The Daylighting Collaborative: Creating an Advanced Market Transformation Program

Mark Hanson, Energy Center of Wisconsin
Abby Vogen, Energy Center of Wisconsin
Steven Ternoey, LightForms LLC
Melanie Lord, Energy Center of Wisconsin

ABSTRACT

The Energy Center of Wisconsin initiated the Daylighting Collaborative in late 1998 with the stated objective to daylight every commercial building. This bold objective required a rethinking of market transformation program design and implementation, which resulted in a comprehensive package of services overseen by a growing collaborative of market participants. The origins and identified market needs being addressed by the Daylighting Collaborative are described. These market needs resulted in the design of a comprehensive program of training, distance learning, small demonstrations, larger demonstrations (case studies), website, and second opinion assistance. This package of services was developed around a simple, elegant core design approach of Cool Daylighting™. Cool Daylighting is a core element of green buildings that typically achieves a 40% plus reduction in cooling loads, and provides a variety of non-energy benefits to building owners and occupants. Early program implementation is drawing an extraordinary response in the market place including the Wisconsin Chapter of the AIA, the State of Wisconsin Division of Facilities Development, commercial construction professionals, and the interest of a variety of manufacturers. Members of the Collaborative fund the program.

The technical basis of cool daylighting is summarized, program elements described and early results indicated. The comprehensive or advanced program design of the Daylighting Collaborative is compared to advanced program design features for other market transformation programs to identify emerging features in advanced program design.

Introduction

"The overall goal of market transformation is to increase the share of energy-efficient products and services within targeted markets. Market transformation programs seek to achieve this goal through fundamental, enduring changes in the targeted markets" (York 1999). Despite these rather simple and widely accepted statements, market transformation is still in a formative state, with various conceptual problems. Some consider market transformation to be an objective unto itself, while others see market transformation as a strategy for achieving an objective. University of Wisconsin-Madison Business Professor David Mick makes the point that "it is not clear how market transformation is fundamentally different from marketing strategy generally. Marketing strategy involves tactics of product development, pricing, promotions, and/or distribution to increase or maintain market share within specific target markets.....and the effects of their marketing tactics are hoped to be relatively enduring (though more often they are not)" (York 1999, p. 25).

In this paper we consider market transformation to be a marketing strategy with explicitly stated public interest objectives of increasing the share of energy-efficient products and/or services. Early market transformation efforts, whose results are now observed, measured, and evaluated around the country, tend to be product focused, target one or two points in the market chain, use few tactics (often financial incentives), and rely on a narrow base of supporters. We define market transformation with these characteristics to be **basic market transformation**.

In contrast, we see the need for more robust and adaptive market transformation efforts. These efforts will be focused on services with associated products, target multiple points in the market chain, use multiple tactics, deliberately build a wide base of participants and financial supporters including market participants. We define market transformation with these characteristics to be **advanced market transformation**.

There are a variety of organizations establishing collaborative efforts to design and implement some advanced market transformation programs. The most highly developed of these at the Energy Center of Wisconsin is the Daylighting Collaborative. Given the early nature of these programs, they must be considered somewhat experimental. The early vigorous real world market response to these programs, however, suggests that they hold considerable promise for future market transformation program design and implementation.

In this paper, we first review the origins of the Daylighting Collaborative, particularly the market needs. Next we describe the technological basis or what the Collaborative terms Cool Daylighting™. This is followed by a description of the program elements and their rationale. Finally, the paper concludes with a comparison of the Daylighting Collaborative to some other more advanced market transformation efforts in order to highlight common program elements.

Origins of the Daylighting Collaborative

The Daylighting Collaborative was formed in 1998 as a result of a ruling by the Public Service Commission of Wisconsin ordering electric utilities in Wisconsin to undertake a daylighting program as part of the advanced planning process. That ruling was preceded by a program study at the Energy Center of Wisconsin that considered the need for such a program (Pigg 1997). The study noted that there was 1.4 billion square feet of commercial floor space in Wisconsin that required $350 million per year to power electric lights, or about 15% of electricity use in the state. Furthermore, the study anticipated an annual growth in commercial floor space of 7.7% over the next decade. Daylighting was suggested as a promising approach to promote energy efficiency and to improve the indoor environment.

