Responsibility & Renewal

UMASS DARTMOUTH
SUSTAINABILITY ASSESSMENT AND
CLIMATE ACTION PLAN

SUSTAINABILITY INITIATIVE

Water

Water

THOUGHTFUL USE FOR A WATER-RICH REGION

"Although we spend nearly a million dollars annually bringing in fresh water and sending out wastewater, there has not been a sustained focus on water conservation. UMass Dartmouth has only four meters for incoming water and no way of keeping track of what the water coming into campus is being used for, or where the substantial amount of wastewater is coming from."

Water is a reminder that natural systems do not follow our designations of what is off-campus and what is on-campus. UMass Dartmouth is part of the Buzzard's Bay watershed. We tap into the water resources of the town of Dartmouth and the city of New Bedford. We are a water-rich region, but the abundance of water that comes to us—and the water filtration we discharge—is dependent on energy. In Dartmouth, the sewage treatment plant and the water plant are the first and third largest users of town energy.[1]

Clean, fresh water is a luxury many people can't afford or obtain in certain parts of the world. Reliance on filtered tap water over bottled water is one means for sustainable usage. Reducing indoor usage, such as waterless urinals, removal of trays from cafeterias, and taking shorter showers, are easy steps. Recycling waste water, such as a grey-water system, reuses water for irrigation and landscaping. Storm water management captures water runoff from roofs and other surfaces and stores it in tanks for cleaning, plant growth, and all other non-consuming uses. Using water-efficient appliances and systems, like leak-proof plumbing fixtures, sink faucets, and shower heads, as well as garden hoses with trigger nozzles, will improve household water efficiency.

As climate change continues to impact water, more of our planet's human and wildlife populations go thirsty. Conflict over water is likely to increase as it becomes more obvious that water taken from others—in the form of diverted waterways, and bottled water—is unsustainable from the perspectives of energy, finance, and humanitarian concerns.

The University is an ideal place to model sustainable water usage, to raise student awareness, and to research new water systems.

Where We Are

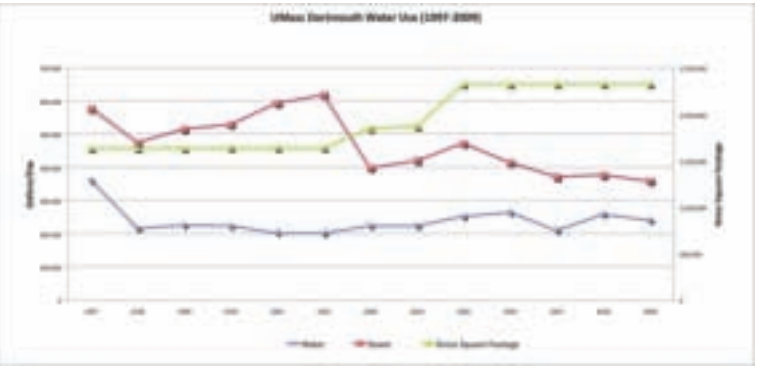
Water Use and Discharge

The water used on our campus comes from the town of Dartmouth which draws on fourteen groundwater wells. The water comes from storage tanks on Chase Road and Old Westport Road.

From June to October, the town often draws on the water supplies of New Bedford, which are treated with chloramine rather than chlorine. Because chloramine is toxic to aquatic life, our biology department must purchase distilled water for their fish tanks. Chloramine is also problematic for those with kidney or immune system disorders.

Dartmouth tests our water weekly for bacteria. The average ph of water from New Bedford is 9.5; Dartmouth's is 7.5-8. The ideal ph of drinking water is 6-8.5.[2]

Although we spend nearly a million dollars annually bringing in fresh water and sending out wastewater, there has not been a sustained focus on water conservation. UMass Dartmouth has only four meters for incoming water and no way of keeping track of what the water coming into campus is being used for, or where the substantial amount of wastewater is coming from. We send out more water in waste than we bring in, perhaps twice as much. A utility assessment conducted by Sebesta Blomberg for the University suggests this is "due to storm water infiltration into an aged on-site sewage piping system." These high numbers could also be attributed to leaks that go unfixed. In addition, run-off from our paved surfaces flows into creeks that lead to the Atlantic.



