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A Status Report on the Greening of Building Codes and Standards

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Overview

Over the past several years, the Development Center for Appropriate Technology (DCAT) has been leading a growing effort to integrate concerns about sustainability into the basic purpose and goals of building regulation. DCAT's focus on building codes and standards grew out of our realization that the built environment is responsible for at least as much environmental degradation, pollution, resource depletion, and energy consumption as any other area of human activity, almost all of which has remained outside the scope of concern of the building regulatory system. By identifying the connection between codified construction practices and global environmental, economic, and social impacts, DCAT initiated what is now becoming a widespread movement to begin addressing this problem.

By taking a non-adversarial approach in this work, we have found great receptivity for this message within the building codes community. We have adopted the position that building code officials represent a "community of caring" (i.e. they are deeply concerned for public welfare). This has struck a chord within that community that relates directly to their sense of responsibility and to the core of our message:

If the purpose of building codes is, as stated in the 2000 edition of the *International Building Code*, "to establish minimum requirements to safeguard the public health and safety and general welfare... from fire and other hazards attributed to the built environment," yet, by virtue of the regulations and industry practices, the entire life support system of the planet is jeopardized, then we are morally obligated to rethink the codes from this larger perspective.

Due to our efforts over the past few years, the code organizations are beginning to recognize that this obligation is no less important than ensuring the structural, fire, or other safety aspects of buildings. Many members of the building regulatory community are responding to the growing awareness of this broader definition of public welfare with a deeper examination and understanding of their personal and organizational responsibilities and opportunities.

DCAT is also working with the green building and sustainable development communities to engage them in the codes and standards development processes. These communities have the most complete and detailed knowledge of where and how regulations are constraining best sustainable building practices. Our efforts are aimed at shifting the response of these groups from complaint to active participation in the process of creating solutions through involvement in the process of code change and code development. Part of that effort is also directed to developing national and international standards for those materials and methods of construction that need them.

This paper is a description of several approaches DCAT is taking to integrate sustainable building approaches with building codes. Several areas of additional work to forward this integration are also discussed.

The Need for Change – A Three Phase Approach

One of the major challenges confronting those who are seeking to build more environmentally responsible and sustainable structures is the hurdle of building code approval. It has been argued that it is possible, both in theory and in practice, to gain approval for nearly anything using existing provisions within the building codes. This is true as long as what is in question can be proven to meet the intent of the building codes by equivalency to what is included and already approved, or able to meet performance criteria where they exist. What is also true, however, and much more fundamentally important, is that to do so often requires the investment of considerable additional time and money for outside expertise, research, testing, documentation, and sometimes just the cumbersome set of added steps to gain approval. Very few projects have unlimited budgets and open-ended schedules. Codes may not be absolute barriers but they clearly are practical ones.

Growing out of our awareness of this situation DCAT started working toward addressing these barriers several years ago, taking the approach of expanding the context of building codes and standards to include the larger issues of sustainability into the concept of public health, safety and welfare. DCAT created a program called *Building Sustainability into the Codes* with an initial focus on developing awareness of the larger impacts of the built environment on the natural environment.

This is actually a three-phase program, with awareness-building being the first phase. The second phase is capacity building, which involves providing the information, expertise, guidance, training, and resources needed by those who recognize the need to change so they are able to carry out those changes. The third phase is the transfer phase, where the primary responsibility for the ongoing work of the first two phases is shifted to those organizations with whom this process should ultimately rest – the code organizations themselves and others whose central mission is to bring about these changes, such as the U.S. Green Building Council (USGBC), the American Institute of Architects Committee on the Environment (AIA-COTE), and various other organizations.

The First Phase – Awareness Building

In the first phase our aim has been to make clear the negative impacts from the entire building sector. Though often occurring away from the building site or extending far out into the future, these negative impacts are nevertheless part of the responsibility of the building regulatory sector. This educational process has been anchored by a slide presentation and talk developed by DCAT and presented to a large number of varied audiences over the past several years. The effectiveness of that presentation is largely a result of our approach to working with building code officials. We make our case in a straightforward, non-adversarial way, encouraging collaborative solutions based on understanding the common goals that we share for safe buildings, but expanding that to include a safe and healthy natural environment as well.

