

Environmental Accounting

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Content of the presentation

- Definitions
- Environmental Cost
- Methods of calculation
- Investment selection techniques
- Summarize

Management Accounting

- A discipline within applied economics with along tradition
- Financial and non-financial Information
- Increasing focus on the concepts of added value
- From „Relevance Lost“ towards „Relevance Regained“

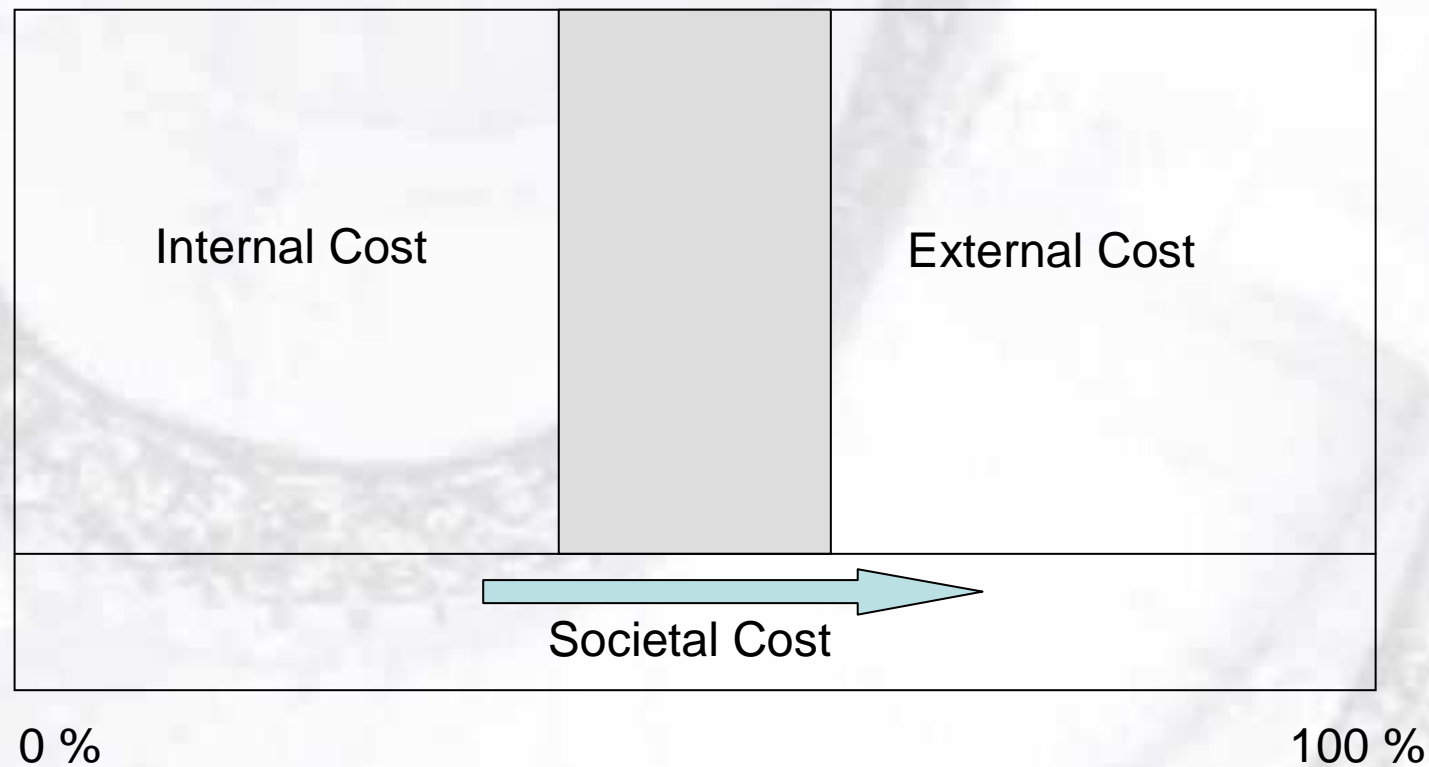
Corporate Environmental Accounting

- An environmental accounting approach to controlling and improving an organisation's cost structure and environmental performance.
- Corporate accounting can be sub-divided into two further categories:
 - **Environmental Management Accounting** (Internal). An accounting approach that considers the financial impacts of environmentally related activity such as the implementation of environmental protection expenditure, costs of legislative compliance and investment. The costs are allocated and tracked to meet the organisation's own business needs, mirroring the traditional management accounting techniques.
 - **Environmental Financial Accounting** (External). Environmental financial accounting mirrors the main purpose of financial accounting, which is communication with external stakeholders of the organisation. Environmental financial accounting, therefore, is the same but focuses on environmental financial and non-financial data such as that given in environmental reports.

Environmental Costs (Corporate Perspective)

- Environmental Costs are often considered as monetary value of the damage to the environment.
- Environmental costs express negative effects: Costs to the society without a direct monetary impact on the corporation which is the source of the environmental impacts.
- Due to the polluter pays principle the external effects are internalized.
- These internal costs are presented at the balance sheet: Costs made to prevent environmental impacts or liability costs.

Corporate and Societal Cost



Environmental costs from a pro-active environmental management perspective

- Environmental Costs are the total costs a company makes as a consequence of the control, reduction and compensation of environmental impacts that occur during the total life cycle of the product or services produced.
