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Water Reuse and Environmental Conservation Project

Pollution Prevention Training Course

P2 Assessment Food

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Implemented by AECOM

Objective

To be able to describe the key steps in pollution prevention assessment

Outline

- P2 assessment definition and outputs
- Steps
  - Plan
  - Pre-assess
  - Assess
  - Synthesize
  - Implement
  - Sustain
- Summary

P2 Assessment Definition and Outputs

Definition

- In-depth review of existing operations to improve efficiency of the operations through pollution prevention and energy conservation

Outputs

- Characteristics of focus area that consumes energy and generates waste
- P2 and energy efficiency options
- Most promising (prioritized) options for implementation

Steps in P2

1. Plan	• Data needed, how to collect, assessment plan
2. Prepare / pre-assess	• Team, resources, focus of assessment
3. Assess	• Material and energy flow analysis
4. Synthesize	• Identify and evaluate options
5. Implement	• Select options, plan and implement
6. Sustain	• Follow up on results and continue in another focus area

1. Planning

- Data collection form
  - Standard worksheet such as EPA
  - Quick scan forms
  - Construct your own worksheets
- Prepare assessment agenda
  - When to launch
  - Meetings with team and management
  - Plant visits

Data Collection Form – Main Products

1 – Worksheets

Example Worksheets

Worksheet 1-1: Main products/services

Company: **xxx Ltd** Responsible: **Mister XY** Page: **1**

No.	Product or service/purpose	Annual quantity	Unit
1			
2			
3			
4			
5			

Data Collection Form – Materials

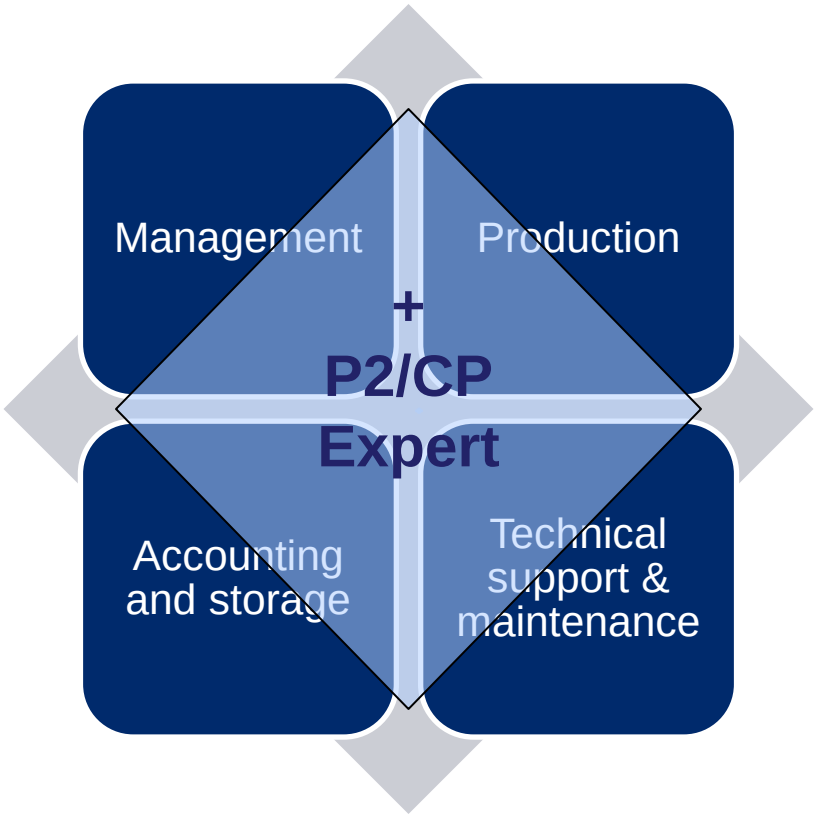
Worksheet 1-2: Main raw and process materials

Company: **xxx Ltd** Responsible: **Mister XY** Page: **1**

No.	Material	Annual quantity	Unit	Specific costs	Total costs	Purpose/use	% incorporated into the product
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

2. Pre-Assessment – Team

- Identify P2 Assessment Team
  - Number and specialties depend on size and complexity of processes to be investigated
- You may need:



2. Pre-Assessment – External Resources

- Identify required external resources
  - Laboratory
  - Equipment for sampling and measurements