We have switched to low-flow faucet aerators and have built pilot green bathrooms that conserve water. New construction that meets LEED standards will also benefit the campus: a 30% reduction in water use earns two LEED credits and helps to meet Massachusetts LEED Plus standards.

Drinking Water

Despite the fact that the water brought into campus is potable, little of it over the past few years has gone into drinking water. It has become the norm for campus offices and individual students and faculty to drink bottled water trucked in from Poland Springs or through our beverage contract. In the fiscal year 2008, the University spent $26,916.23 on bottled water, including containers, cups and coolers. Students likely spent many thousands more on water purchased in vending machines and from Sodexho.

In the summer of 2009, the University stopped purchasing bottled water for University offices and placed filters in all the drinking fountains on campus. Facilities also purchased a water filling station for the Fitness Center.

Education and Awareness

Preliminary surveys of students' awareness of water issues indicate that water literacy is low. Nor have there been any sustained campaigns for water reduction. Such a campaign—perhaps in conjunction with a bottled water campaign—could be a significant opportunity for changing attitudes towards water usage on campus.

Two honors students recently conducted studies of water: one focused on campus water use and the other on the use of algae wheels in wastewater treatment. An early Topics in Sustainability course brought together five faculty members to teach their differing departmental perspectives on "water" as a sustainable concern in our time and in times past.

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Recent Accomplishments

Four East Campus Residence Halls Switch to Water Conservation Aerators

Based on a standard showers lasting 8.1 minutes used a day per person, 400 users per building, the switch to water conservation aerators (from 2.2 gallons per minute to 1.75 gpm) will save over 13,000 gallons of water a day for all four residence halls, potentially saving UMass Dartmouth 2.9 million gallons of water a year.

Reduction in Bottled Water

The University stopped funding bottled water for campus offices in the summer of 2009. At the same time, campus bubblers were repaired and fitted out with filtration systems. A water filling station has been installed in the fitness center and reusable bottles are sold nearby. Sustainability events serve tap water in pitchers rather than bottled water. Many other offices are following Sustainability's lead. Student Affairs provided refillable water bottles for incoming freshmen in 2008.

Facilities Met with a Purveyor of a Packaged Water Treatment Plant

This plant is designed to treat sewage water on campus, reducing the amount of water delivered to the sewage system.

Opportunities

Reducing Water Usage and Discharge

Our intake and discharge of water could both be reduced by multiple targeted measures. Mechanically, sewer and water piping could be fixed to repair groundwater leakage. Replacing and retrofitting older water-consuming equipment—such as toilets, faucets and showerheads—with modern and more efficient devices would cut down on unnecessary usage. Installing meters on pipes going in and out of each building would keep track of consumption in each building and could help the University determine how much water seepage there is in the pipes. Conducting periodic water audits of all water fixtures, flow rates and user frequencies could determine which water-flow devices offer the greatest potential water and monetary savings. These measures, coupled with a water-saving and awareness campaign, could greatly reduce our overall usage and discharge.

Reducing or Eliminating the Use of Bottled Water

Installing water filling stations throughout the campus and conducting an educational campaign about the damages of bottled water use could significantly reduce the amount of bottled water consumed on campus as well as the related trash. A student or other group could use the sale of UMD reusable water bottles as a fund-raising endeavor.

