GSA Office of Governmentwide Policy

section 4

APPENDIX

The New Sustainable Frontier

PRINCIPLES OF SUSTAINABLE DEVELOPMENT

September 2009

the government mandate for sustainability

executive summary

"[It] is the continuing policy of the federal Government… to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans."[1]

National Environmental Policy Act of 1969, Declaration of National Environmental Policy

The Government has a mandate to operate in an environmentally friendly and sustainable manner. The sustainable development model provides the best decision-making model through its comprehensive consideration of economic, environmental, and social issues associated with every business decision the Government makes. As we write in the OGP publication, Sustainable Development and Society, "Getting the best value for the American people means more than choosing what appears to be the lowest first cost option. It means understanding, acknowledging, and even celebrating the choices that the Government makes across the broad spectrum of its programs and responsibilities."

Mandates are in place for energy and resource conservation and toxics reduction, as are numerous other tools and policies intended to lead us towards sustainability.

But these strategies are not considered an intrinsic part of how the Government does business; rather, they are sometimes seen as add-ons or even as obstacles to efficient operations.

Sustainability should be the Government's mission – and it needs to be easy.

"Sustainability connects our activities today to those of tomorrow with sound business and environmental practices. We have learned over the past decades that simply complying with environmental regulations will not ensure that we will be able to sustain our mission."[2]

The Army Strategy for the Environment[3]

There is more to operating sustainably than resource conservation and toxics reduction - operations need to help environmental, economic and social systems to flourish. We need an approach that makes economic decisions based on methods that are proven to work for all kinds of goods and services, including:

- using multidisciplinary, decision-making teams
- giving priority to human and ecosystem health, safety and welfare
- conserving and recycling natural resources
- preventing pollution
- eliminating toxics
- using renewables sustainably
- conserving energy and using alternatives to carbon-based energy
- restoring and protecting of public goods like clean air and water
- preventing, rather than remedying, harmful results of economic activities
- reexamining and implementing economic decision-making tools

See http://www.asaie.army.mil/Public/ESOH/doc/ArmyEnvStrategy.pdf

It is time to place government operations on a foundation that promotes sustainability

The Government can use insights from the physical and life sciences that recognize the economy as an inseparable subsystem of the environment, to promote sustainable development. Tools such as multiple criteria and value systems analysis need to be brought to bear. Cost Benefit Analysis (CBA), Life Cycle Assessment (LCA), and Life Cycle Cost Analysis (LCAA), if appropriately used, should be part of the instrument mix. The desirable end state of sustainability should guide development. (Forecasting gives only a limited view of what could happen. Backcasting gives a broader perspective on what should happen.)

The next steps towards sustainability

For decades, the Government has led the Nation in energy efficient, resource-conserving building design, construction, and operations. Our facilities have led the way in accessibility for all; our purchasing power has contributed to national adoption of better business practices and products. We have also made great progress in water conservation, use of recycled products and renewable energy sources. However, we need to be certain that existing federal laws, executive orders, and regulations, will make the Government's operations sustainable.

Operationalizing Sustainable Development

There are economic, environmental, and social consequences to every business decision we make, whether at home or at work. When we buy a cup of coffee, for example, we are considering the value we get versus the price being asked. And, consciously or not – we're deciding if the people who grow and harvest the raw materials, and the communities in which they live, are being exposed to dangerous pesticides and fertilizers, and whether or not the workers who made that cup of coffee, and those who grew, harvested, processed and transported it can support themselves and their families with respect.[4]

When we choose a building product or system, we are deciding whether the people who collect the raw materials that go into them, who fabricate, install and maintain them are earning enough for them and their families to live in dignity. And, by the manner in which we design building components, we decide if workers will be injured by the installation techniques required, and the energy that will be needed and the emissions that will be generated over the long run.

We are also deciding whether the people who collect the raw materials that go into them, who fabricate, install and maintain them, and the communities in which they live, are being exposed to dangerous chemicals and wastes. And our choices reflect the level of environmental enforcement and mitigation, and long-term degradation – or improvement – of the environment that is acceptable to us.

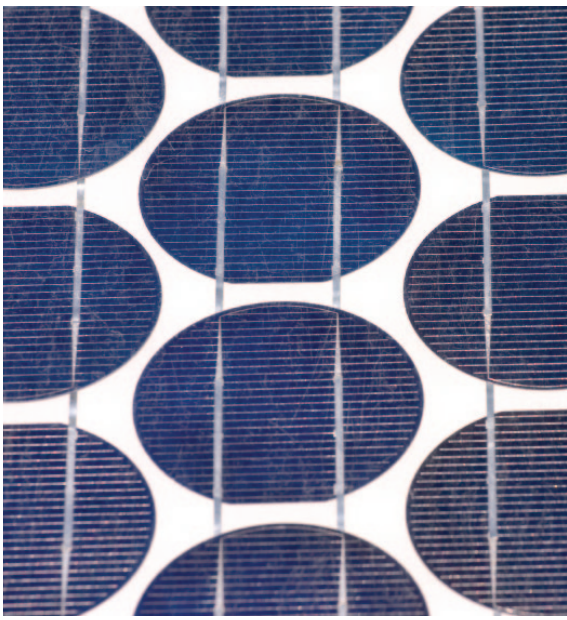
How do federal mandates measure up? Do our current policies support or slow down progress towards a sustainable future?

The Government and Sustainability

The Government has in place, numerous programs and policies for acquisition of all goods and services, and facilities intended to be sustainable. While they are generally viewed as individual, rather than integrated efforts, if implemented by Agencies as required, these programs and policies will substantially lessen the Government's negative impacts and promote economic prosperity, environmental quality and social equity. These requirements are an essential part of the Federal Acquisition System's (FAR) guiding principles, which call for not only the best value product or service to the customer, but also fulfilling the Government's public policy objectives.[5]

For example, the FARs listing of required sources for supplies and services promote resource conservation and economic efficiency by requiring Agencies to consider existing Government inventories before making new purchases. The next priority is to buy those supplies and services through programs that provide job skills training to federal prison inmates and from people who are blind or severely disabled. Only then are Agencies to use stock programs, federal supply schedules, and commercial sources.[6]

The Economy of Government Operations



Numerous laws and regulations exist to improve the economy of Government operations. The Budget and Accounting Act of 1921 established the predecessor of today's Office of Management and Budget (OMB), to implement annual centralized budgeting in the Executive Branch. Before 1921, federal Government agencies usually sent budget requests independently to congressional committees. The Congressional Budget Act (CBA) of 1974 centralized budgeting in the legislative branch. Previously, each appropriations bill was acted on separately by the Congress.