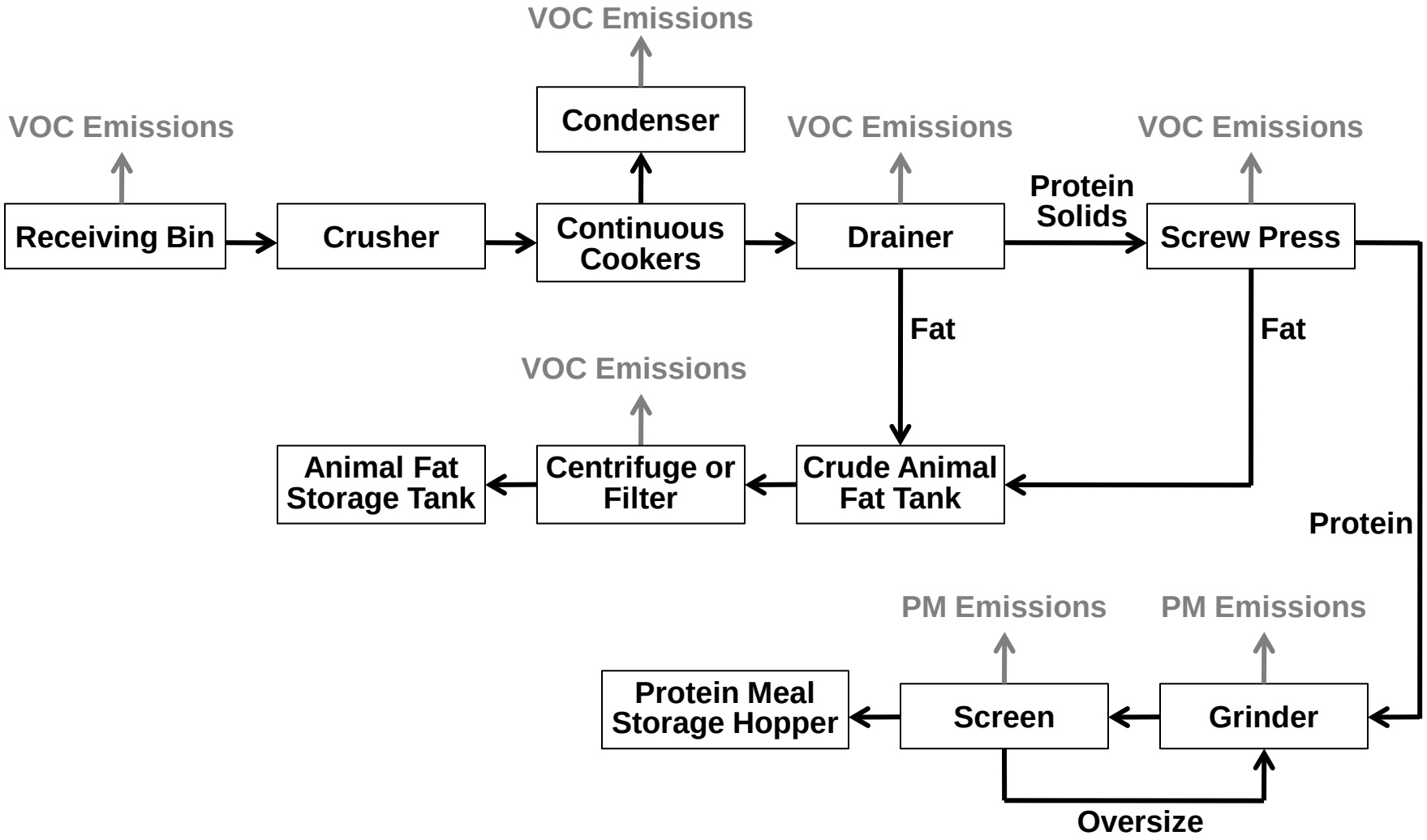
2. Pre-Assessment – Overview of Processes

- Provide overview of processes
- Watch out for interim activities, i.e. washing, heating or cooling
- Collect general data on raw material, products, fuel, water

Walk around entire facility:
Gain good understanding of processing operations
Be able to describe process in terms of unit operations

Sketch process layout and material transfer areas

Example from Food Industry – Meat Rendering



2. Pre-Assessment – Benchmarking

- Determine specific productivity or KPIs such as
  - kg product / kg raw material
  - kg product / m3 of water or ton of diesel etc.