The study confirmed the existence of many barriers that were already intuitively known to exist regarding daylighting. To overcome these identified barriers, the study committee proposed the following program strategies (Pigg 1997):

- Increase awareness of what daylighting is and how it works
- Promote simple daylighting principles readily integrated into building designs
- Provide practical demonstrations of the energy savings and cost effectiveness
- Provide hands-on training for architects and engineers
- Promote a systems approach to daylighting that optimizes lighting and HVAC savings
- Promote awareness of daylighting at all phases of building design and construction

- Promote the productivity and green building benefits of daylighting

The utilities turned to the Energy Center of Wisconsin to design and administer a market transformation oriented program. The founding members of the Daylighting Collaborative included public interest groups who had been instrumental in promoting such a program, electric utilities in Wisconsin, the Wisconsin Chapter of AIA, some architectural firms, and staff from the Commission and the Wisconsin Energy Bureau. The Daylighting Collaborative was deliberately designed to bring in an expanding set of partners to participate throughout the United States. The Lighting Research Center, the New York State Energy Research and Development Authority, and the Iowa Energy Center, among others, have since joined the program and close coordination has been established with a number of manufacturers.

The initial program study's recommendations formed the basis for much of the market transformation program design. The most significant departures from past daylighting programs have been the advocacy of *simple* design principles and resulting specifications as the starting point for all commercial buildings, a systems integration approach, and the use of practical and typical demonstrations. One departure from the original study has been the deemphasis of complex lighting controls. Instead, the program is promoting simpler, more reliable, and less costly electric lighting systems. The Daylighting Collaborative was deliberately planned to work with the commercial building market without the use of financial incentives. This approach necessitates a strong marketing message of superior indoor building environments, increased productivity and learning, as well as energy savings at no or low increased first cost.

The Daylighting Collaborative

The Energy Center of Wisconsin initiated the Daylighting Collaborative in late 1998 with the stated objective to daylight ***every*** commercial building. This bold objective required a rethinking of market transformation program design and implementation, and resulted in a comprehensive package of services overseen by a growing collaborative of market and public interest participants. While the main focus of this paper is the new programmatic approaches, it is necessary to describe the technological approach which the program promotes.

Technological Approach

As a program attempting to promote widespread adoption of daylighting, the Collaborative had to identify a design approach that was effective in significantly increasing energy efficiency, was first cost conscious, and relatively easy for designers and owners to incorporate into every commercial project. Rather than relying on the innovation of a new technology, it uses a new design approach incorporating already accepted and proven designs and technologies but in a markedly different integrated design approach that has been demonstrated in projects only during the last few years (Ternoey 1990). We call the approach Cool Daylighting.

The central challenge of daylighting in commercial buildings is to bring natural light into buildings without bringing in unwanted incident solar heat and glare, and without increasing construction costs. The technological innovation in response to this challenge is the adoption of advanced glass (spectrally neutral with high shading coefficients), innovative

low connected load electrical lighting design, appropriate architectural forms with physical shading, and down-sized HVAC systems matched to load.

We call this approach Cool Daylighting to differentiate it from daylighting design approaches that bring in unwanted solar heat, glare, and uncomfortable lighting contrasts, or from approaches requiring substantial first cost increases. It is common to find daylighting designs that bring too much light into a space. This creates light sources 10-50 times brighter than necessary, which in turn creates significant glare problems and actually reduces visibility. This glare renders the space less useful to people, while excess solar heat gains (which are space-cooling loads) negate all electric lighting energy savings.

Cool Daylighting as an integrated building approach can be characterized by a combination of building attributes as shown in Table 1. Most striking in Table 1 are the glazing specifications that use less glass than many typical office buildings with much lower light transmittance to control glare and contrast. For these and other reasons, an important feature of the Daylighting Collaborative as a market transformation approach is the development and use of demonstration rooms and case study buildings so that prospective building owners and designers can experience a cool daylit space.