Water Best Practices

The University of California in Davis voted to remove all bottled water sold on campus, putting water conservation and waste reduction ahead of revenues. Other water-related initiatives include:

- Most of the domestic, drinking, and irrigation water on campus comes from underground aquifers. Forty campus buildings are metered for water usage.
- The campus wastewater treatment plant reclaims water to use for lawn landscaping.
- Water quality monitoring in the University's arboretum occurs before the water is pumped into Putah Creek.
- Storm water detention ponds were constructed at the California National Primate Research Center.
- The UC Davis Tahoe Environmental Research Center has toilets that use rain and snowmelt. In addition, its air conditioning uses water cooled by night air that is circulated through radiant pipes.
- When there is insufficient irrigation water to meet the water demands of crops, gardens, and the arboretum, the available irrigation water is applied using drought management techniques.
- Student housing has installed hydration stations, provided ENERGY STAR-rated washing machines, and retrofitted all bathrooms with ultra-low flush toilets.

Spotlight on Sustainability

Forsaking Disposable Water Bottles

The drinking of bottled water has a fairly short history, but the practice has overtaken the United States and many other countries. Aside from being easy to use and widely available, bottled water is perceived to be healthier than tap water.

Yet, the sustainability-minded web site lighterfootstep.com lists five reasons not to drink bottled water, including the fact that research has shown bottled water is no better than tap water; that it is not a good value (averaging five cents per ounce versus one cent per gallon for tap water); that it takes away support for important public infrastructure; that it creates garbage; and that it corporatizes a resource that ought to be a public good.

Each of these issues plays out in some way on a college campus and it is for this reason that student groups nationwide have worked on ban-the-bottle campaigns. At UMass Dartmouth, trash barrels often overflow with plastic bottles. The availability of bottled water distracts staff, faculty and students away from options like the use of upgraded and filtered bubblers or water filling stations.

The recent decision of the UMass Dartmouth Purchasing Office not to pay for bottled water for office use has changed this landscape. The water from campus bubblers now repaired and outfitted with water filters tastes great. Sodexho also now offers pitchers of water for events as part of their green conferencing commitment.

The University spent $27,000 in 2008 to purchase bottled water for offices, not including the electricity used to keep the bottled water stations running. Student spent many thousands more on bottled water in vending machines.

As an alternative, refilling stations may encourage students to make the switch from buying disposable bottles to reusing durable bottles. Water fountains designed for people to take a sip while on the run simply do not make it easy to fill a bottle. The "hydration station" UMass Dartmouth is testing in its athletics facility automatically detects a refillable bottle without touching and delivers filtered water. The manufacturer, Hawes, says that "every bottle refilled saves the equivalent of a quarter bottle of crude oil that would have been used in the manufacture and shipping of bottled water."

Future Research Projects

Designing and Installing an Onsite Biological Water Treatment System

Such a system could purify enough water to meet all campus non-potable water needs. Onsite wastewater recycling would also help reduce demand on the City of Dartmouth's wastewater treatment plant, and provide a direct learning opportunity for UMass Dartmouth students.

For Discussion

Despite studies that most bottled waters are no better than tap water, people have become attached to the concept of purchasing and drinking from individual-portion, disposable bottled water. Are you one of those people and why?

Already in this global marketplace the poor countries suffer from lack of access to safe water supplies. Can you imagine a world where water became an increasingly scarce and expensive commodity? How might that force changes in water use and rationing?

What uses would you feel comfortable adapting to for waste-water from sources like washing machines or rainwater runoff?

Additional Resources

- Alliance for Water Efficiency www.allianceforwaterefficiency.org
- American Water Works Association www.awwa.org
- An online publication for water conservation www.waterefficiency.net
- Water Efficient Solutions www.waterefficientsolutions.net
- The United Nations Environmental, Scientific, and Cultural Organization provides information on its World Water Assessment Program and a link to the World Water Development Report. www.unesco.org/water/wwap/

Recommended Reading and Viewing

Second Nature
Education for Sustainability

Books

Believing Cassandra
Alan Atkission

Cradle to Cradle: Remaking the Way We Make Things
William McDonough,
Michael Braungart