The Government Performance and Results Act of 1993 (GPRA) mandated effective management and planning to improve internal operation of the federal Government; by eliminating waste and improving the efficiency of federal programs, to retain the confidence of the American people and increase the federal Government's ability to address adequately vital public needs.

The Office of Management and Budget (OMB), in its Circular No A–11, Part 7, requires federal Agencies to develop and promote "cost effective, energy efficient and environmentally sustainable techniques or practices for siting, design and construction of all new and replacement buildings," and that new federal buildings comply with sustainable design principles. And OMB's Circular A-94 contains the basic framework for decision-making in the form of life cycle cost analysis, which "promotes efficient resource allocation through well-informed decision making."

According to FAR Part 7—Acquisition Planning, all federal acquisitions must consider life cycle cost and discuss the cost model used to develop life-cycle-cost estimates.[7]

The Government and the Environment

In the area of environment, the Government programs and policies for purchase of all goods and services, generally require that agencies must buy products that contain low or no toxic or hazardous constituents, contain the highest percentage of recovered materials practicable, use energy-efficient products,[8] and reduce indoor and outdoor water use, among other requirements. These requirements can be found in Executive Order (EO) 13423, "Strengthening federal Environmental, Energy, and Transportation Management."[9]

Mandatory Acquisition Practices of EO 13423

Federal Agencies must:

1. Use environmental management systems (EMS) to address environmental aspects of internal agency operations and activities
2. Consider life-cycle costs and savings in planning investments in all capital assets, services, and other procurements
3. Implement this Order using a cross-functional support team, consisting of procurement, legal, budget, facility and energy management, vehicle fleet management, environmental management, technical support and others
4. Purchase environmentally preferable products and services, including:
    - ¤ EPA's Comprehensive Procurement Guidelines designated products
    - ¤ Energy Star® qualified and FEMP-designated energy-efficient products
    - ¤ Water-efficient products meeting EPA's WaterSense standards
    - ¤ Energy from renewable sources
    - ¤ Department of Agriculture designated BioPreferred biobased
    - ¤ Electronic Product Environmental Assessment Tool (EPEAT) registered products for 95 percent of electronic purchases and implement an Electronics Stewardship Plan
    - ¤ EPAct-required alternative fuel vehicles and alternative fuels
    - ¤ Products containing low or no toxic or hazardous materials
    - ¤ Non-ozone depleting substances
    - ¤ Paper of at least 30 percent postconsumer fiber content
5. In its daily operations and in its owned and lease facilities, each agency shall:
    - ¤ Ensure that new construction and major buildings renovation comply with the "Guiding Principles for federal Leadership in High Performance and Sustainable Buildings;" and 15 percent of existing buildings comply by the end of fiscal year 2015
    - ¤ Reduce the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of by the agency
    - ¤ Recycle a minimum of 35 percent of its solid waste
    - ¤ Not less than 7.5 percent of the total amount of electric energy consumed by Agencies must be from renewable sources, after 2013
    - ¤ Reduce motor vehicle fleet consumption of petroleum products by 2 percent annually through the end of fiscal year 2015 and increase the total fuel consumption that is non-petroleum based by 10 % annually

EO 13423's purchasing requirements for goods and services, OMB's guidelines for capital asset planning, and the "Guiding Principles for High Performance and Sustainable Buildings" are easier to apply than the Brundtland Principles and the Triple Bottom Line. They affirm that the Government is committed to reducing its total ownership impact on the environment, cost of facilities; improving energy efficiency and water conservation; providing safe, healthy, and productive built environments; and, promoting sustainable environmental stewardship.

The Government defines sustainable building in the 2006 Memorandum of Understanding (MOU) on federal Leadership in High Performance and Sustainable Buildings.[10]

Guiding Principles for High Performance and Sustainable Buildings

I. Employ Integrated Design Principles - [Use a collaborative, integrated planning and design process that establishes performance goals throughout the lifecycle of the building; and total building commissioning]

II. Optimize Energy Performance – [Establish a whole building performance target. reduce the energy cost budget by 30 percent for new construction and 20 percent for major renovations, compared to the baseline building performance rating; install building level utility meters in new major construction and renovation projects to track and continuously optimize performance]

III. Protect and Conserve Water – [Reduce potable water indoor use by 20 percent and outdoor use by 50 percent less than the water use baselines]

IV. Enhance Indoor Environmental Quality –
[Meet current ASHRAE Standard for thermal comfort and ventilation; control moisture, achieve a minimum of daylight factor of 2 percent in 75 percent of space, with dimming and lighting controls]; use low-emitting materials, including adhesives, sealants, paints, carpet systems, and furnishings; and, protect indoor air quality during construction]

V. Reduce Environmental Impact of Materials – [Use EPA-designated products and other materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10 percent (based on cost) of the total value of the materials in the project; use USDA-designated biobased products, and other biobased products made from rapidly renewable resources and certified sustainable wood products; recycle or salvage at least 50 percent construction, demolition and land clearing waste; do not use ozone depleting compounds where alternative products are available]

The FAR requires all federal acquisitions to consider environmental and energy conservation objectives associated with the acquisition, the applicability of an environmental assessment or environmental impact statement, the proposed resolution of environmental issues, and any environment-related requirements to be included in solicitations and contracts.[11] When acquiring products and services, agencies must consider: (i) Energy-efficient products and services; (ii) Products and services that utilize renewable energy technologies; (iii) Products containing energy-efficient standby power devices; (iv) Products containing recovered materials; (v) Biobased products; and (vi) Environmentally preferable products and services.

The Government and Society

In the area of social issues, the Government invests in communities and supports a well-trained and stable workforce by requiring payment of locally prevailing wages and fringe benefits, as determined by the Secretary of Labor, in accordance with the Davis-Bacon and related Acts (DBRA), which apply to construction, supplies, and services, among other requirements. And, there are many other requirements. For example, EO13005, "Empowerment Contracting," directs Agencies to give preference in acquisition to socially and economically disadvantaged individuals, minority-owned small business concerns, and small business concerns owned and controlled by women; in order to foster "growth of federal contractors in economically distressed communities and ensuring that those contractors become viable businesses for the long term will promote economy and efficiency in federal procurement and help to empower those communities."[12]

According to FAR Part 7—Acquisition Planning, **all** federal acquisitions must consider these small businesses in their acquisition plans.[13]

Existing Tools and Strategies

These tools and strategies would, if fully implemented, significantly reduce the Government's impact on the natural environment and promote economic prosperity and social equity. They can be fully implemented now in the acquisition of all goods and services that support Government operations.