Table 1: Cool Daylighting Performance Standards – Typical Office Building
(© 1999 LightForms LLC, Santa Barbara, CA – as reproduced in Daylighting Collaborative curriculum)

Orientation	Maximize north/south exposures
Building Depth and Form	Distance to window or clerestory $\leq$30 ft.
Glazing Specifications a. Clerestory b. View Glass (shaded)	General: low E, spectrally neutral a. 0.38 Tvis (visible light transmittance); $\leq$ 0.30 shading coefficient b. 0.23 Tvis; $\leq$ 0.25 shading coefficient
Electric Lighting	$\leq$1.0 W/ft^2, including task lighting 4100K lamps CRI of $\geq$ 78 < 10% harmonic distortion
Illumination Target Levels	Generally 30 to 60 footcandles. Assumes brightness is controlled, quality electric lighting, availability of window treatments, and task lighting.
External Shading	South, East and West as needed
Window Treatments	Dark, transparent shades as needed
HVAC Design	>500 ft^2 per ton; < 0.95 CFM/ft^2 or less
Transparency	75% + full time occupants have view to outdoors
Cost	No net construction cost increase
Maintenance	Significant lifetime reductions in cost

The Harmony Library in Fort Collins, Colorado, which is a Cool Daylighting design, is compared to a conventional building in Table 2 (Miller/Ternoey 1999). At equivalent construction costs, the Harmony Library provides greatly reduced annual energy costs and even greater reductions in peak kW.

Table 2. Harmony Library: Comparison between Base Building and Final Design
(© LightForms LLC, Santa Barbara, California)

Base Building		Final Design
	Lighting Capacities:	
1.50 W/ft^2	Day	0.45 W/ft^2
1.50 W/ft^2	Night	0.85 W/ft^2
0.57	Shading Coefficient	0.22
0.56	U-Value	0.33
$95.00	Construction Costs ($/ft^2)	$95.00
$30,082.00	Annual Energy Cost	$18,082.00
$1.00	$/ft^2 – first year energy	$0.60
181	Peak kW	87
36,500	Peak Fan CFM	21,000
65	Peak Fan HP	35
86	Peak AC Tons	50
228	Peak Heating kBtu/h	175

Reallocating construction funds from downsized and/or more efficient lighting and HVAC components often pay for most, if not all, of the Cool Daylighting design strategies in new construction. Cool Daylighting has demonstrated that it can reduce lifetime utility cost and peak building power demand by up to 50% or more in new buildings. Commercial construction in the United States is first-cost dominated. Construction innovations that improve the final product without increasing cost tend to be absorbed more readily into standard construction practices.

Programmatic Approach

The Collaborative's first task in designing a program was to review the successes and shortcomings of past daylighting programs (Pigg 1999). Two important program themes were identified by this review. The first was to focus on the issues of quality illuminance for the occupants and a quality building for the owner. The Daylighting Collaborative works to promote a quality of space that is equally as important as the energy savings achieved through daylighting. Therefore visual and thermal comfort are viewed as equally important as energy and an added benefit for the occupants and owner. The second theme was to emphasize the no or low increased first cost design features as described in the technological approach.

The review revealed various reasons for the limited success of past programs. First, some programs focused their resources on high profile, unique projects that had high construction budgets and different requirements compared to everyday buildings. They tended to be one-of-a-kind type projects, not the repeatable models of success needed to demonstrate daylighting in mainstream construction. Second, state-of-the-art design teams tend to demonstrate the state-of-the-art, rather than a logical starting place for market transformation efforts focused on typical designers and builders. These designs tended to be much too advanced, stifling interest due to complexity and fear of failure and fostered the myth that using daylighting must cost more and requires daylighting experts.