- Environmental costs should account for activities that have a pay off or are integrated with worker safety.
- Pro-active environmental management asks for:
 - The calculation of the financial costs and benefits of environmental investments.
 - The integration of the protection of the environment, workers safety.
 - Information on environmental impacts during the total environmental life cycle of a product.
 - The prevention of environmental impacts instead of the end-of-pipe solutions.

Identifying Environmental Costs

- Direct materials and labor,
- Manufacturing or factory overhead (i.e., operating costs other than direct materials and labor)
- Sales
- General and administrative (G&A) overhead
- Research & development (R&D).

Examples of Environmental Costs

<i>Potentially Hidden Costs</i>		
Regulatory	Upfront	Voluntary (Beyond Compliance)
Notification	Site studies	Community relations/ outreach
Reporting	Site preparation	Monitoring/testing
Monitoring/testing	Permitting	Training
Studies/modeling	R&D	Audits
Remediation	Engineering and procurement	Qualifying suppliers
Recordkeeping	Installation	Reports (e.g., annual environmental reports)
Plans		Insurance
Training		Planning
Inspections		Feasibility studies
Manifesting		Remediation
Labeling		Recycling
Preparedness		Environmental studies
Protective equipment		R & D
Medical surveillance		Habitat and wetland protection
Environmental insurance		Landscaping
Financial assurance		Other environmental projects
Pollution control		Financial support to environmental groups and/or researchers
Spill response		
Stormwater management		
Waste management		
Taxes/fees		
	Conventional Costs	
	Capital equipment	
	Materials	
	Labor	
	Supplies	
	Utilities	
	Structures	
	Salvage value	
	Back-End	
	Closure/ decommissioning	
	Disposal of inventory	
	Post-closure care	
	Site survey	
<i>Contingent Costs</i>		
Future compliance costs	Remediation	Legal expenses
Penalties/fines	Property damage	Natural resource damages
Response to future releases	Personal injury damage	Economic loss damages
<i>Image and Relationship Costs</i>		
Corporate image	Relationship with professional staff	Relationship with lenders
Relationship with customers	Relationship with workers	Relationship with host communities
Relationships with investors	Relationship with suppliers	Relationship with regulators
Relationship with insurers		

Why Environmental Accounting?