'Ready to Go' Tools

The Environmental Protection Agency (EPA), particularly the Office of Pollution Prevention, has programs to identify products and practices that reduce or eliminate waste and toxic substances in Government operations and promote recycling of materials (see http://www.epa.gov/p2/). Agencies should work with EPA to identify and eliminate use of non-compliant products and services. The EPA and the Department of Energy's Federal Energy Management Program (FEMP) also have programs that reduce energy consumption in products, services and buildings. ENERGY STAR qualified and FEMP designated products may be assumed to be life cycle cost-effective (see http://www.energystar.gov/).[14]

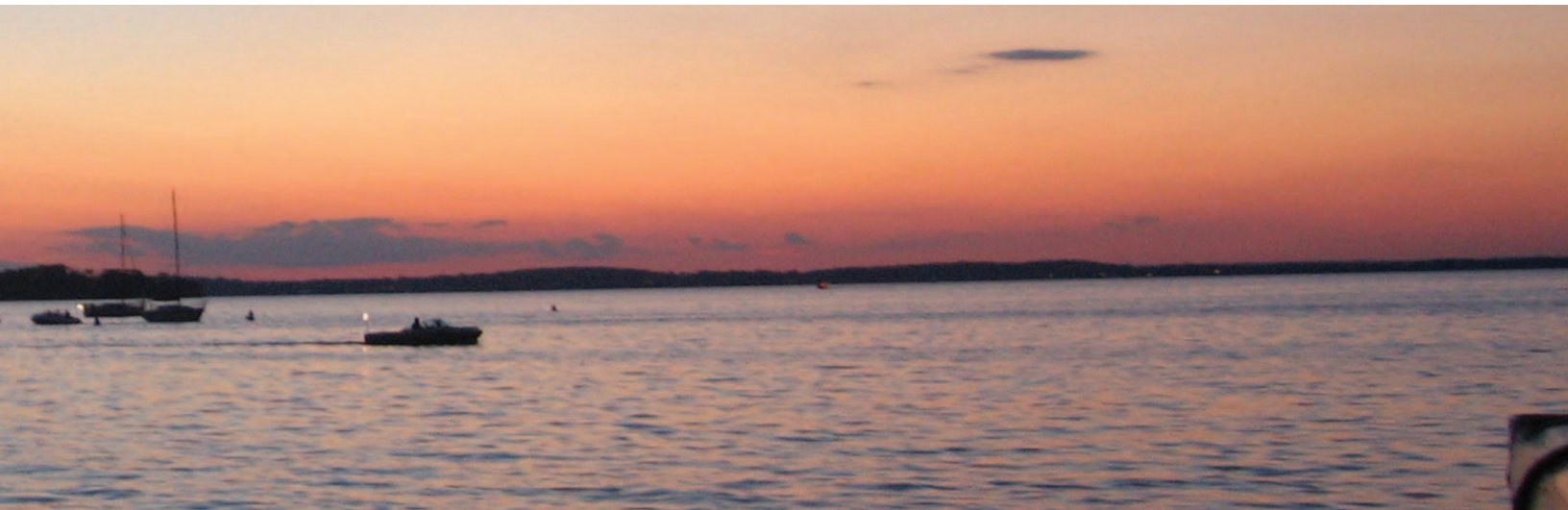
"Lake Mendota, Madison, Wisconsin." Photo credit: Jonathan Herz

Tools Needing Further Consideration

Some of the other tools used by the Government address more complex matters, and are themselves far more complex. While the elements that make up these tools are generally "transparent," they function as a sort of "Black Box," allowing their use without requiring detailed knowledge of their internal workings. These tools need further consideration:

- Office of Management and Budget OMB Circular A-11, "Preparation, Submission, And Execution of the Budget," which includes principles for capital asset acquisitions which address planning, costs and benefits, financing, and risk management requirements
- Various life cycle cost analysis (LCCA) guidelines, including:
- OMB Circular A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs,"
- FEMP life-cycle costing rules and procedures; NIST Handbook 135, "Life-Cycle Costing for the Federal Energy Management Program;" and
- Tri-Services Memorandum of Agreement on "Criteria/Standards for Economic Analyses/Life-Cycle Costing for MILCON Design"
- The National Institute of Standards and Technology's BEES® (Building for Environmental and Economic Sustainability) tool contains data on life cycle inventory results for a variety of building materials and building components
- Green Building Rating Systems, Including the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) rating system and the Green Building Initiative (GBI) Green Globes™ rating system.

How do we know whether these guidelines and tools result in sustainable choices, in the sense that they can be "carried on for a prolonged duration, or for the foreseeable future?"



How do we make Government operations sustainable - not just less harmful?

Throughout our history, there was recognition that while the market place could promote efficient allocation of resources; there were problems that it could not, or would not, resolve on its own. So the Congress and the President issued dozens of laws, executive orders and regulations to protect the environment and society from the operations of the economy, to help clean up and prevent pollution and toxics contamination, and to deal fairly with labor. Understanding some of the background will help us to understand how we arrived at the current situation of well-intended but often ineffective laws, executive orders and regulations and perhaps help us to move forward from here.

History: from Conservation to the Environmental Movement

The Government's Evolving Approach to "Environmental Quality" And "Social Equity"

Since the founding of the Republic, the Government's approach to sustainability, especially in the area of natural resources and the environment, has evolved dramatically. If anything was done at all, it was generally up to the States and local Governments to protect the environment. One of the earliest laws was in South Carolina where, in 1671, the Colonial Assembly passed a law to punish any person who released into "any of the creeks, streams or inland waters of this State any impurities that are poisonous to fish or destructive to their spawn…"[15]

Throughout the 19th Century, the policy was generally to promote settlement of newly acquired lands and exploitation of natural resources, particularly minerals and lumber. A typical sentiment was expressed by Thomas Ewbank, the United States Commissioner of Patents, in 1855. Referring to the "world as a factory" with Man in charge of it, he wrote that:

> *"[All] matter [is] brought under human influence, and made to contribute to human enjoyment… I do not think it is too much to assert that the whole was destined to pass, and that repeatedly, through human hands, preposterous as the thought may seem."*[16]
>
> *And, he was not alone in his belief that nature's resources were boundless, as in this observation:*
>
> *"A first element of progress for all time, it is preposterous to suppose the supplies of coal can ever be exhausted or even become scarce. The idea is almost blasphemous."*[17]

In his first inaugural address, President Abraham Lincoln called for the mineral resources of the Louisiana Purchase to be "developed as rapidly as possible."

