Environmental Laws: How They Impact Design and Construction

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ABSTRACT

The recent increased interest in sustainable design has largely neglected the rapidly expanding influence of legislation and regulation on building design and construction practice. Polls demonstrate that over ninety percent of the population in the United States consider ourselves to be environmentalists; but, they also consistently indicate a growing level of distrust concerning the legislative capabilities of our elected officials. A recent Time/CNN poll indicated that only 19% of those questioned trust the Government to do what's right most of the time, down from 76% in 1964.[1] Appendix A lists some of the major pieces of federal environmental legislation that have been enacted over the past two decades and their associated design/construction topics.

The purpose of this paper is to review the legislative and regulatory changes at both the state and national levels, with a specific focus on the relevance for the design and construction industry. It evaluates the rationale and need for environmental regulation, reviews the effectiveness of various types of environmental regulation, and speculates on the future prospects for environmental legislation for both the State of Michigan and the Federal government. A wide variety of sources were contacted to help develop these ideas, including politicians, special interest groups, legislative databases, the popular press, and academic publications. The paper concludes that free-market approaches do not appear to be adequate in the long-run for transferring intergenerational costs and benefits on a scale that is necessary to maintain sustainable development. For this reason legislative approaches may be necessary. In the long run, a paradigm shift to a steady-state economy is likely with an accompanying awareness and social consensus that economic activities and material consumption are not the central focus of society. Such a steady-state economy would have a very dramatic and fundamental impact on Western societies, especially on those sectors of the economy which rely on growth in capital formation for their livelihood, such as building construction.

ENVIRONMENTAL ISSUES

There appear to be three defining issues that provides a context for this paper and for discussions concerning the impact of legislation on mitigating environmental problems. These three issues address key concerns raised by individuals and institutions that were contacted during the course of this research.

1. Is there a public consensus that environmental problems are permanent and serious?
2. How effective is legislation compared to other approaches that could be used to address environmental problems? Is legislation the only and best answer?
3. What are future legislative agendas for Michigan and the Federal Government; and what are the probable effects on design and construction?

IS THERE A PUBLIC CONSENSUS?

Meaningful public policy can be implemented only if the public appreciates and supports that policy. But there may be several important barriers or biases[2] that inhibit the development of public consensus on environmental issues. The first barrier is that it is generally recognized that users of a common resource base have little incentive for conserving that base. One example that is used to illustrate this barrier is that of common fishing grounds. As long as fish in the sea can be caught profitably, fishermen will wish to do so. Eventually, without any other intervention, this may lead to overfishing. The more valuable the fish, the more technologically sophisticated will be the fishing vessels, and the more severe will be the overfishing.

This common-property principle also applies to environmental resources, such as pollution of lakes and streams, the over-exploitation of irreplaceable natural resources, and ozone depletion. The key issue here is that rational, individual decisions may result in undesirable outcomes for society as a whole. Preventing undesirable outcomes usually requires joint action, typically consisting of regulation and enforcement. An example of this type of joint action is the 1984 Montreal Protocol to reduce CFC emissions, where the costs of inaction were potentially immense, while the costs of elimination CFC production seemed reasonable.

A second barrier to developing a public consensus is that

frequently we cannot know with certainty the future effects of phenomena such as global warming, ozone depletion, acid rain, and tropical deforestation. Most likely, future conditions will diverge from any assumptions made about those conditions today. But pessimists (some might say realists?) point out that failure to initiate action soon enough may condemn the earth to irreversible damage. As an example, when CFCs reach the stratosphere they can last for 100 years.[3]

A final barrier to public consensus arises from a tendency for people to have a natural preference for immediate, short term gains even if those gains may be to the detriment of future generations. Using the fishing example again, imagine a coastal fishing community totally dependent on the sea. Further assume that this community is extremely poor, and that the need for immediate survival outweighs any future considerations. People in this community are likely to heavily discount the future in favor of current needs. Sustainability implies concern for the future, and this concern is reduced by people's natural tendency to discount the future.

These biases help to understand why there seems to be two opposing views of sustainability. The "traditional" view holds that increasing resource scarcity will always generate price signals which, in turn, will encourage compensating economic and technological developments. This group believes that future energy scarcity (and increased cost) will be overcome as a result of technological developments, such as fusion. The opposing, "environmentalist" view maintains a belief that the earth is finite and depleteable, that everyday economic incentives are not compatible with sustainability and that poverty is incompatible with sustainable development. To some degree these opposing views reflect recent legislative developments.