Deep Economy
Bill McKibben

Depletion and Abundance
Sharon Astyk

Dream of the Earth
Thomas Berry

Earth in Mind
David Orr

Limits to Growth
Donella Meadows

Natural Capitalism
Paul Hawken,
Amory Lovins,
L. Hunter Lovins

Omnivore's Dilemma
Michael Pollan

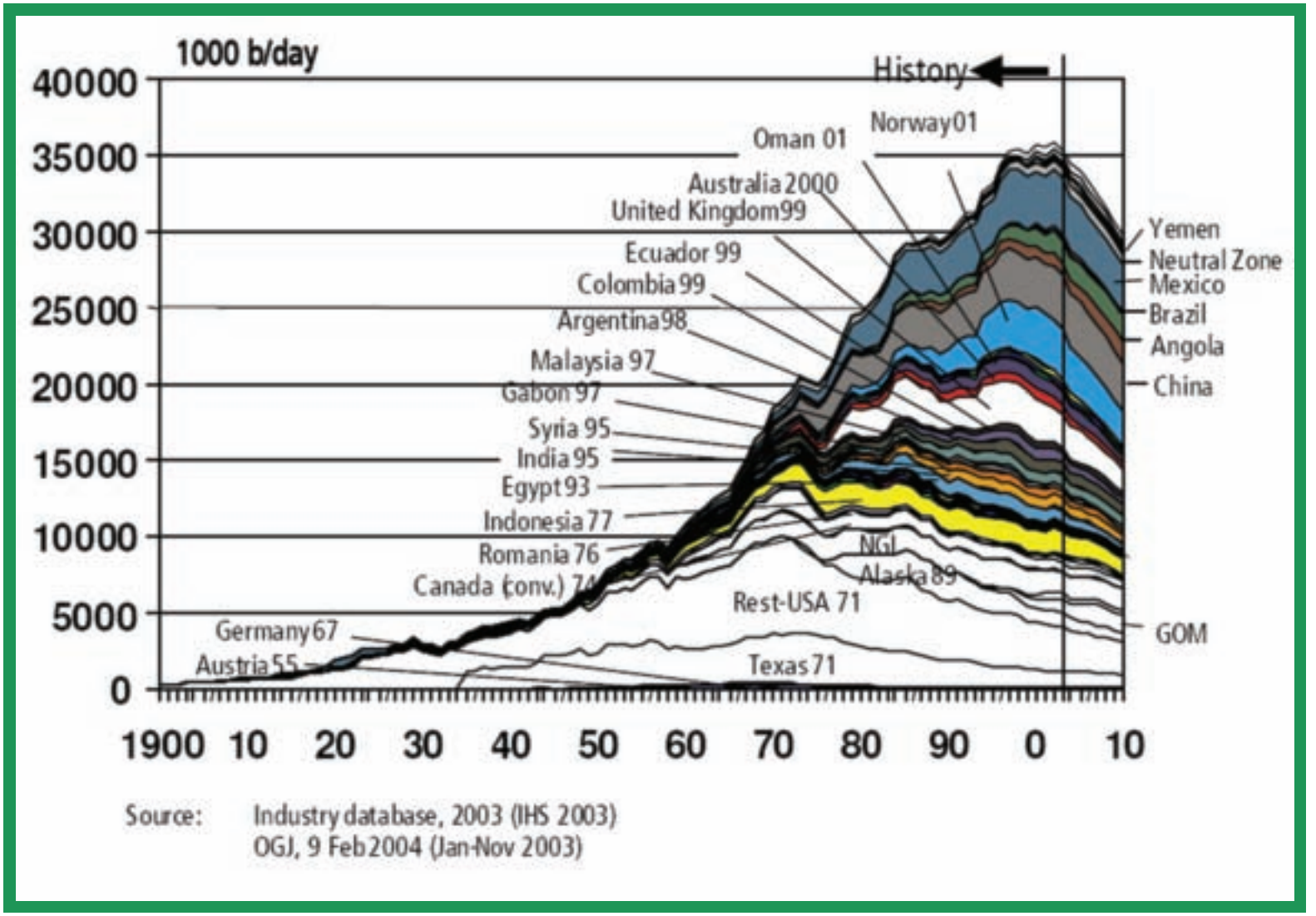
Peak Everything
Richard Heinberg

Web Sites

350.org
aashe.org
foodroots.org
greenreportcard.org
grist.org
newdream.org
peakoil.net
secondnature.org
transitiontowns.org
usgbc.org