The Homestead Act of 1862 privatized ten percent of all lands in the United States – 270 million acres –until it was repealed in 1985. Beginning in 1850, Congress granted over one hundred million acres of public lands to railroads, in order to help subsidize their construction and settle the American West. The Desert Land Act of 1877 granted up to 640 acres of public desert land in the West, to any citizen at a total cost of $1.25 per acre on condition that the land be "reclaimed" by irrigation, for which use of free water from other public lands was made available. And, the General Mining Act of 1872 has given away billions of dollars in mineral rights to prospectors on federal land.[18]

Abraham Lincoln, in 1862 told Congress:

> *"The immense mineral resources of some of those Territories ought to be developed as rapidly as possible… It is worthy of your serious consideration whether some extraordinary measures to promote that end can not be adopted..."*[19]

There was little consideration of the external effects of these laws; which, historians have said, contributed to monopoly power, environmental degradation, and pollution.

As early as 1850, Patents Commissioner Ewbank tempered his enthusiasm for development, warning:

> *"… the waste of valuable timber in the United States, to say nothing of firewood, will hardly begin to be appreciated until our population reaches fifty millions. Then the folly and shortsightedness of this age will meet with a degree of censure and reproach not pleasant to contemplate ... [T]he vast multitudes of bisons slain yearly, the ceaseless war carried on against them, if continued, threatens their extermination, and must hereafter cause deep regret."*[20]

As the effects of development and exploitation were noted, starting in with a bill to set aside the Yosemite Valley in California as a public park in 1864; Congress began passing bills to slow the unrestrained exploitation of Nature. Laws included those limiting fur hunting (1870), protecting fisheries (1871), banning unpermitted logging on government property (1875), creating forest reserves (1891) and the first national wildlife refuge (1892).

In 1890, to try to "rebalance" distortions in the market, the first antitrust law was passed.

In the area of economy and equity,[21] there were many advances and retreats over the years. An 1808 federal law prohibited the importation of slaves, but not slavery itself. President Van Buren declared a ten-hour workday without reduction in pay for all federal employees on public works projects. In 1840, President Lincoln's 1863 Emancipation Proclamation freed slaves in southern areas occupied by Union forces, and the13th Amendment to the Constitution banned US slavery in 1865.

In 1868, the Congress enacted the first eight -hour workday, but it only applied to federal employees on public works projects. The federal Bureau of Labor was established in 1884 as part of Department of the Interior. Between 1881 and 1905 alone, there were more than 37,000 labor strikes in the United States.

In the 1890's the so-called "Progressive Era" arrived, with efforts at a wide range of economic, political, social, and moral reforms. In his First Annual Message to Congress, in 1901, President Theodore Roosevelt said:

> *"The National Government should demand the highest quality of service from its employees; and in return, it should be a good employer. If possible legislation should be passed… to do away with the competition of convict contract labor in the open labor market... [Provision] should be made to render the enforcement of the eight-hour law easy and certain. In all industries carried on directly or indirectly for the United States Government women and children should be protected from excessive hours of labor, from night work, and from work under unsanitary conditions. The Government should provide in its contracts that all work should be done under "fair" conditions, and in addition to setting a high standard should uphold it by proper inspection, extending if necessary to the subcontractors."*

As concerns about environmental destruction came to the forefront, President Roosevelt called for protection of water supplies through the "wise administration of the forest reserves." He called for setting aside forest reserves for "the wild forest creatures."[22]

By 1907, things were getting out of hand, environmentally. Commercial waterways were silting up because of erosion caused by over logging, and our mineral wealth was being wasted. That year, in his Inaugural Address, Theodore Roosevelt recognized that conservation and the proper use of our natural resources would be necessary if were to maintain the material basis for our way of life. In his Seventh Annual Message to Congress, President Roosevelt asserted that:

> *"The conservation of our natural resources and their proper use constitute the fundamental problem which underlies almost every other problem of our National life... We must show foresight, we must look ahead. As a nation we not only enjoy a wonderful measure of present prosperity but if this prosperity is used aright it is an earnest of future success such as no other nation will have. The reward of foresight for this Nation is great and easily foretold. But there must be the look ahead, there must be a realization of the fact that to waste, to destroy, our natural resources, to skin and exhaust the land instead of using it so as to increase its usefulness, will result in undermining in the days of our children the very prosperity which we ought by right to hand down to them amplified and developed. For the last few years, through several agencies, the Government has been endeavoring to get our people to look ahead and to substitute a planned and orderly development of our resources in place of a haphazard striving for immediate profit."*[23]

By 1909, a corporate income tax was established, along with the Department of Commerce. In 1913, a permanent income tax was established and the Department of Labor was created, "to foster, promote and develop the welfare of working people, to improve their working conditions, and to advance their opportunities for profitable employment."[24]

Franklin Roosevelt's "New Deal" established a variety of basic social security programs that are still with us today. They include:

- **1931 -** The Davis-Bacon Act requiring payment of prevailing wages to workers on public construction projects
- **1935 -** The Wagner Act (National Labor Relations Act) protected the right of workers to organize for collective bargaining. Also in 1935, the Social Security Act was approved
- **1936 -** The Public Contracts Act (Walsh-Healey Act) established labor standards, including minimum wages, overtime pay, and safety standards; and banned child and convict labor on all federal contracts. The Fair Labor Standards Act created a $.25 minimum wage and time and a half for hours over 40 per week.
- **1938 -** A 44 hour workweek and minimum wage of 25 cents/hour was established, covering about 20% of all workers
- **1943 -** An executive order banned discrimination against any employee or applicant for employment under a public contract, because of race, , creed, color or national origin.
- **1948 -** The first federal Government conference on industrial safety
- **1949 -** Child labor is prohibited

In the 1960s, in response to growing national social problems, several major laws were passed, including:

- **1963 -** The Equal Pay Act prohibited wage differences for workers based on sex
- **1964 -** The Civil Rights Act prohibited discrimination in employment based on race, color, religion, sex or national origin
- **1968 -** The Age Discrimination in Employment Act made it illegal to discriminate in hiring or firing person between 40-65 on the basis of age
- **1970 -** Congress passed the Occupational Safety and Health Act (OSHA)

And, while there were some programs involving more than just conservation before his administration; it was not until President Lyndon Johnson that the Government committed itself to not just conservation, but also environmental protection.

In 1965, President Johnson called for action against the degradation of the environment by poisons and chemical waste products that threatened the health of the world. In doing so, he also captured some of the ideas of sustainable development, saying:

> *"The air we breathe, our water, our soil and wildlife, are being blighted by the poisons and chemicals which are the by-products of technology and industry... The same society which receives the rewards of technology, must…take responsibility for control."*[25]

> *"… Our conservation must be not just the classic conservation of protection and development, but a creative conservation of restoration and innovation. "Its concern is not with nature alone, but with the total relation between man and the world around him. Its object is not just man's welfare but the dignity of man's spirit."*[26]

Johnson's "Great Society" programs had broad implications for society and social equity. In the area of the environment, there were new laws to improve air and water quality, land and water conservation, solid waste disposal, and reduce motor vehicle air pollution He also signed into law the Endangered Species and National Historic Preservation Acts; and, probably most importantly, the National Environmental Policy Act of 1969, known as NEPA. In the area of equity, there were many new laws, as well. The two Civil Rights and Voting Rights Acts forbade job discrimination and the segregation of public accommodations and housing discrimination, and assured minority registration and voting. Johnson declared War on Poverty with the Job Corps, Food Stamps, Head Start, and Medicare and Medicaid.