In taking a mainstream approach in the Collaborative's program design, the use of traditional design assistance and financial incentives were rejected. In order to take daylighting into mainstream commercial building design and construction, the program created customer friendly program elements with small and easily attainable steps. Our audience is wide and varied, from architects and engineers to developers and owners. In order to achieve relatively rapid and wide market acceptance of a daylighting design strategy it has to make economic/business sense. It has to be a simple design incorporating proven products and technologies and has to be extremely first cost conscious. Within this context, the Collaborative developed multiple program elements and strategies that are flexible and reach multiple points of the market chain. The typical commercial energy services market chain consists of (Guild 1998): equipment manufacturers, distributors, architect/engineer, contractor/installer, buyer/building owner/public official.

One of the advanced market transformation features of the Daylighting Collaborative is that it focuses on multiple points in the market chain using multiple program elements and with the participation of numerous players in the market chain or in ancillary organizations such as research entities, public interest groups, and government. Through this approach, the Daylighting Collaborative seeks to address a number of technical, economic, and institutional barriers to increased energy conservation in commercial buildings including:

Technical	Provide increased daylighting while eliminating unwanted solar gain
	Eliminate unwanted glare from use of natural daylight
Economic	Apply Cool Daylighting principles without increasing first cost
	Demonstrate and document the benefits of Cool Daylighting
	Dispell the myth that Cool Daylighting and other green building features must cost more
Institutional	Provide cost information as the building industry is highly first-cost sensitive
	Promote the incorporation of daylighting from the first schematic drawings due to limited time and resources available for design innovation in most projects
	Provide research and information for the risk-averse design community

Program Themes and Elements

In response to the barriers identified above and the lessons of past daylighting programs, the Collaborative has developed the following programmatic themes:

- **Do not reward first cost increases - emphasize no cost to low cost repeatable models of success.**
- **Avoid high profile/one of a kind projects - address "typical" or mainstream construction.** Focus on typical building design and construction.
- **Break the current dependency on daylighting experts.** Through education and training with the use of practical design templates, every designer is taught to incorporate daylighting into every design. They are taught basic daylighting design concepts for mainstream design.
- **Provide why-do and how-to trainings**. It is imperative to teach the "how to" along with the "why do" of daylighting and other environmentally responsible design practices.

- **Teach in steps - minimize risk and complexity.** Make the first step relatively easy. Focus on getting building owners and designers started and reaching a first level of success in every commercial building. However, this first step will anticipate state-of-the-art design.
- **Invite feedback.** While daylighting is a known design approach, it is not embedded in mainstream construction. Providing actual demonstration sites and inviting feedback from practitioners and building users are integral components of daylighting success, along with continuing research and evaluation.
- **Identify other benefits in addition to energy savings.** Understand and account for other benefits beyond energy savings including reduced environmental impact and potential human performance increases.

With the overall philosophy of daylighting every building and these themes in mind, the Daylighting Collaborative used its diverse and expanding group of partners to develop a market transformation program with the following program components to reach multiple points of the market chain:

Training and education. A deliberate decision of the Collaborative was to develop two distinct training curricula. "Why-do" for the building owner/decision maker and "How-to" for the design/construction professional. "How-to" technical trainings use a simple building block approach, utilize experiential learning, and incorporate visits to daylit buildings. The trainings are structured as one-day sessions for office building design or school design. They include an extensive course book and design work book. Advanced one-day trainings provide training on design tools that can be utilized in daylighting design applications. The goal is to provide participants with the knowledge to make a significant first step in daylighting their very next project. This is very significant in the fact that it is the Collaborative's intent to get every designer started, rather than create a handful of advanced experts. This is based on the experience that the majority of benefits are achieved with the adoption of basic design elements – from proper orientation to the correct glazing selections. Providing the basic technical information on how to reduce glare, reduce the size of lighting systems, lower incident solar loads and increase transparency will let every designer achieve significant energy savings while creating a quality space for the owner and occupants.

The "Why-do" sessions are designed to provide the owner *and other decision makers* with enough information to influence what elements they will require in new facilities. These training sessions are typically held at one of the demonstration sites and are designed as two hour breakfast or luncheon events to attract decision makers. Their purpose is to provide an opportunity for this audience to experience the daylit environment, learn about the basic design features, and learn why it matters, including learning and productivity advantages. Distance learning opportunities are being offered to expand the reach of the trainings. The Collaborative recognized a need to pull as well as push the market – to create demand as well as improve technical knowledge in order to effectively promote and provide daylighting design.