- Reduce environmental costs
- Environmental effort
- Communication with stakeholders
- Environmental cost expectation
- Identifications of bottlenecks and benefits
- Development of prevention policy and an overall EMS
- Selection and development of environmental activities and program
- Communication and negotiations with governments
- Negotiations in case of take-overs
- Competitive advantage
- Specification of indirect cost

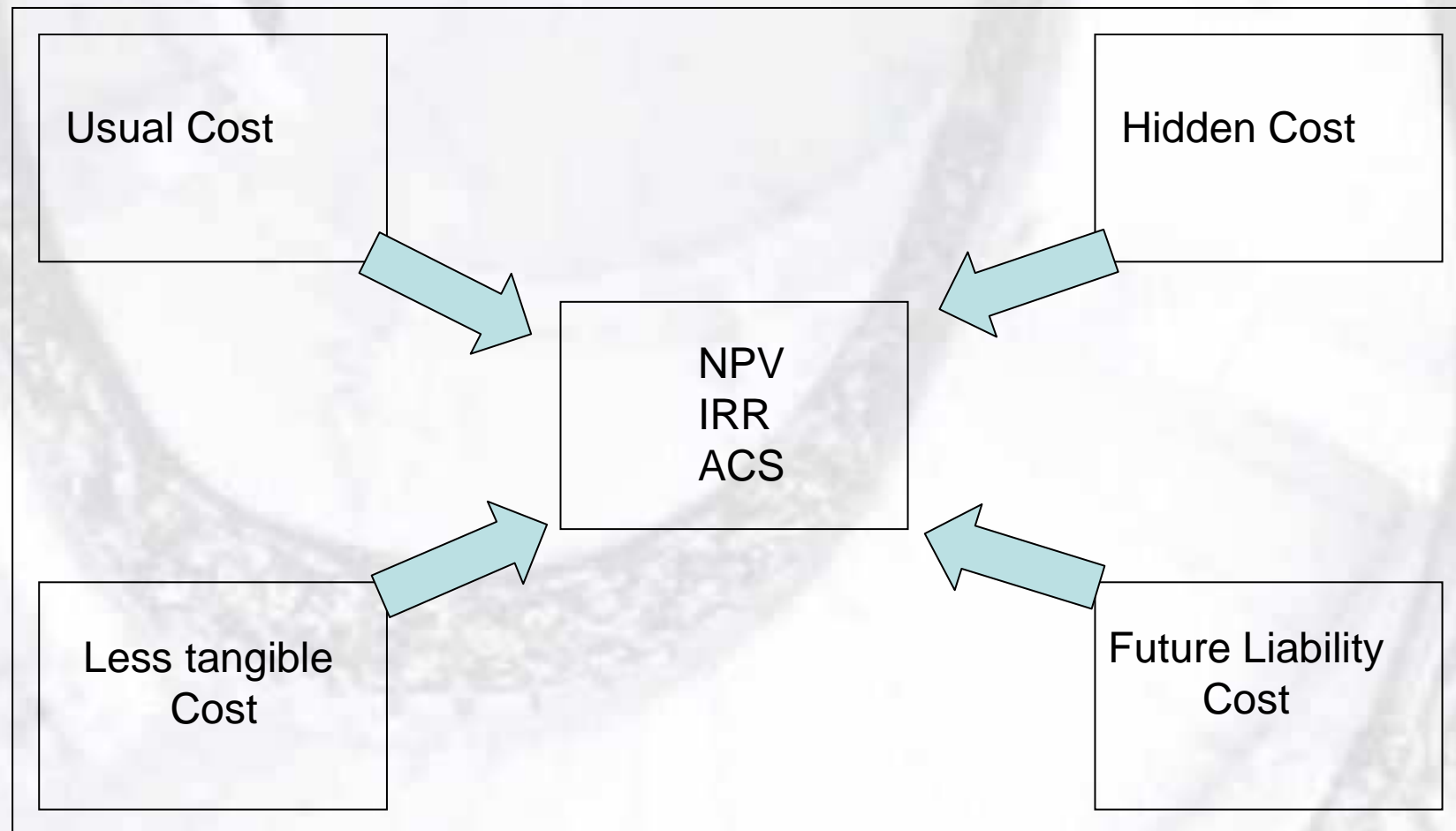
Methods for calculation

- Total Cost Assessment (TCA)
- Activity Based Costing (ABC)
- Life Cycle Costing (LCC)
- Target Costing (TC)
- Environmental quality cost model
- Environmental Impact cost