In the '60's people began to realize that what needed protection was not just nature, but humans, as well. In 1969, the Cuyahoga River caught on Fire. In his January 1970 State-of-the-Union Address, President Richard Nixon recognized that:

> *"Restoring nature to its natural state is a cause beyond party and beyond factions. It has become a common cause of all the people of this country. It is a cause of particular concern to young Americans, because they more than we will reap the grim consequences of our failure to act on programs which are needed now if we are to prevent disaster later.*

> *"Clean air, clean water, open spaces--these should once again be the birthright of every American...*

> *"We still think of air as free. But clean air is not free, and neither is clean water. The price tag on pollution control is high. Through our years of past carelessness we incurred a debt to nature, and now that debt is being called."*[27]

Another important factor in the acceleration of resource depletion and pollution was, and still is, population growth and urbanization. In 1800, the U.S. population was 5.3 million, with 6.1 people per square mile. By 1860, the population was 31.4 million, with 10.6 people per square mile in a much larger territory. In 1910, the population had reached 92.2 million, with 26 people per square mile.[28] There were 179.3 million Americans in 1960, with 50.6 people per square mile. In 2009, the U.S. population exceeded 306.1 million, with over 86 people per square mile. The Census Bureau estimates that, by 2040, the U.S. population will grow to 405.7 million.

During this same period, the World's estimated population increased from about 969 million in 1800, to 1.75 billion in 1910, to 3 billion in 1960. Today, there are an estimated 6.7 billion people on the planet. The Census Bureau estimates population growth from 6 billion in 1999 to 9 billion by 2040.[29]

"Our civilizations are at risk because we are misusing natural resources and disturbing natural systems. We are pressing the Earth to the limits of its capacity. Since the industrial revolution, human numbers have grown eight-fold. Industrial production has risen by more than 100 times in the past 100 years.

"This unprecedented increase in human numbers and activity has had major impacts on the environment.

"The capacity of the Earth to support human and other life has been significantly diminished. In less than 200 years the planet has lost six million square kilometers of forest; the sediment load from soil erosion has risen three-fold in major river basins and by eight times in smaller, more intensively used ones; water withdrawals have grown from 100 to 3600 cubic kilometers a year.

"Atmospheric systems have been disturbed, threatening the climate regime to which we and other forms of life have long been adapted. Since the mid-eighteenth century, human activities have more than doubled the methane in the atmosphere; increased the concentration of carbon dioxide by 27%; and significantly damaged the stratospheric ozone layer.

"Pollution of air, soil, fresh waters and the oceans has become a serious and continuing threat to the health of humans and other species. Humanity is causing emissions of arsenic, mercury, nickel, and vanadium that are now double those from natural sources; zinc emissions are triple and those from cadmium and lead are respectively five and eighteen times higher than natural rates.

"Most astonishing of all, the 5.3 billion people now [1991] on Earth are already using 40% of our most elemental resource - the energy from the sun made available by green plants on land.

"Yet despite this vast takeover of nature, hundreds of millions of people struggle in poverty, lacking a tolerable quality of life. One person in five cannot get enough food properly to support an active working life. One quarter of the world's people are without safe drinking water. Every year millions of children die from malnutrition and preventable disease. Such conditions are grossly unjust. They also threaten the peace and stability of many countries now, and of the whole world eventually."[30]

International Union for Conservation of Nature and Natural Resources/
United Nations Environment Programme/World Wide Fund for Nature

Increasing awareness of environmental degradation led to the first Earth Day celebration on April 22, 1970, when 20 million Americans demonstrated in favor of environmental reform. In the area of equity, the Occupational Safety and Health Act of 1970 protected workers from harm on the job. Perhaps the greatest environmental accomplishment of that period was NEPA, the National Environmental Policy Act of 1969.

Although we seem to use NEPA in a limited way, it addresses all of the principles of sustainable development. NEPA was the first comprehensive federal law to establish the broad national framework for protecting our environment. Eight years before publication of the Brundtland Principles, It established a national policy to account for and to mitigate the Government's negative impact, by requiring impact statements for federal actions having a significant effect on the environment. NEPA procedures make environmental information available to public officials and citizens before decisions are made and before actions are taken. The Act states:

> *"The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the federal Government… to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans."*[31]

Assessing its effectiveness after twenty-five years, a study by the Council on Environmental Quality (CEQ) found NEPA's most enduring legacy to be "a framework for collaboration between federal agencies and those who will bear the environmental, social, and economic impacts of agency decisions."[32] The CEQ study identified five elements of the NEPA process critical to its effective and efficient implementation:

1. "Strategic planning — the extent to which agencies integrate NEPA's goals into their internal planning processes at an early stage;
2. "Public information and input — the extent to which an agency provides information to and takes into account the views of the surrounding community and other interested members of the public during its planning and decision-making process;
3. "Interagency coordination — how well and how early agencies share information and integrate planning responsibilities with other agencies;
4. "Interdisciplinary place-based approach to decision-making that focuses the knowledge and values from a variety of sources on a specific place; and
5. "Science-based and flexible management approaches once projects are approved."[33]

The study also highlighted the cumbersome nature of typical NEPA implementation that keeps it from being fully effective. But, the CEQ also cited numerous benefits that remind us of its importance today:

> *"[Agency] managers who have learned to use NEPA have discovered it helps them do their jobs. NEPA's requirements to consider alternatives and involve the public and other agencies with expertise can make it easier to discourage poor proposals, reduce the amount of documentation down the road, and support innovation. NEPA helps managers make better decisions, produce better results, and build trust in surrounding communities."*[34]