The most significant breakthroughs in integrating these larger issues into the realm of building safety have come through our ability to relate the often unintended consequences of construction and development to issues of personal and general responsibility. We have developed a number of approaches for doing this but they are all based on a simple premise:

If the justification and authority of building codes and regulations is based on a societal demand that the public be protected from the built environment,
and if the systems used to achieve that goal inadvertently place in jeopardy the health, safety, and welfare of everyone by encouraging the destruction of the natural systems on which we are all totally dependent for our survival,

then we are obligated to go back and reinvent our regulatory systems based on that larger knowledge. Basically, it can't be more important to protect individuals in and around specific buildings than all of us collectively on this planet.

To then expand on that concept, we present the issue of responsibility in a slightly different framework. Building codes and standards can be imagined to represent a sphere of concern: those things which must be attended to in order to protect people from the built environment. In thinking about that sphere of concern, it is also possible to imagine a sphere of consequence: all the outcomes resulting from the actions taken in accordance with the sphere of concern. It is then possible to see that the sphere of consequence is much larger than the sphere of concern, since it contains not only all the intended outcomes but also all the unintended ones. Thinking about that, it is then possible to imagine that there is a sphere of responsibility, and that too is much larger than the sphere of concern, since we are responsible for what happens as a result of what we require people to do. We can then define the task and the challenge as the need to expand our sphere of awareness and concern out to encompass as much as possible of the larger spheres of consequence and responsibility. This has proven to be an effective way to essentially connect the building officials to the highest purpose for which they do their work; protecting the public welfare rather than merely attending to the details in the code books.

This approach has proven to be quite effective for a significant percentage of the building officials with whom we have had an opportunity to share it. Out of this approach we have been able to build very strong relationships with the leadership of organizations such as the International Conference of Building Officials (ICBO) and some of the other code organizations, and individuals across the country. Through those relationships we have been expanding our ability to reach this sector, through such vehicles as *Building Standards*, ICBO's magazine. We have helped produce two issues which featured alternative materials and methods of construction (September/October 1998 and January/February 2000 – both on the ICBO website and linked through the DCAT website at <http://www.dcat.net>) as well as other issues with a variety of related articles. We have been asked to help put together a third such feature for the Jan/Feb 2002 issue, as well as just having been asked to create a regular column on sustainable building for the magazine.

While we have been working to develop awareness of these issues with the building regulatory community, we have also been working to engage the green building and sustainable development communities in the building codes and standards development processes. Although the actual work of changing the codes and standards is more of a second phase activity, creating the initial awareness of how codes and standards are developed, enforced, and changed is part of the first phase work. Tapping into the knowledge of the proponents and practitioners of more sustainable approaches to building, who know first hand how and why the codes and standards are problematic, helps establish and document the need for change. Ultimately these people are in the best position to begin to offer changes that could resolve the challenges they have faced.

One of the other avenues we have been pursuing to facilitate the shift from the first to the second phase of this work is a survey of those who have been involved in green building and alternative projects. This web-based survey will be conducted during the summer of 2001 and the results should aid in creating a prioritized set of strategies to address the challenges that are identified in the survey. We have had the cooperation of ICBO in the development of the survey. The results, which will then be compiled, analyzed and used to develop a set of strategies for change, will be made widely available on the internet and through publication in various building related magazines, including the January/February 2002 issue of *Building Standards*. Anyone who would like to participate can visit our website (www.dcat.net) and follow the links to the survey.

The Second Phase – Capacity Building

The second phase of this program is aimed at providing those who have recognized the need for change with the information and tools necessary to begin to implement those changes. This includes such strategies as creating technical workshops and seminars on alternative design, materials and methods of construction, and working with other groups who have expertise in these fields and have or can develop training programs and resource materials that can facilitate this process.

