Improving Competitiveness Through Financial Assessment of Water Reuse Technologies

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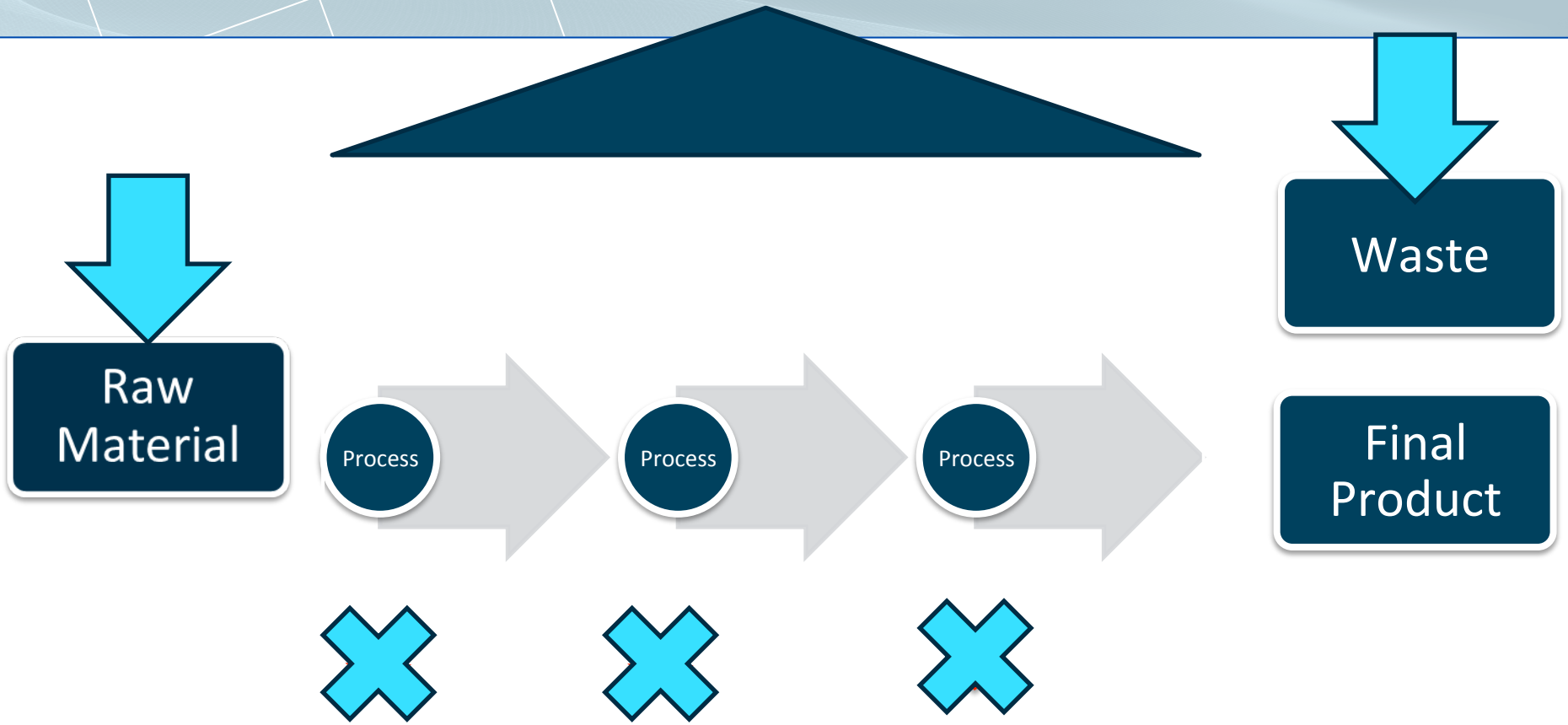
Tool Background

- Developed as part of a industrial cleaner production technology assessment for the Environmental Protection Department (CETESB) of the State of Sao Paulo, Brazil.
- Targeted Users:
  - Industries
  - Regulators
  - Larger Utilities