Films

An Inconvenient Truth
Flow
Food, Inc.
I.O.U.S.A.
King Corn
No Impact Man
The Corporation
The End of Suburbia
Who Killed the Electric Car
Why We Fight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History
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Oman 01
Australia 2000
United Kingdom 99
Ecuador 99
Colombia 99
Argentina 98
Malaysia 97
Gabon 97
Syria 95
India 95
Egypt 93
Indonesia 77
Romania 76
Canada (conv.) 74
Germany 67
Austria 55
Rest-USA 71
Texas 71
NGL
Alaska 89
GOM
Yemen
Neutral Zone
Mexico
Brazil
Angola
China
1900 10 20 30 40 50 60 70 80 90 0 10
Source: Industry database, 2003 (IHS 2003)
OGJ, 9 Feb 2004 (Jan-Nov 2003)

Glossary

ACUPCC
The American College & University Presidents' Climate Commitment (initiated in 2007)

April 2007 Executive Order 484
"Leading By Example: Clean Energy and Efficient Buildings." The goals of this executive order include that all Commonwealth agencies meet the following by 2012:

- 25% reduction in greenhouse gas emission from 2002 levels
- 20% reduction in energy per square foot from 2004 levels
- 10% reduction in water use from 2006 levels

Arboretum
A facility where trees and shrubs are grown for display

Bike Sharing
Systems where numerous bicycles are made available for shared use amongst individuals who do not own any of the bikes

Biochar
Charcoal created by the chemical decomposition of condensed substances by heating that occurs spontaneously at high enough temperatures (pyrolysis) of biomass.

Biomass
A renewable energy source. Biological material derived from living, or recently living organisms, such as wood, waste, and alcohol fuels. Biomass is commonly plant matter grown to generate electricity or produce heat.

Bioreserve
An area containing a wildlife preserve bordered by a buffer zone in where frequent use is permitted to the public.

Brutalist
A style of modern architectural style that developed in the 1950s to mid 1970s. Stylistic features range from block-like geometric forms to organic and sculptural looking forms

Carbon Footprint
Measures the total amount of greenhouse gas emissions released into the environment either directly or indirectly by an individual, organization, event, or product.

Carbon Sequestration
Designed for the lessening of global warming, it is a geoengineering technique for the long-term storage of carbon.

Carpooling
The shared use of a car by a driver and one or more individuals that are going to the same destination, therefore reducing the number of vehicles on the road and reducing CO_2 emissions.

Climate Neutrality
Having net zero Green House Gas emissions (also referred to as Carbon Neutrality).

Closed Loop
A system where materials are continually recycled into the same product. For example, a glass bottle can be recycled and made into another glass bottle.

Consortium for the Advancement of Teaching, Learning, and Scholarship (CATLS)
A group though UMass Dartmouth that seeks to provide a communications nexus within which larger conversations can take place; to help the faculty fulfill their multiple roles; and to connect the activities and programs that the faculty already engages in.

Cradle to Cradle
An assessment where the end-of-life disposal step for a product is a recycling process where a new identical or completely different product is created.

Daylighting
The use of natural light through windows, skylights, light shelves, and other techniques that minimize glare and heat.

DCAM
Division of Capital Asset Management—the state agency responsible for real estate and public building construction for the Commonwealth of Massachusetts.

Electronic Product Environmental Assessment Tool (EPEAT)
A system that helps purchasers evaluate, compare and select electronic products based on their environmental attributes.

Energy Performance Contract
(EPC) a financing technique that uses cost savings from reduced energy consumption to repay the cost of installing the energy conservation measures.