→ **Benchmarks**

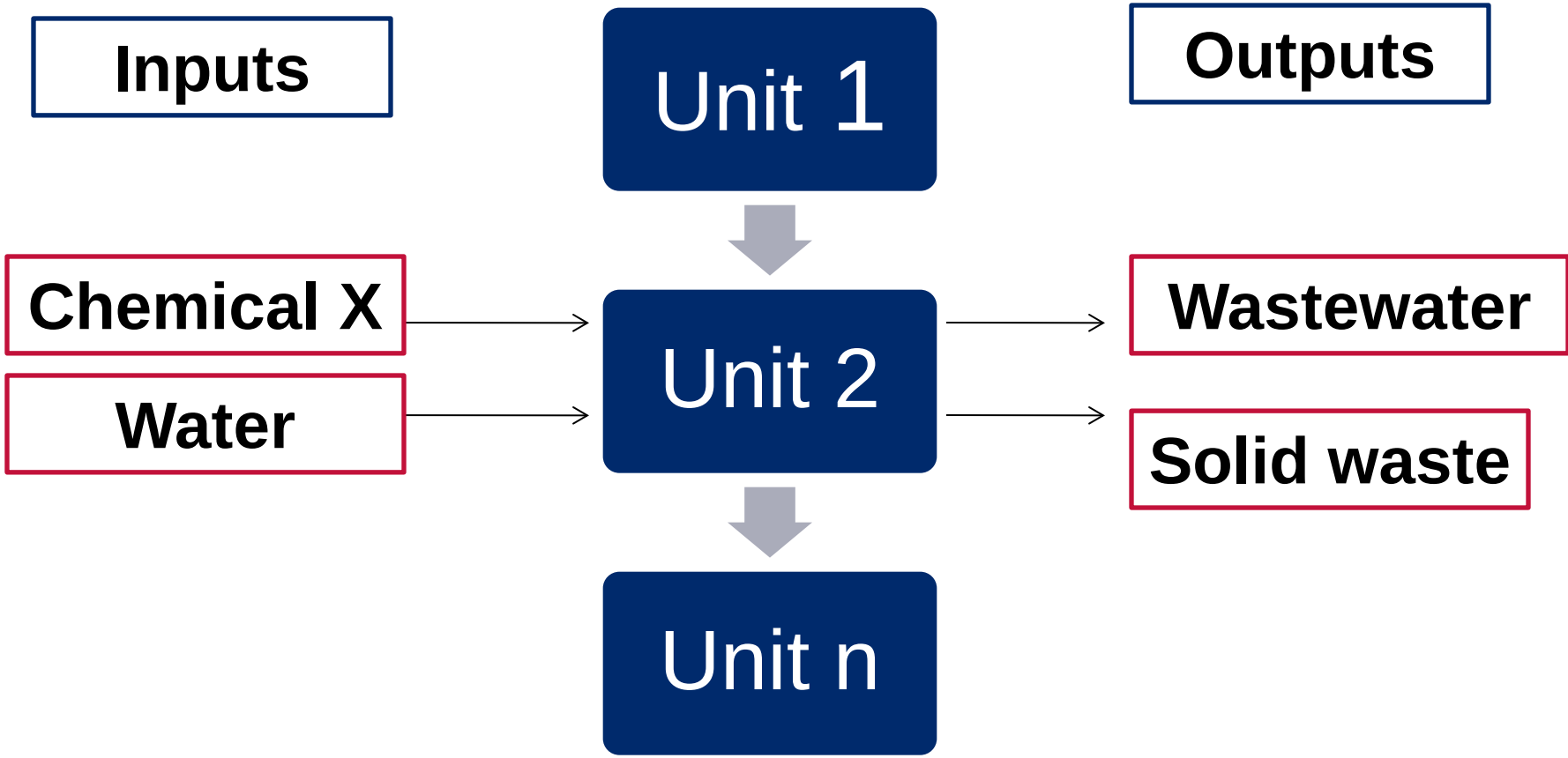
- Compare with international benchmarks following good practices / BAT

2. Pre-Assessment – Identify Unit Operations

- Locate unit operations causing
  - High waste emissions
  - Excessive use of raw material
  - Excessive energy use
  - Use of toxic chemicals or generation of hazardous waste
  - Other issues
- Select focus area for P2