The Concept: Cleaner Production



Importance of Cleaner Production to Industry

- Saves Money – reduces costs, increases efficiency
- Improves Efficiency – reduces some or all of the following: raw materials, chemicals, waste sides streams, reduces maintenance
- Market Advantages – better consumer image, reduction in wastes, income form by-products
- Environmental Compliance – reduction in discharges, environmental compliance, improved regulatory agency relationships, reduced litigation potential

Cost of Losses

Cleaner Production Assessment

- Planning and team formation
- Information collection on production process – material balance, process flow diagrams, process walk-through
- Feasibility analysis – implementation cost for options, technical evaluation (materials, labor, quality, schedule), **detailed economic evaluation**
- Implementation – prioritize actions, execution
- Monitoring – confirm goals are achieved

Financial Payback Period Tool Overview

- Goals of the Tools:
  - Help industries rank projects: the shorter the payback period, the more attractive is the project, financially.
  - Enable users to think of CPT in terms of all associated resources - gains and losses

Financial Payback Period Tool Overview

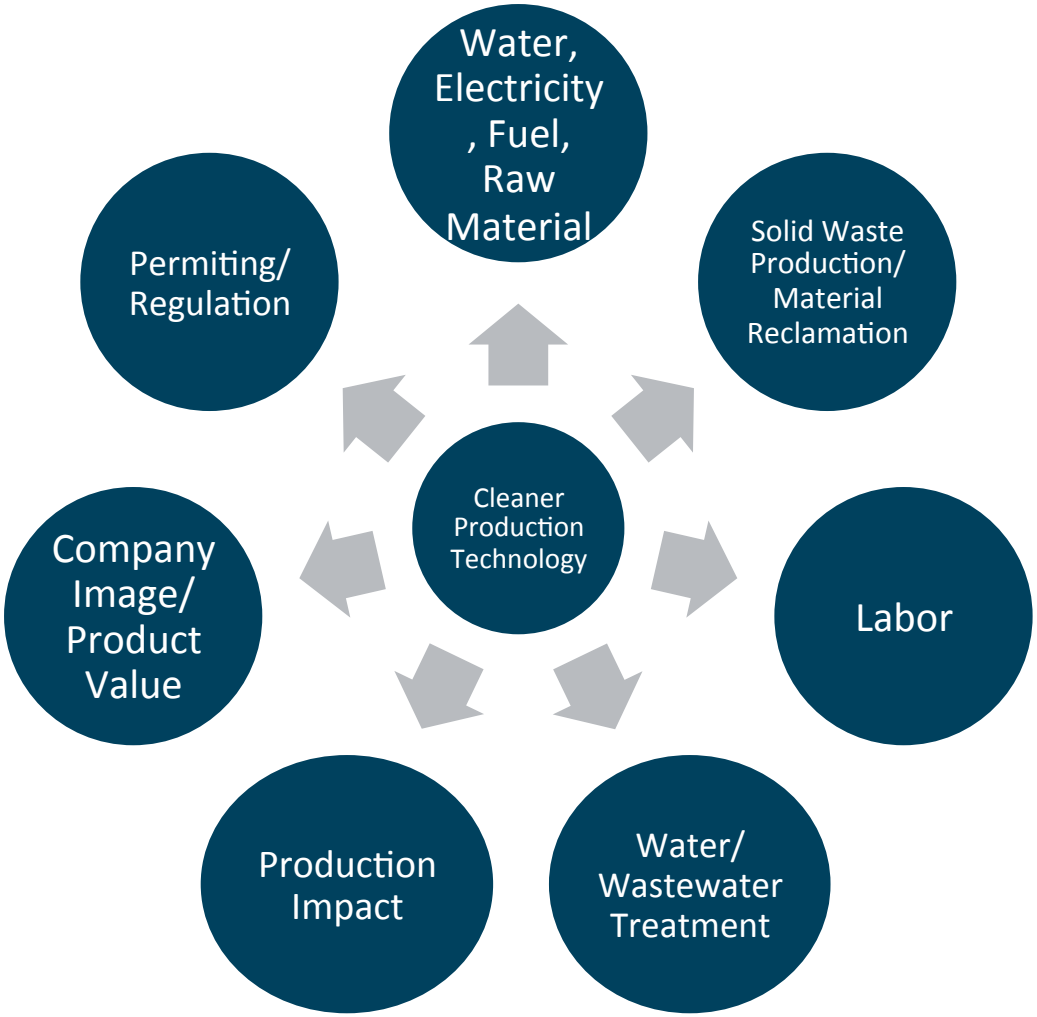
- Proposed Tool Users:
  - Private and public sectors, including environmental and engineering personnel, business and financial managers, technical assistance providers and regulators
  - No financial background needed
- Provides a methodology for communicating details of cost analysis to management.