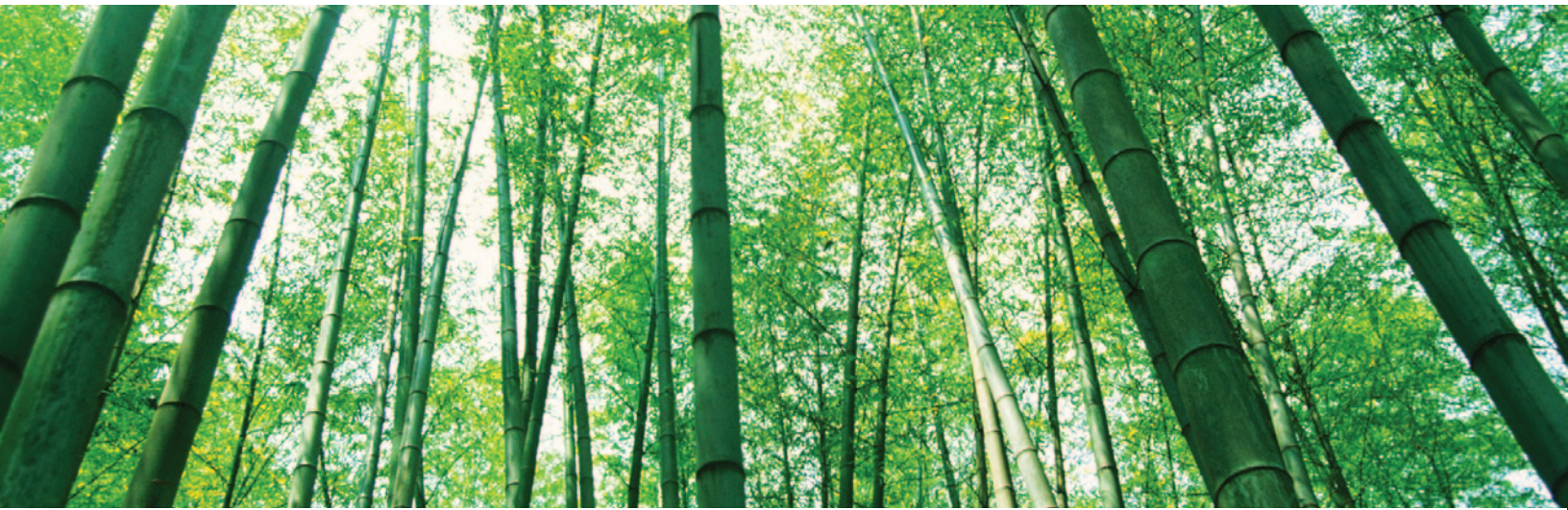
Another benefit is its collaborative nature:

> *"Experience with the NEPA process has shown that better decisions — those that meet the needs of the community and minimize adverse impacts on the environment — require the integrated perspective that can only be obtained by incorporating expertise and information from many fields and sources…"*[35]
>
> *The basic doctrine of NEPA requires the federal Government to use all practicable means and measures to protect environmental values. It does not require consideration of the costs versus the benefits of protecting and restoring the environment. In fact, it calls for the use of "all practicable means and measures, including financial and technical assistance…to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans."*[36]

The Government's Evolving Approach To "Economic Prosperity"

Historians seem to agree that - at times throughout American history – Government spending was not always based upon well-informed decision-making, particularly in the areas of river and harbor improvements and public buildings, where the most common economic decision-making process was "logrolling" - which allowed passage of actions of interest to each legislative member without great analysis. This approach to decision making did not always lead to the efficient resource allocation. Congressman Davy Crockett was one of the first to apply the term to legislation in 1835.

The New York Times, in an 1879 article entitled, "Log-Rolling in Congress," stated, "It is a discouraging fact that very few propositions before Congress stand or fall on their intrinsic merits."[37] A few years later, the Times suggested that, "no more public buildings should be authorized by Congress until a sound and rational system was substituted for the present system of logrolling."[38]



Cost Benefit Analysis

Of course, not all decisions were made in this manner. Secretary of the Treasury Albert Gallatin is cited as one of the first to compare the costs and benefits of public projects to justify their approval. In his 1808 "Report on Internal Improvements," proposing a system of roads and canals, Gallatin wrote:

> *"The general utility of artificial roads and canals, is at this time so universally admitted, as hardly to require any additional proofs. It is sufficiently evident that, whenever the annual expense of transportation on a certain route in its natural state, exceeds the interest on the capital employed in improving the communication, and the annual expense of transportation (exclusively of the tolls,) by the improved route; the difference is an annual additional income to the nation."*[39]

The River and Harbor Act of 1902 introduced a formal method of evaluating the long-term value of proposed projects, based on estimated costs and benefits. In the following years, boosted by the Flood Control Act of 1936, cost benefit analysis (or CBA – sometimes referred to as "Benefit Cost Analysis) became more widely used, but due to the lack of guidance, it was applied differently by Government agencies using a wide range of criteria. In 1950, Government economists identified uniform practices for informal internal use; but a common analytic approach was not officially adopted across the Government until 1965, with the adoption of the "Planning Programming Budgeting System."

The advantage of CBA over other methods is that it provides a coherent framework for data collection and identification of information gaps to decide whether a project should be implemented (or to decide among different projects). One additional benefit lies in the fact that CBA provides one aggregate metric (such as a Cost-Benefit ratio, an internal rate of return, or net benefit in monetary terms), boiling everything down to a single number. Projects with the greatest net benefits are the logical choices. In theory, CBA applies traditional economic concepts of efficient resource allocation, resulting in economically efficient projects.

The PPBS was superseded in 1972 by OMB Circular A-104, "Comparative Cost Analysis for Decisions to Lease or Purchase General Purpose Real Property." In 1981, CBA became a requirement in every regulatory-impact analysis.[40] Since then, CBA has been applied to almost every type of government acquisition.

OMB Circular A-104 was in turn superseded in 1986, by OMB Circular A-104 (Revised), "Evaluating Leases of Capital Assets," which was superseded by OMB Circular A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs."

"A-94" broadly applied benefit-cost and cost-effectiveness analyses to evaluate federal programs and determine whether agencies have considered and properly dealt with all the elements. OMB's goal is "to promote efficient resource allocation through well-informed decision-making by the federal Government."

As cost-benefit analysis became more commonly used, during the 1960s and 1970s, questions about its accuracy and fairness emerged. In response, economists began incorporating the ideas of present value, opportunity costs, sensitivity analysis, distribution effects and equity issues.

Over the years, Cost Benefit Analysis has incorporated the idea of Life Cycle Cost Analysis (LCA), which includes not only first and operational costs, but also future capital replacement, financing, and disposal costs, stated in present value. This approach to LCA assumes that upstream factors (i.e., before acquisition) and downstream factors (after disposal) are indirectly reflected in those predicted costs. These guidelines are founded upon the assumptions of neoclassical economics: that, when functioning correctly, the market will efficiently allocate resources and balance production and consumption in a way that maximizes social welfare.

