



# USAID | JORDAN

FROM THE AMERICAN PEOPLE

## Water Reuse and Environmental Conservation Project

### Pollution Prevention Training Course P2 Opportunities Packaging Industry

Dr. Bassam Hayek  
March 2012

*Implemented by AECOM*



# Objective

To be able to describe key pollution prevention opportunities in paper and packaging industry

# Outline

- Key steps in P2
- Schematic process
- Examples of P2 opportunities
- Summary

# Key Steps to Identify and Implement P2

## 1. Planning

- Data needed, how to collect, assessment strategy

## 2. Preparation

- Team, resources, focus of assessment

## 3. Assessment

- Material and energy flow analysis

## 4. Synthesis

- Identify and evaluate options

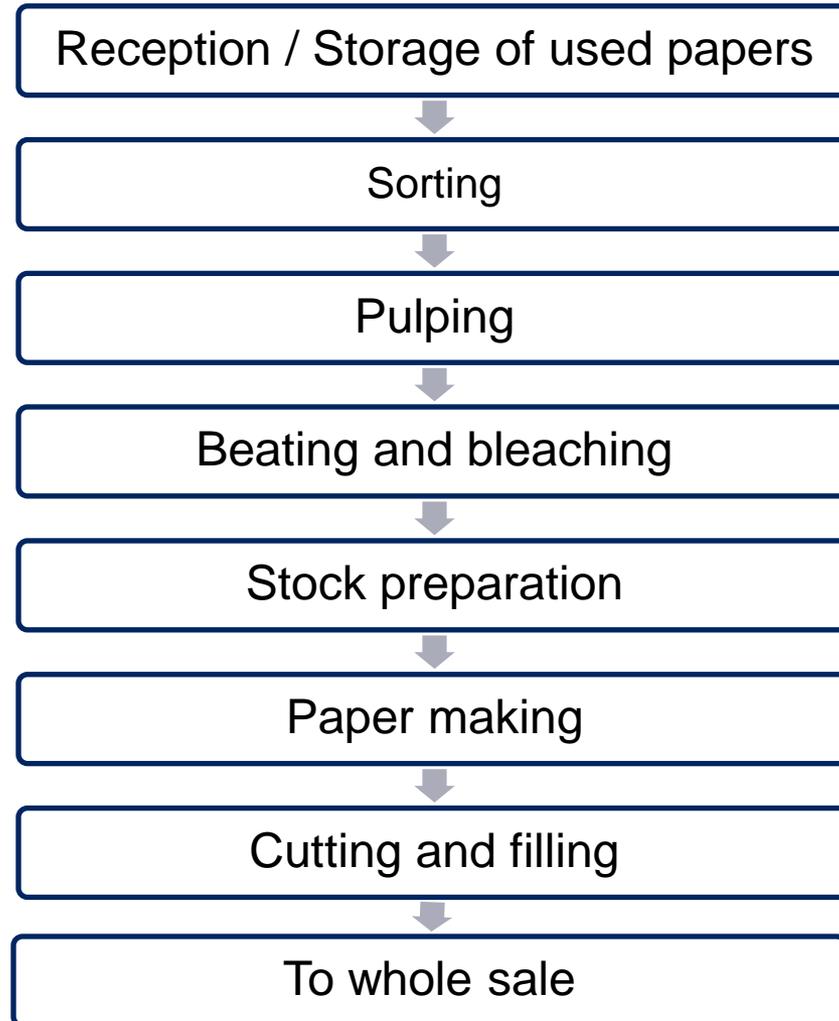
## 5. Implementation

- Select options, plan and implement

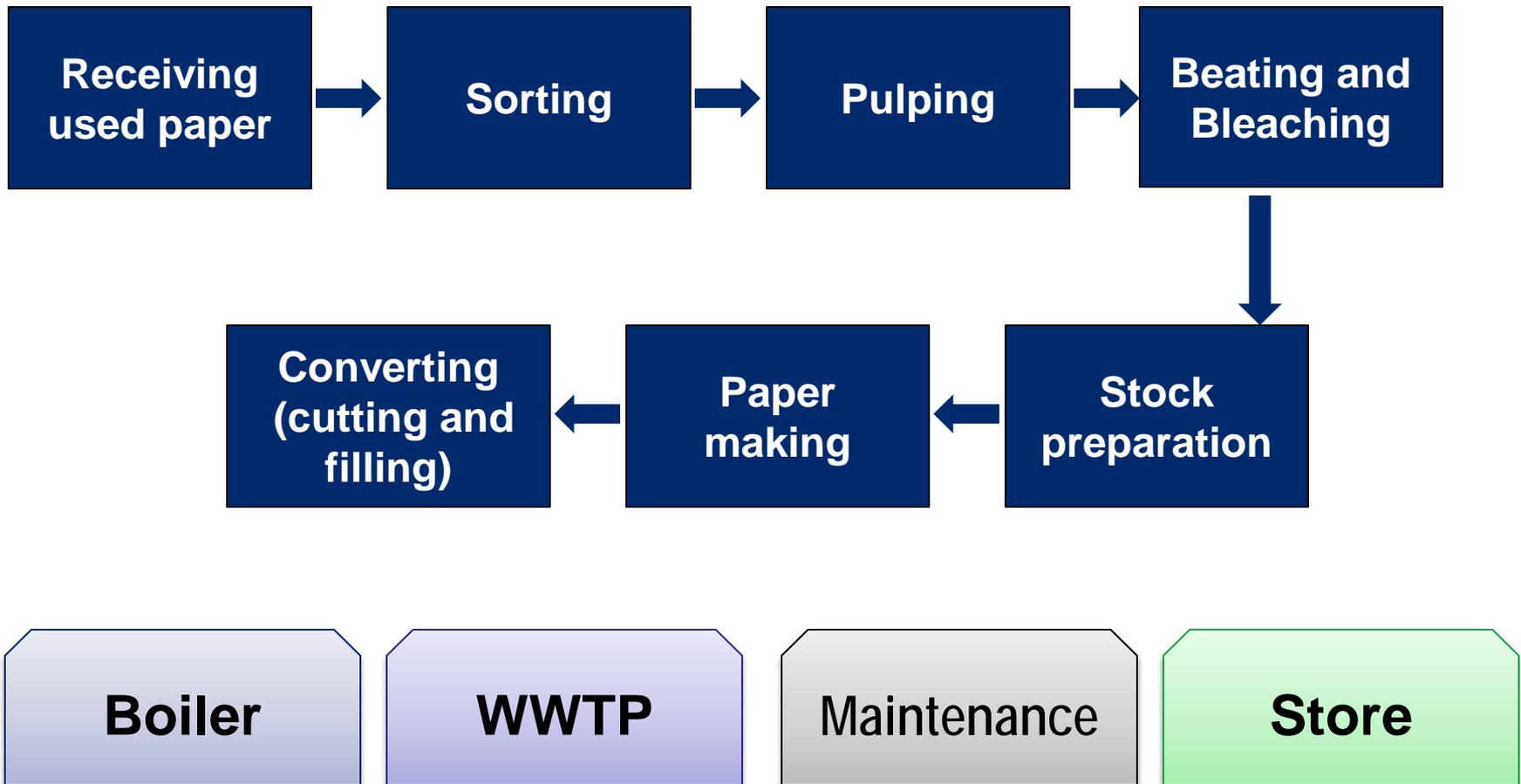
## 6. Sustaining

- Follow up on results and continue in another focus area

# Overall Flow Diagram (Paper Recycling)



# Example: Paper Recycling Plant



# Reception/Storage Opportunities

## Reception / Storage

- Control conditions: timing, temperature, humidity
- Manage inventory: don't store materials that will be needed after long times

# Sorting Opportunities

## Sorting

- Waste: unwanted material like plastic, laminated paper
- Unsuitable paper material

# Pulping Opportunities

## Pulping

- Use of water
- Quantity and quality
- Waste material

# Beating and Bleaching Opportunities

## Beating and bleaching

- Energy efficiency
- Use of chemicals (toxicity)
- Wastewater, solid residues
- Segregate waste

# Stock Preparation Opportunities

## Stock preparation

- Use of water
- Quantity and quality
- Chemicals
- Removed parts, waste

# Paper-Making Opportunities

## Paper making

- Water recycling
- Waste material
- Energy efficiency: use in drum, vacuum, pressing and drying (steam use)