To achieve the second phase goals, we have been seeking partnerships and support to develop comprehensive curricula and educational resources dealing with more sustainable building, alternative materials, methods and design approaches, with a primarily goal of addressing the needs of the building regulatory community. We have explored potential partnerships with such organizations as the National Conference of States for Building Codes and Standards (NCSBCS), the U.S. Green Building Council (USGBC), and the State of Pennsylvania's Governor's Green Government Council seeking support from U.S. Environmental Protection Agency, among other agencies. While we continue to seek avenues of support for this work we have also begun exploring possibilities for working with ICBO to both develop and deliver some of these educational programs. In the interim, we have given workshops and seminars for building officials through their state, regional and local associations and have encouraged others to develop similar trainings and resource materials. We are now being joined by other organizations and individuals in developing and delivering this kind of information, such as some of the seminars conducted by the Ecological Building Network.

Another aspect of the capacity building phase is assisting in the development of code change proposals and strategies to deal with the code approval process. The code development and code change processes are open, public processes and anyone can propose a change to the codes. We have helped with a number of code change proposals and encourage those engaged in this effort to help create solutions to code problems, not just complain about them.

A final piece of our second phase work is the development of national and international consensus standards for alternative materials and methods. The existence of such standards can simplify and enable code approval by giving the building authorities the information they need to evaluate and approve these alternatives. The standards development processes, like the codes development processes are open to public participation.

The American Society for Testing and Materials (ASTM) E-06.71 Subcommittee on Sustainability for Buildings, operates within the ASTM E-06 Committee on Building Performance. Within the subcommittee, we have formed a task group to develop standards for low-environmental impact building materials and methods of construction. The task group has chosen to start with standards for earthen materials. The first standards to be developed in this effort will be for adobe, rammed earth, and compressed earth block. Future efforts in this area are likely to include other types of earthen building systems, as well as other types of materials such as bamboo, straw, and different kinds of low-impact building-related systems, such as standards for water harvesting or greywater systems.

The existence of such standards would enable much more widespread approval for these materials and methods, because such standards could be referenced and used by proponents and building officials as the basis for design and approval in most code jurisdictions.

This second phase of work ultimately must address the needs of both the building regulatory community and the design and building industry in order for the needed changes to be realized. In fact, the sectors that must be influenced extend further than just these two. They eventually must also include the finance, real estate, appraisal, and insurance communities as well as the planning and zoning, transportation and those who deal with other public

infrastructure issues. Thus part of the capacity building phase involves creating the necessary linkages and connections between organizations working in these various areas, to bring an integrated and systems-based set of strategies to bear on the larger set of systems that must change.

The Third Phase – Transferring Leadership and Responsibility

One of the most important aspects of this overall effort is the transfer of responsibility for the continuing work required to sustain these efforts to those organizations for whom this work is naturally appropriate. This is a critical step for DCAT for a number of reasons. First, as a single small organization, we are limited in the amount and scope of work that we can effectively pursue. And the related set of institutional barriers mentioned previously remain to be addressed. Further we would like to be able to redirect our attention to aspects of our mission in addition to this related work.

It is critical for those organizations whose central mission is aligned with this work to be meaningfully involved and empowered to take responsibility for it. This is the only effective way to sustain the overall process of change. Our goal is to carry out the first two phases well enough with the building codes organizations that they will undertake this work as part of their mission, not something separate from it; embracing this work as a matter of necessity in fulfilling their mission. For the non-code organizations whose central missions are aligned with creating a sustainable built environment, this work should easily be recognized as fitting their mission and seen as a necessary step toward achieving their overall goals.