Total Cost Assessment

- TCA is a systematic approach to calculate the cost and benefit of an environmental investment.
- TCA takes into account characteristics that pay off financially:
 - Cost of environmental impacts and benefits of preventing these costs.
 - Less tangible cost and benefits e.g. improved corporate image
 - Costs of environmental impacts are dealt as overhead and allocated to final products.

The 4 cost protocols of Total Cost Assessment



Assessment map Example

	Conventional Costs	Hidden Costs	Less Tangible Costs
Higher			+ criminal liabilities + production quality + public image + financial liability + management resources + shareholder relations
Strategic significance			+ employee health & safety + training + fines + waste disposal + recordkeeping
Lower	+ raw materials		
	Quantitative		Qualitative

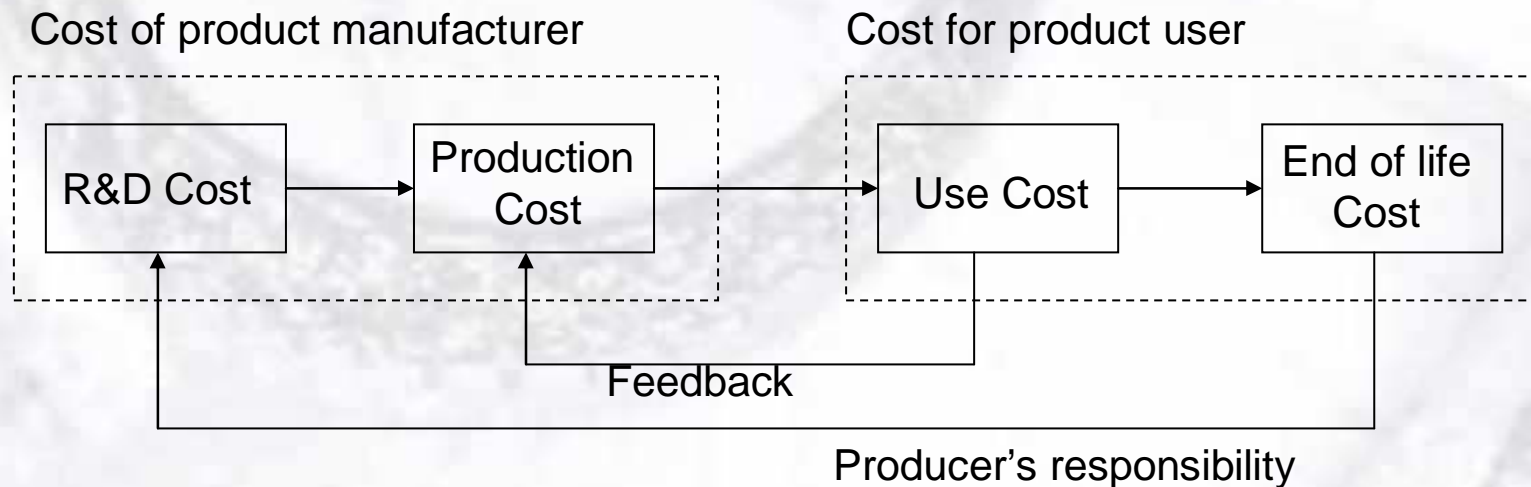
Activity Based Costing (ABC)

- ABC is based on the idea that overhead costs are caused by different activities.
- ABC identify all activities that are performed to produce products
- Product costs are categorized into cost pool
- The costs are referred to their drivers (incl.Environmental cost)
- Activities: Import, Export, Domestic Freight, Physical movements, Returns, Storage, Product disposal, Remanufacturing, ...