Demonstrations. The Collaborative advocates teaching through example. The best way to convince someone to use daylighting in buildings is to let them experience a successful daylit building. The Collaborative utilizes rooms and whole buildings for demonstration purposes.

Demonstration rooms or "copy" rooms (designers are encouraged to copy the simple demonstrated approaches in their own projects) are models of success that designers can replicate easily. Demonstration rooms for different building types are being located in various parts of Wisconsin, allowing convenient access by many people. The first set of rooms have been completed in Madison, Wisconsin while four other sets are under construction. The rooms are used to demonstrate, for example, several different ways to daylight small perimeter offices. People are encouraged to copy the solutions they prefer until they have the experience necessary to go beyond these basic demonstrations. Pending formal evaluation, this approach appears to be effective.

The second type of demonstration is a limited number of whole building case studies. These key case studies move beyond room design to whole buildings and may showcase some additional advanced daylighting strategies and techniques. These sites are carefully selected office and school buildings that show how beauty, efficiency and value can be gained without increasing first cost. Two key case study buildings have been completed: one in Appleton, Wisconsin (Hoffman Corporation headquarters) and one in Menomonie, Wisconsin (the office portion of an Andersen Window Corporation manufacturing plant). A third larger (350,000 square feet) case study has just started construction in Madison, Wisconsin. Pending final specification review, the Alliant Energy headquarters building will provide an example for large commercial buildings. Each demonstration room or case study is documented in design guidelines to encourage use in future projects. Operational data is being collected on the whole building case studies.

Design assistance. The Collaborative offers very limited design assistance. This is not typical design assistance. The intention is for it to serve as a type of safety net for designers. Those incorporating cool daylighting design approaches may work with Collaborative technical staff to provide a brief "second opinion" review of a daylit building design. This service is designed to catch design mistakes early on and prevent costly failures. To qualify for this assistance, owners and designers must take a daylighting training class and follow the Collaborative's design approaches. A very limited number of projects receive more extensive design assistance if they qualify as key case study sites. We are finding that this is an element that is evolving. Within the first year of the program, Collaborative technical staff have consulted on a minimum of twelve projects. As a result, we are developing a catalog of how daylighting is being incorporated into mainstream construction – with lessons learned from each one.

Marketing and information dissemination. When trying to influence both the designers as well as the decision-makers/owners, a comprehensive marketing plan is essential. The Collaborative has focused on a few elements for this: develop working relationships with key professional organizations (both on the design side and the owner/decision maker), communicate and collaborate with other organizations working towards similar goals, work within existing forums (such as existing conferences, professional chapter meetings, etc.), and develop a few key marketing pieces in conjuncture with an extensive web site. The web site *(*www.daylighting.org*)* is used to house the information about the program and the design approach and promotes the various projects around the country that incorporate the Cool Daylighting approach. As the program continues to grow, the offerings of the site will

continue to expand, including individual pages for participating states (New York (NYSERDA) and Iowa (Iowa Energy Center) have joined the Collaborative).

Additionally, the Collaborative places much focus on working with other organizations working towards similar goals. This is done both in an effort to effectively cross promote each other's initiatives but also to reduce or eliminate duplication of efforts. Working together is the defining strategy of the marketing efforts of the Collaborative.

Research and development. Market transformation programs are usually viewed as being deployment efforts. If one is attempting to introduce new design approaches (potentially with new technologies) as powerful market options to compete and even take over a market, research and development are often necessary. This is proving to be the case in the Daylighting Collaborative in a number of areas. For example, it is usually impossible to have experimental control in a daylit-designed building or room because one rarely builds the identical building or room without the daylit features. Thus, modeled results and the performance of new daylit buildings are heavily relied upon. To back up the modeling analysis, the Collaborative is coordinating with the Iowa Energy Center to measure the impact of specifications against controls by using the Energy Resource Station.