The National Energy Conservation Policy Act of 1978 (NECPA), which required federal agencies to reduce consumption of nonrenewable energy resources, was the first to specifically apply life cycle cost methods to the design of new federal buildings and major renovations. Its intent was to "reduce the growth in demand for energy in the United States, and to conserve nonrenewable energy resources … without inhibiting beneficial economic growth."[41] NECPA called for the Secretary of Energy to develop implementation guidelines, in consultation with the Director of the Office of Management and Budget, the Secretary of Defense, the Director of the National Institute of Standards and Technology, and the Administrator of the General Services Administration, utilizing:

> *" … practical and effective present value methods for estimating and comparing life cycle costs for federal buildings, using the sum of all capital and operating expenses associated with the energy system of the building involved over the expected life of such system or during a period of 25 years, whichever is shorter, and using average fuel costs and a discount rate determined by the Secretary "*[42]

CBA went from being just an analytic tool to being the standard decision-making process in 1981, with EO 12291, which required a regulatory impact analysis for every major governmental regulatory initiative. This requirement was confirmed in 1994 by EO 12866, which stated:

> *"federal agencies should promulgate … regulations … made necessary by compelling public need, such as material failures of private markets to protect or improve the health and safety of the public, the environment, or the well-being of the American people…agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures … and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity)… "*[43]

The attraction of CBA is that it takes complex decisions and tries to make an apples-to-apples comparison of all benefits and all costs in terms of money. Of course, the accuracy of the outcome of a Cost-Benefit Analysis Is dependent on how accurately costs and benefits have been estimated.

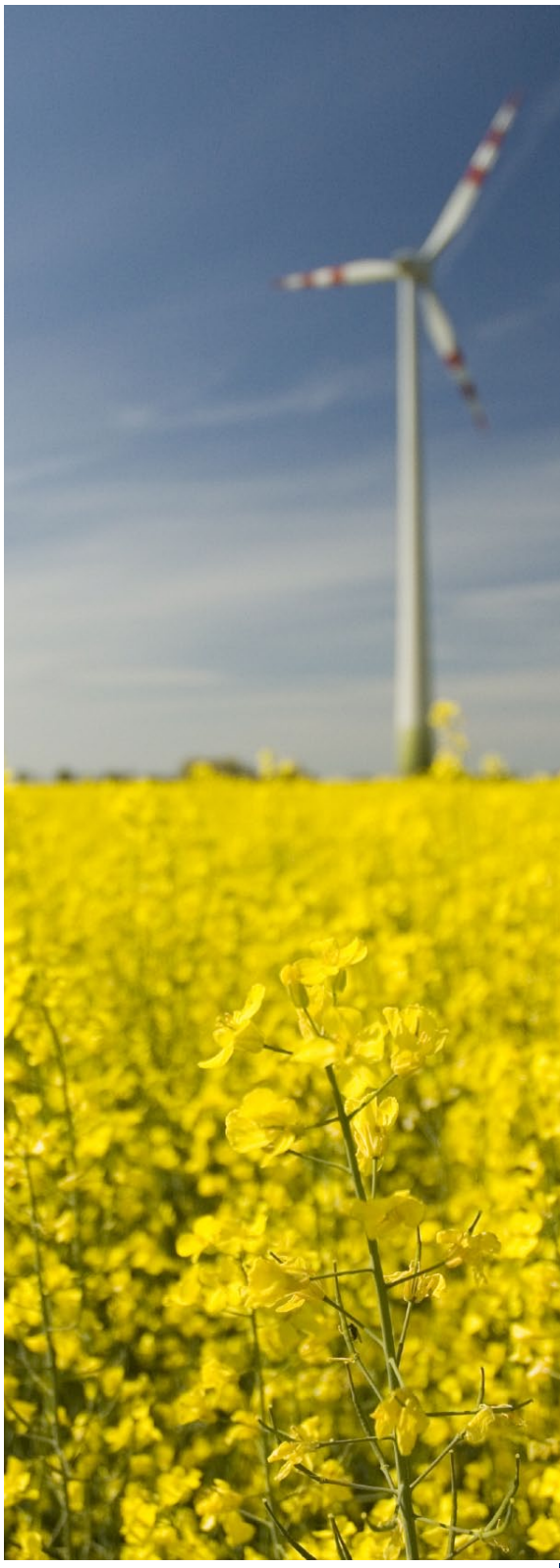
COST BENEFIT ANALYSIS APPROACHES

There are significantly different types of benefit-cost analysis is currently in use, particularly in the ways that BCA is used by the U.S. Government and within Europe. Economist John Graham describes them as:

1. The Kaldor-Hicks Approach. This is the traditional approach, distinguishing features include willingness to pay (WTP) as a measure of benefits, and opportunity costs as a construct for costs. A specific problem of this approach is how to deal with low income populations, whose willingness to accept (WTA) is likely to be large, but whose WTP is by definition going to be small.
2. The Social Well-Being Approach. In this approach, the unit of analysis is not money; rather, it is some interpersonal measure of wellbeing. Public health fields, for example, often use quality adjusted life years, though there is also an entire literature about how to measure happiness and use it as a measure.
3. The Social Welfare Function. This approach uses an interpersonal measure of well-being, but also adds a measure of equity into the equation. It is typically theory-driven, but it the UK government has recently introduced distributional income weighting into their benefit cost analysis.
4. Social Risk Analysis. This analysis recognizes that variability and uncertainty exist, and should be explicitly addressed and incorporated into the benefit-cost analysis. Accounting for variability and uncertainly is particularly important if you have vulnerable populations who are different from average people.
5. The Multi-Objective Method/Regulatory Impact Analysis. This approach is a portfolio of methods, which includes benefit-cost analysis among many other tools, and has no single normative foundation. This suite of methods creates a lot of discretion for analysts to choose which method and normative foundation(s) to use.[44]

There are many forms of CBA. Government tends to base its analysis on the Kaldor-Hicks foundation.

In 1999, EO 13123 directed federal Agencies to use LCC to evaluate energy and water conservation and renewable energy projects. EO 13123, which was incorporated into EO 13423 in 2007, uses LCC to identify more accurately the true costs of programs, processes, products, and services, to determine the cost effectiveness and cost-benefit value of government services. Traditionally, LCC has used the benefits and costs over the life of the material, asset, or program (including decommissioning or disposal) to evaluate investment decisions. However, we are learning that ignoring the "upstream" costs, leading up to our acquisition and "downstream" impacts after disposal of a product or service can omit major costs and impacts. So, in addition to the other considerations added to LCC in the 1960's and 1070's, like present value, opportunity costs, and equity issues; we realize that it is necessary to factor in those upstream and downstream costs – through the entire lifecycle - if we are to make the right investment decisions.