Life Cycle Costing

- Life cycle cost refers to all associated with the system as applied to the defined life cycle.

Economic Life Cycle



Life Cycle Costing based on LCA

	Cost for product Manufacturer	Cost for Product User
R & D	<i>Market research</i> <i>Development cost</i>	
Production	<i>Materials</i> <i>Energy</i> <i>Machine, plants</i> <i>Labor</i> <i>Waste Management</i> <i>Emission Controls</i> <i>Transports</i>	
Usage	<i>Maintenance/Repair (Warranty)</i> <i>Liability</i> <i>Infrastructure</i>	<i>Transport</i> <i>Storage</i> <i>Materials</i> <i>Energy</i> <i>Maintenance</i> <i>Infrastructure</i>
End of life		<i>Waste Collection</i> <i>Disassembly/Recycling/Disposal</i>

Target Costing

- Target costing takes up the idea of customer satisfaction, starting from the assumed market price of product.
- A target cost price is set at which the company realizes an acceptable profit.
- Environmental care is stimulated if it reduces costs
- It can be shown that environmental care with unbearable cost cannot be supported by the market.

Investment selection Techniques

- Payback period
- Net present value
- Internal rate of return
- Environmental performance indicators

Cash Flows

Cash Outflows

- Initial Investment
- New equipment
- Raw materials for new processes
- New fees and insurances

Cash Inflows (Savings)

- Avoided treatment and disposal wastes
- Maintenance savings on old equipment
- Avoided cost and handling of toxics
- Reduced insurance and fees
- Depreciation tax shield on new equipment

Net Present Value example

years	0	1	2	3	4	5
OUT						
investment	180,000,-					
installation charges	20,000,-					
installation measure	7,000,-					
training		7,500,-		7,500,-		
operational costs		2,000,-	2,000,-	2,000,-	3,000,-	3,000,-
total cash outflow	207,000,-	9,500,-	2,000,-	9,500,-	3,000,-	3,000,-
IN						
less cleansing agent		24,000,-	24,000,-	24,000,-	24,000,-	24,000,-
less productloss		20,000,-	30,000,-	40,000,-	40,000,-	40,000,-
salvage value						1,000,-
total cash inflow		44,000,-	54,000,-	64,000,-	64,000,-	65,000,-
saldo cash flow	-207,000,-	34,500,-	52,000,-	54,500,-	61,000,-	62,000,-
cost of capital	8%					
		0.9259	0.8573	0.7938	0.7350	0.6806
present value	-207,000,-	31,944,-	44,582,-	43,264,-	44,837,-	42,196,-
payback period	beginning of year five					
net present value	minus 177,-					