Other Collaborative research areas potentially include development and testing of new glazings working with glass and window manufacturers, the development with a ballast manufacturer of more cost effective dimmable ballasts matched to the specified lighting systems, and with the Lighting Research Center the development of methods to measure human response and performance. These R&D activities will serve to answer questions raised during ongoing evaluation of the Collaborative as a market transformation program.

Evaluation. Any sustained market transformation requires evaluation activities to measure the performance of various program elements and the success in moving the market place to different behaviors, including pre determined market transformation targets. A full program evaluation is now underway but is not scheduled for completion until early 2001. An evaluation is done for each training event and are showing the program training events to be the most highly rated of the Energy Center of Wisconsin's seventy annual training events. A survey of course attendees after six months is done to ascertain their use of the training experience and specifications in their projects.

Early program implementation is drawing a powerful response in the market place in terms of the number of buildings being designed by program trainees that are including Cool Daylighting. An evaluation of the program (Hagler-Bailly 2000) for the Focus on Energy Program in Northeast Wisconsin shows a 17 to 25% increase trainee respondents reporting they are incorporating Cool Daylighting guidelines in their projects. The Wisconsin Department of Administration Division of Facilities Development has also announced that it "is beginning to take steps to introduce daylighting into the design of every new and remodeled state building project (Sokal 2000)." The Division has requested the Daylighting Collaborative's assistance in developing guidelines. Other response from the commercial market place includes the support of the Wisconsin Chapter of AIA and the interest of manufacturers. Other evaluation efforts are planned in New York on human response at demonstration rooms in schools and at an office building.

Adaptive Management of Program Elements

Dynamic optimization is a programming technique that makes optimal choices as a program moves through time. In essence, the Collaborative is attempting to manage the content and delivery of program elements through time so as to have the greatest market transforming impact. The Northwest Energy Efficiency Alliance aptly calls this adaptive management. As the program develops and matures, it is anticipated that the mix of program efforts will change over time as well as the content of each individual program element. During its first year, the Daylighting Collaborative focused on completing design specifications, developing and offering training events, and establishing a web page. As the collaborative completes its second year, it has added demonstration sites as a priority as well as improvements in the training offerings and a distance learning option. It is already becoming evident that the level and amount of design assistance at Case Study sites will be less than anticipated in that more new buildings meeting much or all of the Cool Daylighting specification are being constructed sooner than had been anticipated. With these Case Study sites now available, the program is currently trying some decision-maker training events. These events and the decision of the state to adopt daylighting in state projects, may require program adjustment in terms of more training as well as the development of formal design guidelines for state procurement. In its third year, the collaborative will add some R&D activities such as the room performance measured against controls, a national expert panel review, and human performance methods development. The value of the numerous program elements and collaborating partners is the ability to work with and respond to market needs in a dynamic manner.

Comparison of Market Transformation Programs

We have suggested that what makes the Daylighting Collaborative an advanced market transformation program and distinguishes it from basic market transformation programs is both the number of partners as well as the range of program elements meeting various needs in the commercial energy services market chain. Table 3 is a summary comparison of eighteen market transformation programs in terms of ten potential program elements and thirteen types of collaborating entities or partners.[1]

What is immediately striking about the table is the growing complexity of market transformation programs in terms of the breadth of program elements and partners. This growing complexity is evidence of the movement in market transformation from basic to advanced approaches. The longer duration of the programs and the substantial size of the budgets are required to support advanced market transformation and have a substantial impact on the market place. Most of the budgets are well in excess of $1 million. The Daylighting Collaborative, the NEEA WashWise program, and the NEEP Tumble Wash and the Motors programs appear to have the greatest number of elements and partners. The latter two programs target a single technology and carry high price tags due to the use of substantial financial incentives. Other programs have decreasing numbers of program elements. Whether the wealth of elements and/or participants will result in demonstrably

[1] Information in Table 3 was derived from program descriptions posted on either the sponsoring organization's web site, the program's web site, or various program written material. Any omissions or misrepresentation of the information are not intentional.

more effective market transformation is a question that will require *ongoing* evaluation as these programs play out and evaluations are consistently done across these programs. Lacking this information, some observations can be made based on the patterns in the table and other program information.