LEGISLATION COMPARED TO OTHER APPROACHES

There appear to be four approaches that have and can be used to mitigate environmental problems. Historically, the most common approach was legislation that was implemented through administrative command-and-control mechanisms. In Michigan, the past two decades have resulted in a proliferation of legislation affecting every area of the environment. This legislation has typically been implemented by administrative agencies.[4] High-profile, successful and non-controversial examples of this "administrative command-and-control" approach are easy to find, and include mandated standards for automobile emissions and mandated eliminating the use of cholorofluorocarbons (CFCs). However, there are also examples of regulations that have been more controversial, such as in Aspen, Colorado, where the Mayor threatened to stand in front of government bulldozers rather than pay $12 million to clean up lead deposits that resulted from silver mining hundreds of years ago or in Florida, where two residents spent 19 months in jail for dumping clean builder's sand on an otherwise dry lot that previously had been designated wetlands.[5]

Government agency rules and often legislation (perhaps particularly at the state level) tends to deal with environmental problems in a reactive, and sometimes site-specific manner. Twenty years ago this may have been adequate, when the costs of abating major pollution sources were relatively small compared to the benefits. However, the current political climate seems to be reacting against the applying these same regulatory approaches to today's problems.

A coalition has formed consisting of business leaders who have become annoyed with excessive regulation; state and local officials who often get stuck with cleanup costs; and landowners angry at the erosion of their private property rights.[6] This coalition is calling for reforms that have been referred to by environmentalists as the "unholy trinity."[7] These three reforms to current environmental policy are: 1. requiring a risk assessment and cost-benefit analysis of all major legislation and federal environmental rules; 2. requiring that land owners be compensated when environmental legislation lowers the value of their property; and 3. instituting a "no money, no mandate" law which requires the federal government to provide funding for implementing all new legislation. An example of recently introduced legislation that uses this approach is Senate bill S. 1920 (Domenici, R-NM) which would amend the Safe Water Drinking Act by authorizing the EPA to consider both cost and risk reduction benefits when determining the maximum level at which a contaminant may be present in drinking water.[8] And the League of Conservation Voters, in its 1993 scorecard, warned that "the heart of the environmental agenda is at stake as a phony 'property rights' movement challenges the broad protections that environmental laws give us."[9]

A second type of legislation has also been used which does not impose rules and regulations. An example of this type of legislation is illustrated by Michigan's Environmental Protection Act (1970). This act, which authorizes the courts to prevent environmentally harmful conduct, modifies the traditional view that public agencies are the sole defenders of the environment. The act empowers private individuals to protect their environmental rights in much the same way as they have historically protected their property and contract rights. In particular, MEPA states that any person can bring an action "for the protection of the air, water and other natural resources and the public trust therein from pollution, impairment or destruction."

A third approach that is gaining increased favor is to mitigate environmental problems through the use of economic incentives. For example, President Clinton has formulated his Climate Change Action Plan to meet the dual challenge of both global warming and strengthening the economy.[10] Another example of a government program that is designed to meet these dual objectives is the EPA's Green Lights and the more recent Energy Star programs. Both programs operate under the assumption that many firms can achieve energy savings by adopting more energy-efficient lighting and/or heating, cooling and air conditioning. Since

its inception in 1991 through October, 1993, the Green Lights program entered into more than 1,000 partnership agreements to analyze and, where profitable, to upgrade lighting with more energy efficient alternatives. Other similar, new initiatives seek to improve the energy-efficiency of appliances and automobiles.

Economic incentives have three advantages over the command-and-control systems: 1. Properly designed economic incentives are lower cost ways to effect environmental protection; 2. Since economic incentives make pollution more costly, they encourage continuous improvement towards less expensive prevention methods; and 3. Economic incentive establish a more direct link between the environment and the market, thus moving the entire economy on a more sustainable path. However, it may not be possible to define a market for all issues that are critical to a sustainable society, such as depletion of the ozone layer. Furthermore standard economic approaches such as life-cycle costing are not adaptable to very long time horizons required for the inter-generational transfer of costs and benefits. The maximum effective time horizon of a life-cycle cost, present-value analysis is around 25-30 years.