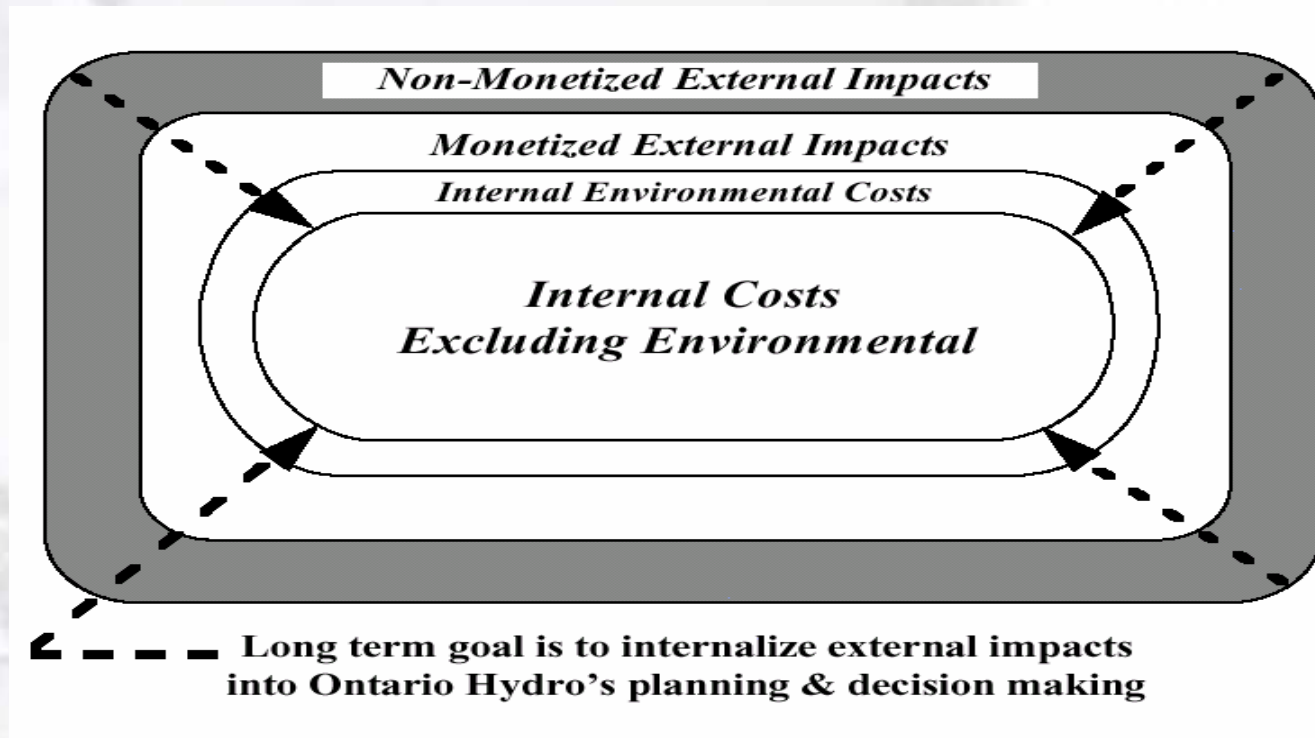
Table 4: Andersen's Financial Analysis

	Year 0 (Installation)	Year 1	Year 2	Total (Years 0-5)
Investment				
Equipment	(\$ 115,541)			(\$ 115,541)
Installation and other expenses	(\$ 14,559)			(\$ 14,559)
Total Investment	(\$ 130,100)			(\$ 130,100)
Costs				
Operating costs		(\$ 109,355)	(\$ 115,302)	(\$ 623,197)
Total Costs		(\$ 109,355)	(\$ 115,302)	(\$ 623,197)
Savings				
<i>Paint Use and Waste Reductions</i>				
Paint purchase and shipping		\$ 110,374	\$ 113,685	\$ 585,991
Waste treatment, transport, disposal		\$ 14,387	\$ 15,106	\$ 79,497
VOC emissions and associated fees		\$ 162	\$ 170	\$ 895
<i>Dilute Solvent Use & Waste Reductions</i>				
Solvent purchase and shipping		\$ 58,710	\$ 60,471	\$ 311,699
Solvent emission losses and fees		\$ 560	\$ 588	\$ 3,094
<i>Flush Solvent Use & Waste Reductions</i>				
Solvent purchase and shipping		\$ 10,687	\$ 11,008	\$ 56,739
Solvent emission losses and fees		\$ 130	\$ 137	\$ 718
Total Savings		\$ 195,010	\$ 201,165	\$ 1,038,633
Net Benefit	(\$ 130,100)	\$ 85,655	\$ 85,863	\$ 415,436

The case of Hydro Ontario - Background

- Ontario Hydro is the largest utility in North America and employs over 21,000 people.
- Its revenue for 1994 was approximately \$8.7 billion.
- Ontario Hydro's supply system includes 5 nuclear, 8 fossil-fueled, and 69 hydroelectric energy stations. Total system capacity is approximately 34,000 megawatts.
- Ontario Hydro is a self-sustaining, government-owned utility (estimated 92% market share) without share capital.
- Since 1990 Ontario Hydro has faced declining load demand due to economic conditions and has excess generating capacity.
- Restructuring was designed to contain costs, stabilize electricity rates, and gain greater efficiency. The changes also involved dividing the company into separate business units, each with clear accountability for its activities, costs, and environmental performance.