Life Cycle Analysis (LCA)

Life Cycle Assessment (LCA) expands the traditional, limited focus of Life Cycle Cost analysis, and allows us to make business decisions based, not only on expenses over the life of the material, asset, or program, but also on the environmental impacts. It is a standardized methodology for identifying and evaluating environmental burdens throughout the societal life cycle of a product. Based on International Organization for Standardization (ISO) standards, LCA is a society-level evaluation method, as it takes account of impacts on health and the environment no matter where they occur or whom they affect. LCA does not specify or account for the timing of impacts, and it adopts a practically unlimited time horizon.

The Federal Management Regulations[45] state that LCA should be applied within a life-cycle assessment framework that accounts for both the costs over the asset life and the environmental consequences of investment decisions on upstream (e.g., extraction, production, transportation, and construction), ongoing (e.g., health impacts on tenants and the community), and downstream (e.g., decommissioning and disposal) costs. The value of LCA is to quantify the health, environmental, and social impacts of products or purchases that are not otherwise readily seen or known. These quantified impacts can then be used for better decision making.

Although the process can be resource, time, and labor-intensive, LCAs are useful tools that, if applied transparently and with understanding of possible biases in methodology, can help lead us to make sustainable choices. Over time, a number of tools have been developed that try to incorporate lifecycle cost and lifecycle assessment thinking and fill in the information gaps that can lead us to the unsustainable choices.

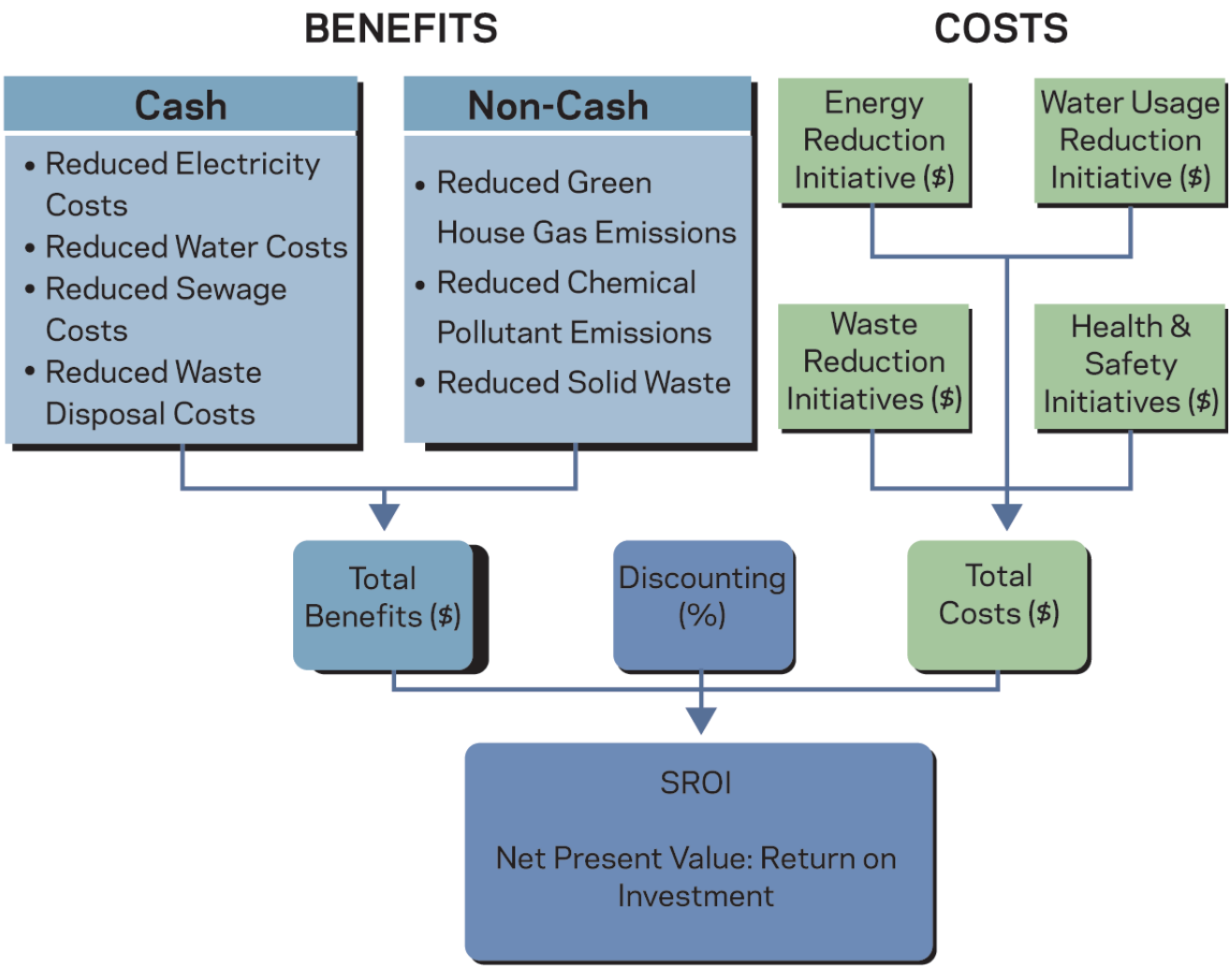
LCC and LCA Tools

Among the Tools for Life-Cycle Costing and Life-Cycle Assessment, Umberto® integrates LCA and LCC to model material and energy flows systems along a product's entire life cycle. SimaPro LCA software contains a wealth of detailed and transparent life cycle inventory data on thousands of processes. It also contains the most important life cycle impact assessment methods. The ATHENA® Impact Estimator uses an LCA methodology to evaluate whole buildings and assemblies and enables users to compare the environmental implications of industrial, institutional, commercial and residential designs–both for new buildings and for major renovations.

Building Life-Cycle Cost (BLCC) Programs developed by the National Institute of Standards and Technology (NIST) enables users to conduct economic analyses by evaluating the relative cost-effectiveness of alternative buildings and building-related systems or components. Energyplus is a building-energy simulation program for modeling building heating, cooling, lighting, ventilating, and other energy flows. Carnegie Mellon's BIDS (Building Investment Decision Support Tool) is a case-based decision-making tool that calculates the economic value added of investing in high performance building systems using a framework of multiple life-cycle variables. NIST's BEES® (Building for Environmental and Economic Sustainability) contains data on life cycle inventory results for a variety of building materials and building components. BEES uses a tool based on the EPA's Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI) that assists in impact assessment for Sustainability Metrics, Life Cycle Assessment, Industrial Ecology, Process Design, and Pollution Prevention.[46]

Another tool is the HRD, Inc., Sustainable Return on Investment Tool that is intended to identify projects that would yield the greatest economic, environmental and social benefits.[47]

SUSTAINABLE RETURN ON INVESTMENT



Courtesy of Chris Behr, HDR, Inc.

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