We do not necessarily foresee a time when we have removed ourselves completely from working in the codes and standards realm. What we do see is developing the capacity for leadership and responsibility in many other organizations and individuals, so that the primary burden of this work is not on DCAT, but on the appropriate communities of interest and expertise that will be able to carry out the long-term goals. There are many opportunities for participation and leadership. Our ultimate goal is to help define this bigger reality well enough that each sector will act in their own enlightened self-interest, understanding how their role fills a critical aspect of facilitating the changes that need to take place for all of us and those who come after us.

Sustainable materials research and development: a missing piece

DCAT also seeks to foster support for a national partnership for the research, development, and testing of low-impact building materials and systems in order to bring them into more common and practical usage within building codes. Since these are often natural or minimally processed materials and traditional methods, frequently in the public domain, they lack a proprietary basis or established industry to provide a sufficiently large profit base to fund their development and promotion. Thus they rarely have access to the funding required to pay for extensive research, testing and development that their industrial counterparts routinely have done. This is a legitimate role for government to play, especially where technologies that are in the public domain and could be used for broad public benefit can be supported with public funds and public facilities.

DCAT has been promoting the creation of a national laboratory or program in the national labs for sustainable materials. This program would not be limited to building materials and could be structured in a way similar to the Forest Products Laboratory. The Forest Products Lab has produced enormous advantages to the timber and wood products industry and is funded by U.S. taxpayers. There is no similar subsidy for other natural materials such as earthen materials, agricultural residues, or other products of the various waste streams in the U.S., all of which could be beneficial resources for the shift to a sustainable resource economy.

As far as building materials are concerned, an initial research program should be funded to identify, catalogue, and evaluate all the various known materials and building methods or systems, analyzing and prioritizing them based on accurate comparative information about the life cycle costs and impacts, as well as the benefits, problems, and research and development needs associated with these materials and methods, whether ancient or modern. The development of such information would be a powerful tool to assess the benefits and costs of the available options, and could leverage support for the necessary research, testing and development work needed to make the best and lowest-impact technologies widely available.

In the second part of such a program, a prioritized research, testing and development agenda could be carried out based on the first phase results. This work could be carried out in the national laboratories and at research universities with a specific focus of gathering information from the international community, where advances in research and practice often extend well beyond those in the U.S. Finally, in the third part, the results of the second part could be translated into optimized codes and standards for these low-impact building materials and systems making them truly available to anyone who could benefit from their safe and practical use. The ultimate goal of such a program would be to make a number of safe, high-performance, yet low-environmental-impact building options available wherever they are appropriate. This program, if fully realized, should result in reduced costs, risks, and negative environmental and social impacts, for building owners, builders, lenders, insurers, communities, the nation, and local and global ecosystems.

Conclusion

Within the past year, DCAT initiated a process in the U.S. Green Building Council to form a Building Codes and Standards Committee. David Eisenberg, who is a member of the Board of Directors of the Council, chairs this new committee, which is still in its formative stage. Recently, ICBO contacted the Council about creating a formal liaison between the organizations both for the purposes of enlisting their assistance in greening the building codes and to seek a partnership in developing an expanded aspect of the ICBO Evaluation Service, a "green" evaluation that would certify the ecological aspects of selected materials or products in addition to their code compliance certification. These two events serve as a good indicator of the shifts that are now underway as a result of the growing awareness of the need for change.

The energy crisis in California, combined with the more widespread U.S. acceptance of the reality of global climate change and concern for the environment in general can only strengthen both the momentum and the level of participation in the work to realize the changes that are needed. Every sector with involvement in the creation or maintenance of the built environment has a role to play in these changes. There is much work to be done to make this a reality. However, if we can make clear the benefits to each sector, we should be able to find a way to enlist as partners those who might otherwise seem to be enemies to the needed changes. With an integrated understanding of the challenges and an integrated approach which seeks alignment and common purpose based on responsibility, there is no reason that ecologically responsible design, building, and development can't become the mainstream practice.

We offer our organization and the wealth of our networks and experience toward expanding the web of those actively engaged in creating these changes everywhere regulatory constraints to more sustainable construction exist.