What are the costs of cleaner production?

Where to invest in and at what costs are probably one of the first questions that industries have. The answer is not simple as it depends on many factors, such as type of industry, size, and location.

Where large funders tend to invest more often in clean tech business, probably more profit (financially and environmentally) could be achieved when investments are made in simple improvements of conventional industrial processes. An example of this is the Dutch paper factory Van Houtem (see box).

In fact, Anup Jacob, partner in investor Virgin Green Fund, states that market potential of dirty tech (traditional industry wanting to become greener) is 10 times higher compared to clean tech. The ten largest companies of the world are still occupied by oil and gas companies. Making those cleaner should be a business of billions.

Putting this in the Ethiopian Upper Awash Basin context, indicates there is enourmous perspective to become cleaner in a profitable way.

Van Houtem paper factory: simple investments

Van Houtem (based in The Netherlands) is a factory that produces toilet paper and tissues, which is a process that requires an enormous amount of energy.

In 2010, the factory has invested in several water treatment systems (150,000 euro per system) which now enables reusing half of the water to be reused in the factory. The other half of the water is discharged into the sewage system. To discharge the waste water the factory pays hundreds of thousands of euros every year on environmental taxes. This might seem a lot, but it is much less compared to 10 years ago. The investments in the treatment systems are already paid back in 2 to 4 years.

Example: Tanneries

Cleaner Production in tanneries could involve a variety of steps among the leather manufacturing processes. One way to reduce the amount of harmful effluent is to reduce the amount of sulphates and chlorides in the waste water.

Among others, salt is used in the pre-tanning process to preserve skins. Alternatively, chilling installations could be used for the same purpose.

An example from Zimbabwe showed that if the company runs the pre-tanning process for 15 days per month the payback period was calculated to be 38 months considering savings from salt and water. Furthermore, chilling will greatly reduce TDS in tannery effluents and the problem of disposing of evaporated salt.

Another option using chilling systems is to collecively store skins in a chilled place and use refrigirated transport.

The table below gives an overview of expected costs, based on quotations of an Indian chiller company (EAKCON Systems).

Description	Costs (USD)*
Blast chiller plus chilled storage (5 tonnes hide)	30,000
Tannery chilled storage (10 tonnes hide)	13,500

** Prizes in 2012 (Source: Dandira, V., et al. 2012)*

Example: textile industries

The Natural Resources Defense Council (NDRC) is a national nonprofit environmental organization based in the United States. In 2013 they compiled the top 10 Best Practices in the Textile Industry to save water and energy.

NRDC estimates that implementation of the 10 Best Practices can potentially save a factory as much as 45% percent of the water and 45% of the fuel it uses in manufacturing, and this can be achieved by pursuing only the "low hanging fruit"—opportunities that generally cost very little up front and return their investment in less than a year.

They found that up-front costs typically ranged between 110,000 and 300,000 USD and savings were typically between 230,000 and 730,000 USD per year. Factories often found additional savings opportunities beyond the 10 Best Practices once they began to identify improvements. An overview of costs is presented in the table on the back.

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Practice	Typical percentage resources saved	Largest savings seen at any factory	Costs (USD)	Savings (USD)	Payback period
Water leak detection, preventive maintenance, improved cleaning	Water: 1.1–5%; Fuel: N/A–1%	Water: 6.1%; Fuel: 2.2%	Insignificant	<1,000 - 20,000	< 1 month
Reuse cooling water	Water: 2–8.9%; Fuel: N/A–0.3%	Water: 18.6%; Fuel: 0.5%	2,000 - 3,000	2,000 - 18,000	2-7 months
Reuse condensate	Water: 0.2–5.4%; Fuel: 0.6–3.1%	Water: 20.3%; Fuel: 7%	12,000 - 33,000	8,000 - 78,000	4-18 months
Reuse process water	Water: 1.1–6%; Fuel: N/A–0.9%	Water: 21.1%; Fuel: 2.9%	<1,000 - 24,000	6,000 - 48,000	1-10 months
Recover heat from hot water	Fuel: 6.6–10.4%	Fuel: 29.7%	35,000 - 79,000	119,000 - 265,000	4-7 months
Improve boiler efficiency Prescreen coal Insulate boiler and economizer	Fuel: 2.6–4.3%; Electricity: N/A–1% Fuel: 1.6–2.4% Fuel: 0.6–1.8%	Fuel: 19.7%; Electricity: 2.3% Fuel: 3.9% Fuel: 15.1%	12,000 - 22,000 5,000 - 8,000	23,000 - 49,000 10,000 - 18,000	6-9 months 4-8 months
Maintain steam traps and system Maintain steam traps Repair steam leaks	Water: N/A–0.1%; Fuel: 1–4.3% Fuel: 0.4–1.2% Fuel: 0.3–1.9%	Water: 0.8%; Fuel: 10.2% Fuel: 3.9% Fuel: 5.1%	2,000 - 5,000 0 - 1,000	7,000 - 28,000 4,000 - 16,000	2-6 months <1-2 months
Insulate equipment and tanks	Fuel: 1.4–3.2%	Fuel: 19.2%	15,000 - 36,000	34,000 - 72,000	6-10 months
Recover heat from hot air	Fuel: 0.7–2.8%	Fuel: 5.7%	16,000 - 36,000	11,000 - 38,000	7-18 months
Optimize compressed-air system	Electricity: 1–3.9%	Electricity: 15.4%	0 - 19,000	9,000 - 36,000	<1-12 months
Total	Electricity: 1–5% Fuel: 12.9–30% Water: 4.3–25.4%		110,000 - 300,000	230,000 - 730,000	3-10 months

Source: NRDC (2013)

Resources & Further reading

Articles and Reports

- ACIAR Partners Magazine: Clean Technology: presenting challenges for tanneries [available at: http://aciar.gov.au/files/node/629/Cleaner%20tanneries.pdf]
- Dandira, V., et al. 2012. A Cleaner Production Exercise of A Leather Manufacturing Company: A Zimbabwean Experience in: International Journal of Scientific and Technology Research. [available at: http://www.ijstr.org/final-print/dec2012/A-Cleaner-Production-Exercise-Of-A-Leather-Manufacturing-Company:-A-Zimbabwean-Experience.pdf]
- NDRC (2013) NRDC's 10 Best Practices for Textile Mills to Save Money and Reduce Pollution: A PRACTICAL GUIDE FOR RESPONSIBLE SOURCING [available at: https://www.nrdc.org/sites/default/files/responsible-sourcing-guide.pdf]
- The optimist magazine: De schone potentie van vuile fabrieken [available at: www.theoptimist.nl/de-schone-potentie-van-vuile-fabrieken/