes

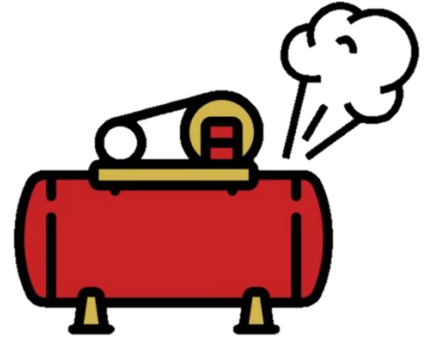
Annual potential reductions of resources and emissions were identified

#### Annual reductions of resources and emissions:



## RECP – National Case Studies Compressed Air and Steam System Optimization (CASO & SSO)

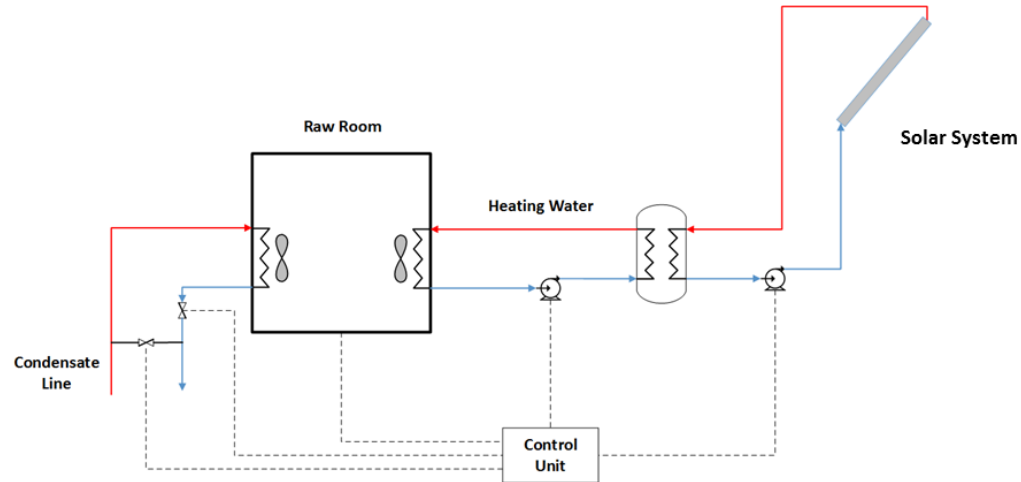
- Textile factory focused on implementation of **quick-wins** in the compressed air and steam system.
- Leakage of compressed air,
- Optimization operation compressors,
- Optimization operation of boilers,
- Leakage of steam,
- Optimization of burning efficiency,
- Ensure all condensate return,
- **Total Savings 60 Million EGP in 8 months**





## RECP – National Case Studies Solar Heating in Industrial Process (SHIP)

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





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# RECP – National Case Studies

## Solar Photo Photovoltaics (PV)

- 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

## Compressed air systems

Actions	Potential Savings	Investment
Implement a leak reporting and repair program	20 - 40%	Low
Do not pressurize the system during non-productive periods	2 - 10%	Low
Fit dryer controls (refrigerant and desiccant)	5 - 20%	Medium
Install compressor drive and system control measures (Ex. VSD)	5 - 15%	Medium
Install heat recovery measures where appropriate	up to 75%	Medium

Operating at 7 bar(g) (700kPa(g)) with an output of 500 liters/s

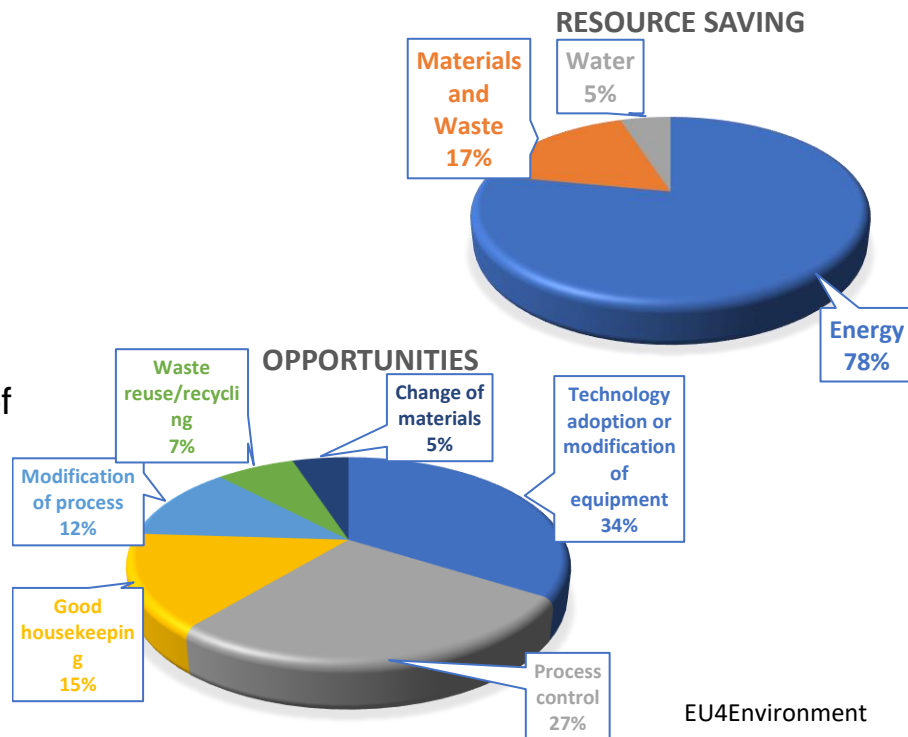
The percentage figures given are indicative, are not cumulative and will vary with each system

Low = less than £2,000; Medium = £2,000—£10,000

# 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

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

## Steps

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



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# Challenges and How to Overcome Them (Open Discussion)





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