A final approach is to emphasize social, ethical, and cultural values in which economic activities and material consumption are not the central focus of society. In this approach, individual competition resulting in problems such as "overfishing" gives way to a social ethic of shared goals. "Think globally and act locally" is one form of this approach. A logical conclusion of this thinking is a replacement of traditional economic thought with a new paradigm which emphasizes cooperation over competition.

ENVIRONMENTAL ISSUES AND OTHER PRIORITIES

In 1990 the U.S. Environmental Protection Agency produced the results of a study based on scientific knowledge to identify and prioritize critical environmental risks. Relative risk projects were initiated in all regional offices of the EPA. In late 1991 Michigan became one of the first states to begin a similar study. The result of this study was published in July 1992 and is summarized in Table 1.[11]

The following six issues were identified through this study has having the highest relative risk for the State of Michigan:

- Absence of land use planning
- Degradation of urban environments
- Energy production and consumption: practices and consequences
- Global climate change
- Lack of environmental awareness
- Stratospheric ozone depletion

This report and the six issues were identified as most critical to the State may serve to act as the environmental agenda for future legislative action.

LEGISLATIVE PROSPECTS: STATE OF MICHIGAN

Several issues have been identified as important to the future legislative agenda in the State of Michigan.[12] Absence of an integrated, state-wide land use control system has been identified as one of the major issues that threatens Michigan's quality of life. A study completed by the South Eastern Michigan Council of Governments concluded that continuing the current pattern of urban sprawl is unacceptable. It concluded that even with a relatively small projected population growth of 6%, by the year 2010 sprawl would consume about 40% more land.[13] One of the principal conclusions of Michigan's Environment and Relative Risk 1992 report was that:

> "It should be a priority for Michigan to develop a land-use plan that optimizes wood production, resource extraction, biological diversity, clean water, cultural cohesion, human health, housing, and other societal goals. Not adopting this priority poses a severe, long-term risk to the sustainability of resources, integrity of ecosystems, and human health and existence. Current science and technology is sufficient to allow us to undertake integrated land use planning now.[14]

Options for developing a comprehensive land use plan were further developed in a more recent report.[15] This report recommended a two-step process for beginning to develop a comprehensive land-use plan for Michigan. The first step was to initiate a comprehensive study to identify what type of plan would best meet the needs of Michigan's present and future residents while, at the same time, utilizing the State's resources economically. The second recommended step was to authorize the creation of a state land-use planning commission. The commission's duties would be to supervise the study and conduct duties necessary for the development and implementation of a state-wide land use plan.

The outcome of such a plan may result in growth management statutes, revision of existing statutes, codification of case law, and/or amendment to current zoning. At least sixteen other states have already developed successful land-use plans. The 1973 plan that was enacted by Oregon reportedly led to a dramatic increase in business development. New Jersey enacted their plan in 1992, which directs growth towards areas that have transportation, water and sewer systems already in place. They estimate that, between 1990 and 2010 this plan will save $740 million in road costs, $440 million in water supply and sewer costs, and generate 40% less water pollutants over their prior plan.[16] The impact of such a plan on planning, design and construction in Michigan would likely be significant.

Another issue that emerged from Michigan's Environment and Relative Risk 1992 report was the lack of environmental awareness on the part of the public in the State of Michigan.[17] This has been identified as a second priority for

action by the Senate Majority Policy Analysis Office. Options for a plan for improving environmental awareness in Michigan has been drafted[18] and may serve as a vehicle for initiating an environmental awareness program. If a program for environmental education is implemented, such a program is likely to indirectly affect planning, design and construction in Michigan, particularly over the long term. An environmentally aware public are likely to demand an