How Does Ontario Hydro Define Full Cost Accounting ?



- Dividing line between internal and external costs is not static.
- Ontario Hydro's long-term goal is to better incorporate environmental impacts and costs into planning and decision-making.

How Did Ontario Hydro Account for Environmental Costs

- Ontario Hydro's goals is to better define and allocate internal environmental costs to enable it to make better decisions and ensure value from environmental expenditures.
- Environmental spending is estimated by each business unit in terms of operations, maintenance, and administration (OM&A) major capital initiatives and fuel and related
- Environmental spending is categorized by: material and waste management, water management, air management, land use management, environmental approvals, and energy efficiency.
- Ontario Hydro's Approach for Quantifying and Monetizing Externalities. Ontario Hydro supports the damage function approach to quantifying and monetizing externalities.

Why Did Ontario Hydro Address Full Cost Accounting?

- Commitment to Sustainable Development: Ontario Hydro's mission is "to make Ontario Hydro a leader in energy efficiency and sustainable development, and to provide its customers with safe and reliable energy services at competitive prices."
- Ontario Hydro articulated in 1993 the following expected benefits from introducing FCA:
 - provides a powerful incentive to search for the most economic ways of reducing environmental damage
 - leads to choices that include explicit consideration of the present and future environmental impacts of alternative options
 - should lead to a more efficient and effective use of resources
 - should help in "leveling the playing field" when evaluating demand and supply options (e.g., demand side management, alternative power generation technologies, conventional supply options).

Hydro 1993 Full Cost Accounting Recommendations

- Modify the current accounting system into a full cost accounting system
- Augment the current financial evaluation framework
- Support a research program on full cost accounting
- Initiate a training program on full cost accounting
- Take full cost accounting beyond Ontario Hydro
- Establish a fund for decommissioning, waste disposal, etc.

What Has Ontario Hydro Done To Implement Full Cost Accounting?

- Established FCA Corporate Guidelines
- Applied FCA to Decision-Making
- SED Decision Criteria: (1) resource and energy use (2) environmental impacts, (3) social impacts, (4) employment of renewable energy sources, and (5) financial integrity.
- Applied FCA to Resource Planning
- Use of Multi-Criteria Analysis in Planning
- Undertook Full Cost Accounting Research
 - Internal Environmental Cost Research
 - *Externalities Research*
- *Executed FCA Communication and Education Programs*
- *Conducted Outreach Beyond Ontario Hydro*
- *Addressing FCA Accounting Processes and Issues*

What Has Ontario Hydro Learned?

- FCA must be positioned as an approach which makes "good business sense".
- FCA is not yet mainstream thinking.
- There is a need to build bridges between environmental and financial staff.
- FCA it is not the decision making process.
- Distinguishes between FCA and Full Cost Pricing.
- FCA is data-intensive.
- Develop some high level FCA Guidelines and link them to the EMS.
- It is essential to have a methodology for considering externalities which allows for the consideration of monetized and non-monetized.
- Define the links between internal and external environmental costs.
- Developing and implementing FCA is a gradual process.
- FCA should be developed and implemented as part of a larger context.
- The process of changing corporate culture and attitudes are key to fostering support and commitment to FCA
- Training and communication on what FCA means.

Summarize

- Environmental Accounting for reduction of cost, identify benefits, Corporate governance
- 4 main methods: TCA, ABC, LCC, TC
- Beyond Environmental Accounting
- Essential part of management of change

Thank you very much for
your attention!

See you tomorrow
at 9:00 o' clock