Energy Service Company (ESCO)
A business that provides energy management services to an energy user.

Environmentally-Preferable Purchasing (EPP)
The federal government requires the purchase of products or services that have the least negative effect on the environment and human health in consideration of the attainment of raw materials, manufacturing methods, packaging, distribution, and recyclability.

Externalized Costs
Negative effects associated with economic transactions which affect people outside of those dealings, which means that neither the buyer nor the seller is influenced by the impact.

Food Waste
Is any food substance which is discarded, or intended or required to be discarded.

Geothermal
Of or relating to the heat in the interior of the earth.

Green Roof
A literally green roof that's covered with plants to reduce the heat that the roof absorbs. The roof system uses a specialized undercarriage for the waterproof membrane and excess water removal.

Green Seal Certification
means that a product or service has been tested according to science-based environmental leadership standards, that it works as well or better than others in its class, and that it as been evaluated without bias or conflict of interests.

Grey-Water
Non-industrial wastewater generated from domestic processes such as dish washing, laundry and bathing.

Life Cycle Cost
The total of all costs concerning a system, product, structure or service during its life time.

LEED
Leadership in Energy and Environmental Design. A system to categorize the level of environmentally sustainable construction in buildings.

Meteorological Tower
A device that measures wind speed and determines whether a site qualifies for a wind turbine.

Methane Capture
A method of gathering methane by using wells, pipes, and other technology from either landfills or dairy farms, stopping it from entering the atmosphere and harnessing it for energy.

Municipal Solid Waste
A waste type that includes predominantly household waste collected by a municipality within a given area.

Nature Deficit Disorders
Refers to the trend that children are spending less time outdoors, resulting in a wide range of behavioral problems.

Peak Oil
The term used to describe the point when worldwide production of conventional crude oil peaks in volume, which is expected to result in an increase in oil prices from a decline in the availability of cheap and easily accessible oil sources.

Potable Water
Water which is free from impurities that may cause disease or harmful physiological effects, such that the water is safe for human consumption.

Preferred Parking
Parking that is preferred for environmentally-friendly vehicles including hybrid cars. However no punitive action is taken when a non-preferred vehicle parks in a preferred spot.

Public Transportation
Various forms of shared ride vehicles which are intended for use by the public.

Recycled Content
Refers to the percentage or weight of recycled materials in a product.

Renewable Energy
Energy from sources that cannot be used up: sunshine, water flow, wind and vegetation.

Restriction of Hazardous Substances (RoHS) environmental standards
Restricts the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment. It is closely linked with the Waste Electrical and Electronic Equipment Directive which sets collection, recycling and recovery targets for electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic e-waste. Helps reduce solders' environmental footprint, including energy consumption, releases of toxic chemicals, and potential risks to human health and the environment.

Single Occupancy Vehicle
(SOV) is a privately operated vehicle whose only occupant is the driver.

Slow Food
Movement that was founded by Carlo Petrini in Italy to combat fast food. It claims to preserve the cultural cuisine and the associated food plants and seeds, domestic animals, and farming within an ecoregion.

Sprawl
Development patterns where rural land is converted to urban/suburban uses more quickly than needed to house new residents and support new businesses, encouraging people's dependence on automobiles.

Sustainability
Meeting the economic, social and environmental needs of the present generation without compromising the needs of future gererations.

Sustainable Living
Lifestyle that attempts to reduce an individual's or society's use of the earth's natural resource and his/her own resources.

Thin-Film Solar
Also called a thin-film photovoltaic cell, is a solar cell that is made by depositing one or more thin layers of photovoltaic material on a substrate. Thin film solar cells employ materials such as amorphous silicon cadmium telluride and copper indium diselenide. These materials have high light absorbency and a much thinner layer of material is required. Cells fabricated from these materials are currently less efficient

than Crystalline cells, but promise attractive cost and flexibility benefits.