Table 1: Rankings of Environmental Risk — A Comparison

	EPA Region V	
Michigan Relative Risk Study	**Ecological Risk**	**Human Health Risk**
High-High	**High**	**High**
Absence of Land Use Planning	Accidental Chemical Releases	Accidental Chemical Releases
Degradation of Urban Environments	Physical Degradation of Water and Wetlands Habitat	Indoor Air Pollutants
Energy Production and Consumption: Practices and Consequences	Nonpoint Source Discharges to Surface Waters	Indoor Radon
Global Climate Change	C02 and Global Warming	Municipal Wastewater Discharges
Lack of Environmental Awareness	Physical Degradation of Terrestrial Ecosystems	Stratospheric Ozone Depletion
Stratospheric Ozone Depletion	Stratospheric ozone depletion	
	Hazardous/Toxic Air Pollutants	
High	**Medium-High**	**Medium-High**
Alteration of surface water and groundwater hydrology	Abandoned/Superfund Sites	Hazardous/Toxic Air Pollutants
Atmospheric transport and deposition of air toxics	Industrial Wastewater Discharge	Nonpoint Source Discharges
Biodiversity and habit modification	Ozone and Carbon Monoxide	Ozone and Carbon Monoxide
Indoor Pollutants	Pesticides	Pesticides
Nonpoint-source discharges to surface water and ground water	Sulfur and Nitrogen Oxides	Sulfur and Nitrogen Oxides
Trace metals in the ecosystem		Radiation Other than Radon
		Lead
Medium High	**Medium Low**	**Medium Low**
Contaminated sites	RCA Hazardous Waste	Abandoned/Superfund Sites
Contaminated Surface Water Sediments	Storage Tanks	Aggregated Drinking Water
Generation and Disposal of Hazardous Waste		Aggregated Groundwater
Generation and Disposal of High-level Radioactive Waste		Airborne Lead
Generation and Disposal of Low-level Radioactive waste		Industrial Solid Waste Sites
Generation and Disposal of Municipal and Industrial Solid Waste		Industrial Wastewater Discharges
Photochemical Smog		Municipal Wastewater Discharges
Point Source Discharges to Surface Water and Groundwater		Particulate Matter
		PCB Worker Exposure—TSCA
		Storage Tanks
Medium	**Low**	**Low**
Accidental releases and responses	Industrial Solid Wastes	Municipal Solid Waste Sites
Acid deposition	Municipal Solid Wastes	Physical Degradation of Terrestrial Ecosystems
Criteria and related air pollutants		RCRA Hazardous Wastes
Electromagnetic field effects		

Table 1: Rankings of Environmental Risk — A Comparison

increasing level of environmentally sensitive design and construction services.

The final major legislative agenda item has emerged from a report from the Governor's Environmental Code Commission released earlier this year.[19] Laws affecting the environment and natural resources in Michigan have been promulgated since the late 1800's. Currently there are over 200 separate natural resources management and environmental laws in Michigan. Often, individual laws were adopted with little or no consideration of other laws, resulting in substantial confusion. For example, the term "person" was defined in 30 different statues 30 different ways.[20] In an attempt to reorganize and consolidate environmental laws, the Environmental Code Commission proposed a taxonomy of 10 major categories, proposed consistent definitions and generally attempted to integrate the existing laws into a more understandable and workable system.

LEGISLATIVE PROSPECTS: FEDERAL GOVERNMENT

Federal legislation and regulation is important for two reasons. First and most obviously, federal legislation can result in regulations and standards of the "command-and-control" type from agencies such as the U.S. Environmental Protection Agency and the U.S. Occupational Safety and Health Administration that require certain actions. Secondly, federal legislation can have both a direct and indirect impact on federal projects.

The legislative agenda of the Executive Branch was generally outlined in the Climate Change Action Plan.[21] The main goal of this plan was to return U.S. greenhouse gas emissions to their 1990 levels by the year 2000. Of course, legislation is proposed by members of Congress who may or may not have different agendas concerning the environment. Below are listed several bills that seem to be on their way to successful passage and/or that have significance for the design and construction industry.

RECYCLING AND SOLID WASTE REDUCTION LEGISLATION -- FEDERAL RESOURCE EFFICIENT BUILDINGS MATERIALS ACT OF 1993.[22]

Senate bill S. 817 by John Glenn (D-OH) addresses the issue of waste and recycling, with a specific emphasis on what the U.S. Government can do to lead and inspire the public and private sectors in the effort to recycle. It will establish a 3-year pilot program run by General Services Administration to demonstrate the use of resource-efficient building materials in federal buildings. It also creates an advisory board to oversee the implementation of the program.

Specific Building Design & Construction Implication.

- Would encourage the development of the recycling in buildings industry and lead to the reduction of solid waste in the construction of Federal buildings and facilities.

Status.

As of Monday, Aug. 15, 1994 no committee hearings or other action had been scheduled for this measure.