Financial Payback Period Tool

- Features
  - Multi-tier approach to looking at economic feasibility
  - Sophisticated checklist by breaking down resource costs and usages (uncovering hidden costs)
  - Payback period as a widely accepted economic indicator of feasibility
  - Simplified and conservative calculations by omitting inflation rates
  - Success of the tool is dependent upon having accurate information about the costs of an existing manufacturing operation

$$\text{Payback Period (years)} = \frac{\text{Capital Investment and Project Costs}}{\text{Net Savings to Annual Operating Costs}}$$

Financial Tool Cost Accounting/Input Categories



Qualitative Benefits

- Improved Competitive Positioning
- Less Financial Liability
- Enhanced Public Image/Corporate Reputation
- Improved “Green Market” Share
- Less Environmental Liability
- Improved Employee Morale

- CETESB _ CPT Financial Payback Period TOOL #2_050113.xlsx

Multi Tier Approach

- Tier 1: A quick analysis based on user-input annual savings. *Tier 2 should still be considered because it may unveil costs that weren't taken into consideration*
- Tier 2: Detailed analysis and breakdown of input savings values. *Acts as a sophisticated checklist program that accounts for savings and costs associated with implementing a new technology, determines if Tier 3 is necessary.*
- Tier 3: Independently performed, company specific analysis *Corporate financial protocols are followed and more complex NPV and IRR calculations may be performed*

Financial Payback Period Tool – Tier 1

Financial Payback Period Tool #1

Use this tool as a first pass review of the potential payback period and cost savings associated with the implementation of a Cleaner Production Technology.

Total Capital Costs

This table represents the total capital costs associated with the implementation of the selected Cleaner Production Technology (CPT).

	Total Capital Costs
	cost ($)
FDGSDFG	

Annual Total Savings

This table represents the cost savings resulting from the implementation of the Cleaner Production Technology. Specific resource costs are input into the table below. The following tabs and the cost annualized per resource category. The costs are summed and the annual net cost savings (both positive and negative) are show in the table below.

Water Use	Electricity Use	Fuel Use	Reduction in Solid Waste	Increase in Material Reclamation	Waste Water Treatment	Water Treatment	Labor	Changes in Production Rate	Raw Material Reductions and/or Chemical Substitutions	Permitting and Regulations	Enhanced Product Value
cost savings ($)	cost savings ($)	cost savings ($)	cost savings ($)	cost savings ($)	cost savings ($)	cost savings ($)	cost savings ($)	cost savings ($)	cost savings ($)	cost savings ($)	cost savings ($)

Payback Period

Total Capital Cost	=	R$ 0.00
Total Annual Savings	=	R$ 0.00
PAYBACK PERIOD (in years)	=	---

NOTES: Inflation is not accounted for in this Payback Period tool. The payback period calculated with this tool will be conservative as the actual payback period will be less when inflation and other economical environmental actors are taken into consideration.