Triple-Bottom-Line
Is for companies aiming for sustainability, who have to perform to not just a single financial bottom line, but the simultaneous pursuit of economic prosperity, environmental quality and social equity—Profit, Planet & People.

U.S. Green Building Council's' (USGBC) Leadership in Environmental and Energy Design (LEED) green building certification program
Provides independent, third-party verification that a building project meets the highest green building and performance measures. LEED-certified buildings are designed to:

- Lower operating costs and increase asset value;
- Reduce waste sent to landfills;
- Conserve energy and water;
- Be healthier and safer for occupants;
- Reduce harmful greenhouse gas emissions;
- Qualify for tax rebates, zoning allowances and other environmental incentives in hundreds of cities;
- Demonstrate an owner's commitment to environment stewardship and social responsibility.

Waste Stream
The total flow of solid waste from homes, businesses, institutions, and manufacturing plants that are recycled, burned, or disposed of in landfills, or segments thereof such as the "residential waste stream" or the "recyclable waste stream."

Contributors

John Anthony Amarello; Meghan Amatrudo; Jeff Augustine; Rose Ayres; Nicole Suzanne Babcock; Carol Baroudi; Derek C Bealby; Ana-Maria Bell; Liz Bender; Jim Bisagni; Luis S Botelho; Wayne B Botelho; Jeffrey Brown; Marion V Burton; Nate Byrnes; John Joseph Caressimo; Kathleen Christianson; Garry Clayton; Mary Ann Conroy-Miller; Derek Costa; Craig Andrew Costa; Ashley Cronin; Rob Darst; David Chapman; David Hall; Andrew Douglas Davidson; Justine Ryan Davis; Deirdre Confar; Jenn Denker; Nick DiCarlo; Katerina Vasileva Divarova-Cormier; Daniel Jon Duquenoy; Thomas W Econopouly; Kristen Emmett; Peter Farrell; Dave Ferguson; Brittany Filker; John Finnie; Emil Fioravanti; Peter Gagnon; Jonathan M Gruca; Daniel J Hankins; Bill Heaney; Kaisa Geraldine Holloway Cripps; Brian Michael Iacaponi; Brittany Lynn Iacaponi; Susan Jennings; Vann G Jones; Kelly Kowolski; Mike LaGrassa; Suzanne C Lapointe; Jeanne Leffers; Rich Legault; Kristina Lopes; Heather M Lopes; Eric Lyonnais; Joseph Paul Macchi; Kelley Hayes Mahoney; Pam Marean; Darlene Marie Medeiros; Haley Ann Medeiros; Michel Lewis; Stephanie Mireku; Douglas Harlow Nickerson; Tom Paine; Michael Mark Pallister; Robert Peck; Kevin Charles Pelissier; Thomas Michael Quinn; Cheryl Denise Raposa;Michelle Soares Rocha; Randal C Rothwell; Andrey Ryazanov; Megan Scheffer; Tina A Sherman; Justin L Silvia; Joseph Snigier; Allison Sousa; Roxane E Sousa; Neelim Talluri; Patrick Thielmann; Jonathan Turcotte; Lindsey Ann A Veiga; Cassandra Walsh; Steve White; Brandy Young; Marguerite Zarillo

Photo Contributors

Nate Byrnes, D. Confar, Stephanie Long, Kyle Mooney, Alicia Petitti, Kate Thornhill, Lev Turkewitz, Kelly Walls, Jennifer White

One generation of intensely focused investment, research, and redevelopment— redesigning our energy systems, overhauling our chemical industries, rebuilding our cities, finding substitutes for wood and replanting lost forests, and so much more—could transform the world as we know it into something far more beautiful, satisfying, and sustainable.

This I believe: Sustainability is possible. Sustainability is desirable. Sustainability is a goal worthy of one's life's work. Sustainability is the great task of the next century. Sustainability is the next challenge on the road to our destiny.

From http://www.atkisson.com/pubs/Manifesto-AtK2001.pdf


UMass
Dartmouth