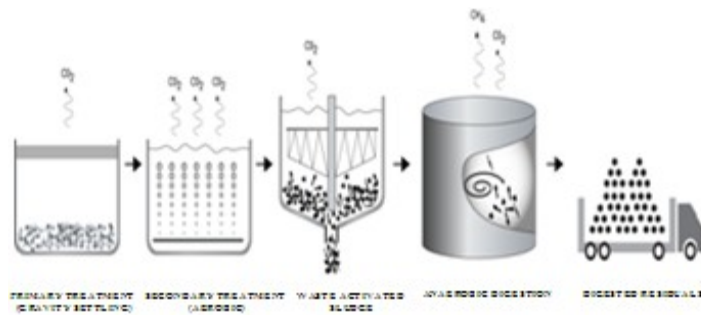


Life Cycle Analysis in the Water Industry, A Changing Paradigm

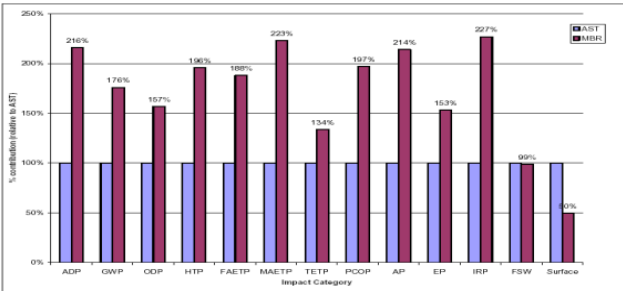
LCM 2011, August, 28 – 31, The Dahlem Cube, Berlin
 Mohamed Tawfic Ahmed
 Suez Canal University, Ismailia, Egypt
 motawfic@tedata.net.eg



In Water and Wastewater Facilities Main Emphases are on GHG Emission And Energy Consumption

Energy Use at Wastewater Treatment Plants

Wastewater treatment is the single biggest electricity use for most local government. At the plant, energy makes up 25-40% of total operating costs, second only to labor.

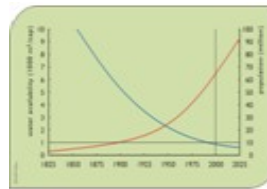


Life cycle impact assessment (LCIA) methods overlook the environmental consequences of the decrease in freshwater quality and availability.

Change of Paradigm

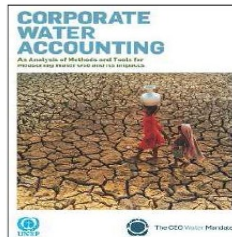
Problem setting:

- 1.1. billion people lacking sufficient access to safe drinking water; Water scarcity strongly influences food security.
 - Large burden on human health particularly in Africa and Asia.
- Increasing agriculture production (irrigation) and damming .
 - Reduced freshwater availability for ecosystems.
- Overexploitation of freshwater bodies & abstraction of fossil groundwater.
 - Diminished availability for future generations.



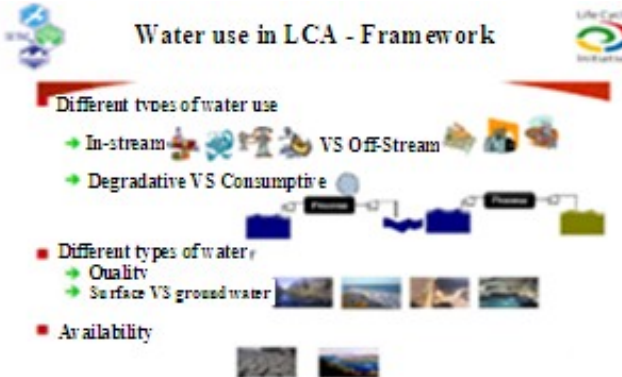
UNEP/SETAC Life Cycle Initiative

Assessment of Use and Depletion of Water Resources within LCA



Slice of white bread: 40 liters water

Forget carbon: you should be checking your water footprint
 By Amol Rajan, Monday, 21 April 2008



UNEP/SETAC Project Group: Assessment of Water Usage and Depletion of Freshwater Resources within LCA

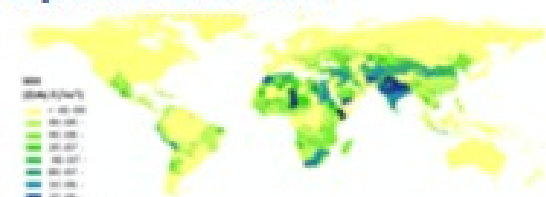
- Develop midpoint-endpoint framework to assess environmental consequences of water usage in LCA
- Midpoint: Physical environmental impact due to environmental intervention (e.g. global warming)
- Endpoint: Damage to Areas of Protection
- 3 Areas of Protection (AoP)
- Resources, human health, and ecosystem quality
- Impact pathway approach (cause-effect chains)
- Develop impact assessment methods for characterizing water usage
- Establish recommended practice and guidance for LCA practitioners.



Why regionalization?

- No water scarcity on global average
- Different impacts – different regions:

Impact on human health



Inventory Data and Environmental Impacts Per kg Cotton Textile

Yarn	Production share	Water consumption [m³/kg]	Water deprivation [m³/kg]	Ecosystem Quality [PDF·m³·yr/kg]	Human Health [DALY/kg]	Resources [Surplus MJ/kg]	ESDWA-score caused by water use [1/kg]	Portion of total damage (ESDWA) caused by water consumption
Argentina	0.7%	8.81	1.87	2.67E+00	2.03E-07	6.38E+00	0.34	17%
Australia	1.4%	3.43	1.38	4.96E+00	9.00E+00	1.04E+00	0.41	20%
Brazil	5.8%	0.11	0.01	9.97E-03	2.16E-09	5.02E-03	0.00	0%
China	27.2%	1.85	0.88	4.26E-01	5.76E-07	3.77E+00	0.14	8%
Egypt	0.8%	10.26	10.05	8.63E+01	1.82E-05	5.34E+01	8.47	84%
Greece	1.8%	4.40	3.13	7.88E-01	1.23E-07	7.24E+00	0.24	13%
India	19.9%	8.23	5.56	2.08E+00	1.17E-05	1.47E+01	0.82	33%
Mali	0.8%	3.87	0.96	3.20E+00	5.53E-06	0.50E+00	0.39	19%
Mexico	0.8%	4.03	3.04	2.56E+00	6.78E-07	6.90E+00	0.38	19%
Pakistan	3.5%	9.30	9.08	1.56E+01	2.06E-05	4.11E+01	2.72	62%
Syria	0.9%	7.91	7.90	8.13E+00	7.86E-06	3.87E+01	1.75	52%
Turkey	3.3%	6.84	6.33	3.60E+00	3.86E-06	1.34E+01	0.70	30%
Turkmenistan	1.1%	13.03	13.58	1.35E+01	1.22E-05	6.48E+01	2.91	84%
United States	16.4%	1.40	0.70	4.34E-01	2.98E-09	2.62E+00	0.10	6%
Uzbekistan	4.4%	10.44	10.48	1.07E+01	1.16E-05	3.93E+01	2.07	56%
Average	93.4%	4.06	3.41	3.82E+00	6.63E-06	1.26E+01	0.74	23%
USaverage	16.4%	8.48	3.53	4.86E+00	2.60E-06	1.67E+01	0.74	31%
USaverage	16.4%	3.04	2.35	3.41E+00	2.24E-06	1.27E+01	0.87	26%