Color Key
User Enter Value
Do not change

Financial Payback Period Tool – Tier 2

Color Key
User Selects Value from Drop-down list
User Enters Value
Do not change- calculation

Capital Costs

	This tab calculates the capital costs associated with the implementation of the Cleaner Production Technology (CPT)
How to use this tab	1. Review the "Color Key" to ensure values are being entered into the appropriate locations. 2. **Selected Cleaner Production Technology:** Insert the selected Cleaner Production Technology (CPT) into the user-input cell 3. **CPT Capital Costs Category:** Selected the appropriate Cleaner Production Technology (CPT) category for the data to be input 4. **Capital Costs**: Enter the monetary value associated with each of the input the components into the appropriate categories under "Capital Costs"
Calculation Description	Total capital cost associated with the implementation of the CPT
Selected Cleaner Production Technology (CPT)	(Enter the Selected CPT)

CPT Capital Costs Category	Capital Costs
Engineering/Design Costs	
Equipment Costs	
Total Cost	
(Select Category)	
(Select Category)	

Electricity Use

	This tab calculates cost savings associated with changes in electricity usage. The savings are annualized in this tab and the "Payback Per calculated on this tab.
How to use this tab	1. **Electricity Usage**: If applicable, enter multiple categories of electricity use into the first column (i.e. "Facility lights", "Pumps-Peak hours" the first line and leave the remaining lines blank. 2. **Time Interval:** Select the time frame over which the associated electricity data applies (days, weeks, months, years) 3. **Total Operation Time:** Enter the annual facility operation time in the selected time units (i.e. 350 days a year, 50 weeks, etc.) 4. **Electricity Usage Prior:** Enter the quantity of electricity purchased prior to implementation of the Cleaner Production Technology (CPT) 5. **Estimated Electricity Purchased After:** Enter the anticipated quantity of electricity purchased after implementation of the CPT 6. **Unit Cost:** Enter the unit cost of electricity if known, select the appropriate default unit price from the drop-down list if it is unknown. 7. Include any notes or assumptions in the "User Notes" section below that will aid in understanding the defined electricity uses Notes: - Select the most applicable category for the usage data available and track the input data to ensure that processes are not double counted -The "Real Savings" column converts data entries into reais saved per indicated time interval -The last column "Annual Real Savings" annualizes the savings based on the total operation time of the facility and operations -If waste water treatment and water treatment activates include electricity, do not count the resource twice. Chose to account for the chang both. -If the selected CPT generates electricity, this should be reflected in the "Quantity of Electricity Purchased After Implementation of CPT"
	User Notes:
Calculation Description	(Change in Kilowatt hours*Unit Cost)*(Total Operational Time [User specified based on input data units])= Annual Real Savings
Default Unit Cost- Peak Hours	R$ 0.42 /kWh
Default Unit Cost- Off-Peak Hours	R$ 0.35 /kWh
Example	***If a pump is used 50% of the time during Peak electricity usage rate and 50% during off-peak rate, then separate the usage of the pump during peak and off-pe***

Electricity Usage Task	Time Interval of Electricity Usage Data	Annual Operation Time		Electricity Purchased Prior to Implementation of CPT (kwhr)	Estimated Electricity Purchased After Implementation of CPT (kWhr)	Change in Electricity Purchased (kWhr)
Total Input - All Categories						**0.00**
(Insert Category, Indicate Peak or Off-Peak Rates)	(Select)		---	/ year		0.00
(Insert Category, Indicate Peak or Off-Peak Rates)	(Select)		---	/ year		0.00
(Insert Category, Indicate Peak or Off-Peak Rates)	(Select)		---	/ year		0.00
(Insert Category, Indicate Peak or Off-Peak Rates)	(Select)		---	/ year		0.00
(Insert Category, Indicate Peak or Off-Peak Rates)	(Select)		---	/ year		0.00
(Insert Category, Indicate Peak or Off-Peak Rates)	(Select)		---	/ year		0.00

Questions/Contact

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