One of the important issues in comparing these programs is the use of substantial incentives in some of the programs. Financial incentives can be costly to use and raise issues of developing a dependency in the market place on these incentives. They may, however, be a useful program element as a marketing strategy. As noted in Table 3, the Daylighting Collaborative funding levels for Wisconsin are about $1.5 million for the first three years compared to $9 million for the Wash Wise program in the Northwest and $14.6 million for the NYSERDA new construction program.

The Daylighting Collaborative was deliberately designed to appeal to existing economic incentives in the commercial building market and use multiple program elements and partners to transform the market. The implicit incentives are the provision of trainings at below the cost of production (under $200 for one-day training sessions) and the limited design assistance. The early results described previously provide some evidence that this strategy is viable, but the ongoing evaluation will provide considerably more evidence. A confounding factor in making comparisons between these programs is the considerable differences in the market transformation targets. For example, the Daylighting Collaborative has a broad agenda for most commercial buildings whereas the Washwise program is targeted at one appliance in the home.

Comparisons of the of the Daylighting Collaborative effort to other daylighting efforts or new construction programs in Table 3 reveals that the Collaborative seems to have a strong focus to bring in a broad set of partners. The other programs appear to be narrower in that respect. Most programs have design assistance, although the Collaborative provides less. Most of the other programs rely on financial incentives. Finally, the Collaborative seems relatively unique in emphasizing a mass market, common starting point applicable to most buildings. It is essential to establish market baselines, performance metrics, and perform evaluations to understand the role and value of the various market transformation program elements and partnering arrangements.

Conclusion

The Daylighting Collaborative is designed as an advanced market transformation program with multiple elements, partners, and targets in the market chain. Through its programmatic elements and integrated building approaches it is working to meet identified commercial building market needs by assisting the market to create high performance daylit buildings that are first cost competitive in the marketplace. These buildings are intended to provide quality space that is comfortable and inviting to its occupants. It is too early in the course of the Daylighting Collaborative to know the rate and extent to which the commercial building market place will adopt Cool Daylighting. Early responses and activities by architects and engineers that have attended the trainings, as well as the first Cool Daylighting buildings reaching completion in Wisconsin and elsewhere that have been influenced by the Collaborative indicate a strong market response. The decision by the State of Wisconsin to adopt Cool Daylighting in all future new and rehabilitation projects is another strong indication of market response. The Collaborative will need to adaptively manage its program

elements over the coming years in response to these outcomes and opportunities. The decision on state buildings requires a new design guideline effort and possibly more training to meet a demand that is likely to be spurred by the state guidelines.

The Collaborative has deliberately chosen to use a broad set of program elements and partners in place of incentives. While this feature set the Collaborative apart from many other advanced market transformation efforts, the Collaborative shares many common features. Many current market transformation efforts appear to be adopting more diverse sets of programmatic offerings and broader set of partners. It is the combination of these more developed programs, wider partnering arrangements and adaptive management over the longer term that characterizes advanced market transformation.

From a strategic perspective, the most distinguishing feature of the Collaborative is the use of a very basic starting point from a technology and integrated design perspective. This provides a basic starting point for the adoption of daylighting in all commercial buildings. This aspect of the program is a critical departure from most other daylighting programs. This strategy combined with adaptive management of an expanding set of program elements and partners across the United States make the program rather unique. What the final accomplishments will be will need to be evaluated. Evaluation is underway to determine the performance and value of the programmatic efforts as well as the impact on the market place. Market tracking and evaluation are essential to both determine how this evolving program succeeds and fails, and to inform the development of advanced market transformation program design.