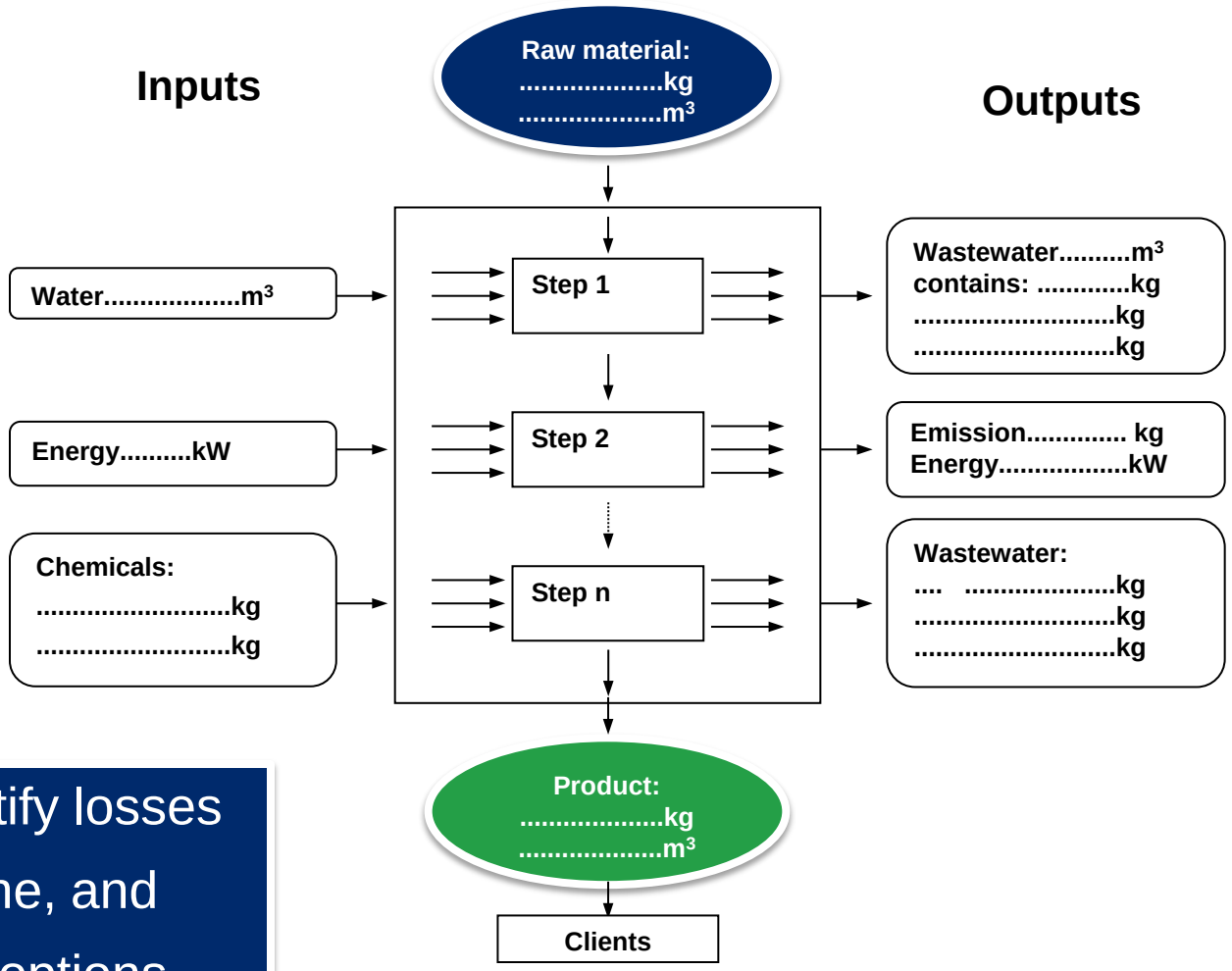
2. Pre-Assessment – List Inputs, Outputs

- List processes steps / unit operations



3. Assessment – Material Flow Analysis

- Material balance is a precise account of the input and output data



- Helps you quantify losses
- Provides baseline, and
- Enables P2/CP options

3. Assessment – Flow Analysis Inputs

- Quantify inputs that may include
  - Raw material
  - Water
  - Air and power
- Obtain input from
  - Financial / storage records
  - Measurements for an appropriate length of time taking into account the storage and handling losses