# Cutting and Filling Opportunities

## Cutting and filling

- Optimum cut form to avoid waste
- Reuse of waste

# Additional Opportunities

- Utilities such as boiler, wastewater treatment, fresh water supply, maintenance, and storage can also be subject to P2 measures for improvement
- Depends on focus area selected and schedule of P2 implementation

# Example of Benefits from LINH XUAN PAPER COMPANY, Top 5 options

SI # / CP Solutions	Environmental Benefits	Investment	Annual Savings
1. Sorting of raw material to segregate unwanted impurities	Reducing solid waste in pulper and screening	NIL	120 MVND
2. Collection of white water for stock dilution and hydro pulping	Reducing waste water volume and pollution load	50 MVND US \$3600	110 MVND US \$8000
3. Installation of high frequency vibrating screen for proper screening and properly designed sand trap	Reduce spillage and foam overflow	30 MVND US \$2100	200 MVN US \$14300
4. Replacing old paper machine with new paper machine	Reduce wastewater generation, Reduce pollution load, Reduce gaseous emission	2 BVND US \$143000	1.1 BVND US \$76,000
5. Power factor correction of major motors by installing inverter-sensors	Reduce electrical energy (reduce off-sire emissions)	150 MVND US \$11,000	72 MVND US \$5,100

# Summary

- P2 opportunities can be simple management actions / housekeeping measures
- Source reduction can provide good examples of simple no cost P2 options
- Adopt environmentally friendly packaging material and reuse the material
- Avoid spills and contain them separately
- Control of temperature and pressure could be common aspects
- Water use (amounts / safety)
- Solid waste / reuse options

# References

- Shreve's Chemical Process Industries
- Fact sheets of [www.cp.org.jo](http://www.cp.org.jo)
- Reduction of Industrial Pollution in HO CHI MINH CITY, Cleaner Production Case Studies, SIDA/UNEP, 1999