Outlook.

Not available.

INDOOR AIR QUALITY LEGISLATION: -- INDOOR AIR ACT OF 1993.[23]

This bill, (US) H.R. 2919 by Joseph Kennedy (D-MA), amends the Public Health Service Act to direct the EPA to promulgate a national strategy to reduce human exposure to indoor air pollutants, including identifying indoor air hazards, establishing training programs, developing standards, etc.

Specific Building Design & Construction Implications.

- Requires certification of indoor air contractors.
- Requires EPA to establish a program to identify, eliminate, and prevent indoor air hazards in Federal facilities.
- Requires EPA to establish a *voluntary* program for Federal buildings that are designed, constructed, operated, and maintained in a manner that prevents indoor air pollution.
- Authorizes EPA to provide grants to state and local governments to reduce indoor air pollution.

Status.

H. R. 2919 was introduced on Aug. 6, 1993, and referred to the House Committee on Energy and Commerce. The medical community supported it, saying that health care is more costlier than prevention. Some business and community members said it was too costly. An amendment was adopted which made compliance of new buildings voluntary. The bill was approved by the House Committee on Energy and Commerce on Aug. 3, 1994. An almost identical bill (S. 656) passed the Senate on October 29, 1993.

Outlook.

Rep. Henry Waxman (D-CA), Chair of the House Subcommittee on Health and the Environment, expects the bill to pass. Subcommittee aides said that the watered down version of the bill is far more palatable to Republicans.

RADON LEGISLATION: -- RADON AWARENESS AND DISCLOSURE ACT.[24]

H.R. 2448 was introduced by Markey (D-MA) on June 17, 1993, would require that all radon testing products and services undergo proficiency tests by the EPA. The EPA would also be required to encourage states to develop their own standards and testing programs; require the disclosure of radon problems, and establishes a Presidential Commission on Radon Awareness to improve public awareness about radon dangers.

Specific Building Design & Construction Implications.

- Standards would be relevant for any frequently occupied space below the third floor of any building other than one used for industrial purposes.
- Requires the disclosure of radon information in residences at the time of their sale.
- Authorizes set-aside grants to States for radon abatement for local governments in high radon areas.

Status.

- House Subcommittee on Health and the Environment approved the measure on Sep 29, 1993.
- The full committee approved the bill by voice vote on May 18, 1994.
- The US House passed the bill on July 28, 1994, by a vote of 255 to 164.

Outlook.

Aides report that there are a few "sticking points" but that they can be resolved. An amendment on the Floor that would have created less stringent building requirements failed by a vote of 193 to 227. The bill has been referred to the Senate Environment and Public Works Committee. No action is scheduled yet. The Senate has a comparable bill (S. 657). This Senate bill was approved by the Senate Environment and Public Works Committee on July 30, 1993. A Senate committee aide said that the bill is noncontroversial and will likely pass.

CONCLUSION: PROSPECTS FOR THE FUTURE

The extent of environmental legislation that has occurred over the past two decades is very extensive. Even states have passed legislation that is so complex that, as in Michigan, it sometimes conflicts with itself or is outdated by more recent legislation. Two major trends appear to exist at this time. First, there is a continuing high level of interest on the part of the public concerning the environment. This almost assures that state and federal legislatures will continue to address environmental laws and regulations that will impact the design and construction of buildings.

Second, at least in the near term, there appears to be a focus on trying to find solutions to environmental problems that also make economic sense. The growing level of distrust concerning our elected officials reinforces this trend. However, the types of economic assessment methods used by the private sector are not adequate for transferring intergenerational costs and benefits on a scale that is necessary to maintain sustainable development. Therefore, a reliance on neoclassical economics for sustainable development requires a belief that technological innovations will emerge that enable future generations to maintain standard of living comparable to today's.

If these technological innovations do not occur, a transformation of our economy from one based on unsustainable growth to a steady-state economy would be necessary.[25] Since neoclassical economic decision models are not adequate for this purpose, there may be an increased necessity for political approaches and/or a heightened awareness and social consensus that economic activities and material consumption are not the central focus of society. At any rate, the transformation of our society to a steady-state is likely to have a very dramatic and fundamental impact on Western societies, especially on those sectors of the economy which rely on growth in capital formation for their livelihood. Construction very obviously falls in this category.

NOTES

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