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* Notes on financial incentives

NEEA — Energy Star Clothes Washers. Consumer rebates were discontinued as of September 1998, although a number of electric, water, and wastewater utilities in the Pacific Northwest are still offering their own incentives as part of their local energy and water efficiency programs. These incentives range from loans (0 - 6% interest) to cash rebates ($50 - $175) or credit ($40 - $50) toward utility bill.

NEEA — Energy Star LightWise. Incentives are provided to manufacturers of compact fluorescent bulbs (CFBs). These incentives are designed to "buy-down" the shelf price of CFBs and leverage marketing and advertising for program products.

NEEP — Tumble Wash. Rebates of $50 - $150 are available from participating utilities.

NEEP — Premium Efficiency Motors. This program combines rebate and incentive programs from many participating utilities throughout the northeast into a single program. The program provides a rebate with the purchase of a qualifying three-phase motor. The rebate amount varies with the type and size of the motor.

Wisconsin Energy Star Appliances/Lighting. Cash-Back Rewards are available from participating Wisconsin utilities on the purchase of any eligible high-efficiency clothes washer and/or ENERGY STAR rated lighting product. Cash rewards of $50 are available for clothes washers. Cash rewards of $5 are available for light bulbs, $15 for fixtures, and $20 for torchieres.

Wisconsin Energy Star Homes. Energy Star Homebuilders will provide a coupon worth $200 to homebuyers who choose to purchase an ENERGY STAR refrigerator, dishwasher, and clothes washer for their new home.

Savings By Design. Financial incentives are available to building owners when the efficiency of the new building exceeds the minimum Savings Be Design thresholds, generally 10% better than Title 24 standards. Financial incentives are also offered to design teams to support the extra effort for integrated energy design and to reward exceptional design accomplishments.

NYSERDA – New York Energy $mart SM New Construction. Financial incentives are available for whole building design, buildings rated as "green buildings," custom measures, prequalified equipment, and equipment replacement. $10.6 million of the $14.6 million budget is available for capital cost incentives.

Table 3. Comparison of Market Transformation Programs

Programs	Program Elements										Partners										Govt.			Budget
	Spec/Design Guide	Web site	Ed/Training	Demonstrations	$ Incentives *	Research & Dev.	Bulk Procurement	Design Assistance	Advertising	Labeling/Cert.	Manufacturers	Distributors	Builders	Contractor/Installer	A&E / Consultants	Retailer	Public Interest Org	IOU	Municipal Util./Coops	Customer	Fed	State	Local	
ECW																								
WI Daylighting Collaborative	x	x	x	x		x		x			x				x		x	x	x	x		x		1.6m (3 yrs)
Compressed Air Challenge	x	x	x								x	x			x			x		x	x	x		965K (3yrs)
NEEA																								
(Energy Star:Clothes Washers Wash Wise)		x	x		x				x	x	x					x	x	x	x		x	x	x	9m (3 yrs)
Energy Star: LightWise		x			x				x	x	x					x	x				x			2.5m (21/2 yrs)
Architecture + Energy		x	x												x		x	x				x		.5m (2 yrs)
Commissioning Public Bldgs.	x	x	x	x		x									x							x		1.9m
Efficient Bldg. Practices						x							x		x		x				x	x	x	6m (3 yrs)
NEEP																								
Tumble Wash		x	x		x	x			x	x						x	x	x	x			x	x	10.8m (2yrs)
Premium Efficiency Motors	x	x			x	x			x			x				x	x	x				x		2.7m (2 yrs)
DesignLights	x		x														x	x	x		x	x		
Other Wisconsin Programs																								
Energy Star: Appliances/Lighting		x			x						x					x	x	x	x		x	x		2.7m (1 yr)
Energy Star Homes		x	x		x				x	x			x				x				x	x		
Other Programs																								
Energy Design Resources	x	x	x					x										x				x		
Savings By Design		x			x			x										x						
PGE Daylighting Initiative	x	x	x	x														x						
NYSERDA New Construction			x	x	x			x	x		x				x							x		14.6m (3 yrs)
Bldg Design Assist FSEC		x		x		x		x														x		

Any omissions or misrepresentation of the information in this table are not intentional.

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