3. Assessment – Flow Analysis Outputs

- Quantify process output
  - Primary products
  - By-products
  - Wastewater
  - Gaseous emissions
  - Solid / hazardous waste

Determine components of waste streams: chemicals, organics, heavy metals

Watch out for NPOs and those that will also result in disposal costs or high losses of expensive material

4. Synthesis – Components of Concern

- Interpret material flow analysis to identify areas or components of concern

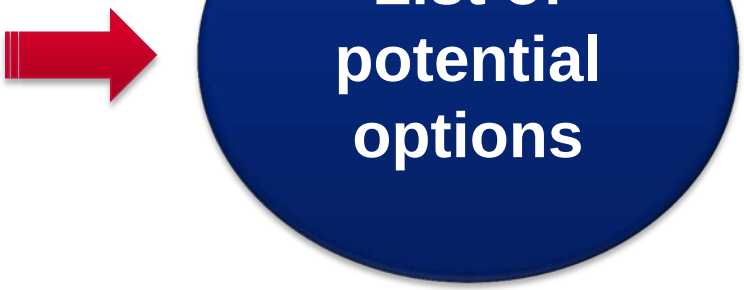
For example look for

- Major sources of waste
- Deviations from the norms
- Identify areas of unexplained losses
- Flows exceeding site regulations (national regulations)

4. Synthesis – Generate Options

Generate options

- Discuss with team
- Meet management
- Seek expert opinion
- Seek case studies
- Technologies



4. Synthesis – P2/CP Options

- Evaluate P2/CP options

Low cost measures or no cost measures,
directly implementable options
such as simple waste reduction measure,
housekeeping, management actions

Some options may require moderate or high investment. Plan for acceptable options to be implemented in a timely manner

4. Synthesis – Evaluate Options

- Economic evaluation
  - ROI = Net savings / Investment
  - Payback period (y) = investment / annual benefits
- Technical evaluation considerations
  - Effect on production aspects
  - Interruption of operation
  - Compatibility
  - Maintenance timing (shut down)
  - Training

4. Synthesis – Low Cost, No Cost Waste Reduction Hints

- ***Process control***
  - Inform employees about importance of waste reduction
  - Develop monitoring program to check wastes from unit operation
  - Ensure regular maintenance on all equipment
- ***Receiving materials***
  - Don’t accept damaged or unlabeled material, demand quality control from the supplier
- ***Storage of material***
  - Reduce losses from containers

4. Synthesis – Options Requiring Investment

Options requiring investment or further planning

- ✓ Equipment and installation changes
- ✓ Changes in process control – automation
- ✓ Changes in process conditions – retention times temperatures…etc.
- ✓ The use of wastes as raw material or the use of materials that produce less water
- ✓ Options that need training
- ✓ Process substitution with cleaner technology

5. Implementation

- So you may get a list of a large number of options!
- Select what you can start with, prioritize
- Discuss with the management to agree on next steps
- No cost options / low cost options should by now have been implemented or underway
- Others requiring some investment go in an action plan

5. Implementation – Action Plan

- P2 / CP Action Plan
- Clearly lists
  - Options
  - Who, when, what is needed
  - How to implement and monitor

Option	Responsible	Time	Resources	Monitoring
1. Efficient pumps	Maintenance department	In July; low season + shut down	Budget (# JD) Purchase from local market	kWh consumption; meter?

6. Sustain – Follow Up

Follow up on P2 options implementation

- Did they result in improvements?
- Aspects to monitor
  - ✓ Raw material
  - ✓ Chemicals type and quantities used
  - ✓ Energy consumption
  - ✓ Waste generation (type and quantities)

Compare results before and after P2 options

Then determine your new KPIs

6. Sustain – Inform

Inform management and team of results

Remember P2 is team work

- You can now move to the next set of options in the plan
- Or to a new focus area

Summary

- P2 is applied in a systematic steps
- Material and energy flow analysis form the back bone of P2
- Plan how to obtain the data
- Determine KPIs and compare with international benchmarks
- As a result select the steps that need improvement
- Identify the P2 options, evaluate them
- Some may be directly implementable
- Plan and implement an action plan
- Monitor, improve performance, inform the team
- Go for another round

References

- http://www.epa.gov/p2/pubs/p2policy/definitions.htm
- CP material www.cp.org.jo
- Guide for CP in SMiE.
- http://www.fpeac.org/caa.html