LIGHTING DESIGN LAB
MARKET PROGRESS EVALUATION
REPORT

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EXECUTIVE SUMMARY

This Market Progress Evaluation Report (MPER) summarizes the findings from an evaluation of two related market transformation initiatives of the Northwest Energy Efficiency Alliance (Alliance): the Lighting Design Lab (LDL) and the BetterBricks Daylighting Lab (Daylighting Lab in Seattle). The scope of this evaluation includes activities from mid-2000 – mid-2002.

Overview

The LDL was founded by the BPA and Seattle City Light (SCL) in 1989 to provide information, training and demonstration of state-of-the-art lighting design and products in order to promote energy efficiency in buildings. The LDL provides educational programs, technology displays, consultations, and facility-based evaluation tools to lighting professionals who make or influence decisions with respect to commercial and industrial buildings – architects, lighting designers, interior designers, electrical engineers, building owners, facility managers, and facility engineers. LDL consultants conduct workshops and provide lighting consultations to professionals on-site and at remote locations. There are product demonstrations, information and displays, and a 1200 square foot mock-up area. The LDL is operated by SCL with major funding provided by the Northwest Energy Efficiency Alliance, a non-profit group of electric utilities, state governments, public interest groups and efficiency industry representatives. SCL also provides substantial in-kind support to the LDL, including computer services and the funding of three staff positions. Other utilities also provide small amounts of funding.

The Daylighting Lab, administered under a separate contract with the University of Washington, is housed at the same facility as the LDL and has begun to coordinate with LDL staff. The Daylighting Lab provides a similar array of consultations and education, as well as daylighting simulation modeling services. The Daylighting Lab has a staff of two professional and several support positions that are filled, in part, by graduate students from the University of Washington Department of Architecture.

Key Findings

Key findings from this evaluation include:

- **Increased use of LDL and Daylighting Services** – As shown in Figure ES-1, both LDL and the Daylighting Lab have expanded their services across the board. The LDL and Daylighting Lab have each continued to provide a wide range of services throughout the region, including electric and daylighting consultations, mock-ups, classes, and information resources. Both the Daylighting Lab and LDL have significantly increased the number of consultations provided.

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1 The scope of this report does not include the BetterBricks Portland Daylighting Lab, which commenced operation in October, 2002, and is also supported by the Alliance.
Figure ES-1: Trends in LDL and Daylighting Lab Services

- **Classes Well Received** – We conducted a thorough review of course evaluations and, by all accounts, LDL courses are very well received. These evaluations indicate that class participants are highly satisfied with the course offerings and experiences. Staff members are supportive of the change to a course curriculum based upon the Advanced Lighting Guidelines. This approach provides a solid set of reference materials and will be updated as necessary, thereby ensuring that LDL courses are kept up to date with minimal effort.

- **New Database Anticipated** – The Alliance plans to implement a new data tracking system for both the LDL and the Daylighting Lab during 2003. This is important because current information management systems for both the LDL and the daylighting programs are not sufficient for tracking project information necessary to support the Alliance’s market transformation and evaluation objectives.

- **Success of Daylighting Lab Marketing Approach** – The peer-to-peer marketing approach utilized by the Daylighting Lab is successful in developing relationships with key architects in the region and ensuring timely intervention in projects. However, because the approach has been directed almost exclusively at architects there has been minimal contact with or influence on other important groups such as electrical and mechanical engineers. There are indications that the same relationship-based approach may be effective with these other groups, but that it will need to be tailored to the needs and work patterns of each target audience. During 2002, the LDL also started to use this
relationship-based marketing approach, including enhanced coordination of marketing efforts with the Daylighting Lab.

- **Electric Lighting Consultation Market Impacts** – Interviews with electric lighting project participants indicate a very high level of satisfaction with LDL electric lighting consultations. However, many consultations are conducted on behalf of utility account representatives or directly with the end user; architects, lighting designers, and other design professionals are not typically involved. Because of this, it is not clear whether these projects will play a significant role in transforming the market. The market impact of such consultations may be improved if, for example, up-front screening and project follow-up are undertaken.

- **Daylighting Consultation Market Impacts** – Daylighting participants have given very high marks to the daylighting consults and their services. Better quality daylighting projects are resulting than would have resulted in the absence of the program. Though not purposely targeted, daylighting projects are concentrated in schools and offices, whereas technical potential for daylighting energy savings is higher in other building types. Energy savings for current projects is difficult to estimate.

- **Electrical Contractors as a Potential Market** – Interviews with electrical contractors indicate that they are potentially interested in services provided by the LDL, but are not likely to seek out these services in a proactive manner. This suggests that marketing and outreach efforts to this target market should be modeled on ways in which other vendors work with these contractors. Manufacturers’ representatives, for example, often provide on-site product demonstrations and information seminars, thereby minimizing interference with day-to-day workflow.

**Key Recommendations**

Key recommendations from this evaluation include:

- **Development of a Strategic Marketing Plan** -- During the course of this evaluation, the Alliance launched its Commercial Buildings Initiative (CBI). During the almost two-year development process of CBI, the LDL and Daylighting Labs operated without specific strategic direction from the Alliance. Such direction is critical, particularly in the areas of marketing and service definition, if these programs are to achieve their full potential. Development of a strategic direction will require the Alliance and the labs to work together to identify specific target markets and develop concrete marketing mechanisms for reaching these target markets. Within the development of this strategy, the following elements should be considered:

  - **Refined Definition of Services Offered** -- At present, the LDL provides a very flexible set of hands-on services including electric lighting design consultations and electric lighting design mock-ups. Each of these services is intended to provide designers and other interested parties with information that may be used to help inform their lighting design projects. While the flexible service approach
has served the LDL well in an infrastructure capacity, a refined definition of services for both the LDL and the Daylighting Lab will create greater clarity in the marketplace and enable staff to focus their consulting efforts with customers. Specifically, we encourage the labs to identify three to four specific levels of service offerings for clients, each of which includes a clear explanation of what clients can expect from each service.

- **Screening of Projects for Consultations** -- Concurrent with a refined definition of consultation services, the Alliance and LDL should define a way to screen projects so that consultation services are provided mainly to projects likely to have secondary effects in the broader market. On a related note, LDL should consider placing expectations upon the customer in return for the value of services received from the LDL. For example, if mock-up services are provided, the LDL might require that it be allowed to review the overall lighting strategy and provide efficiency-related comments on this overall design.

- **Expanded use of Proactive Marketing** -- With respect to electric lighting consults, the LDL presently serves in a relatively passive capacity, responding to referrals, telephone inquiries, and walk-ins, supplemented by some general awareness advertising and mentions by instructors during LDL courses. Conversely, the daylighting consultation approach has been more proactive in identifying firms with which it wishes to work and marketing directly to these firms. This is typically accomplished through a low-key brown bag seminar, followed by a question and answer period that often starts to involve the daylighting consultant in current design projects. As a result of this effort, the daylighting consultants are able to work more closely with project architects early in the design process; that, in turn, provides a better chance for influencing the design. The LDL has taken steps in recent months to implement a similar approach, based upon a territory-based account representative approach. The Alliance and LDL should build upon this approach as a key element of the marketing strategy.

- **Customer Follow-up** – More active follow-up with customers will help to ensure that all questions are answered and pave the way for further involvement in future significant projects. Follow-up procedures for all services should be formalized for both LDL and the Daylighting Lab.

- **Targeting Electrical Contactors and Engineers** -- Two audiences that have thus far not been actively approached by either LDL or the Daylighting Lab are electrical contractors and engineers. The marketing strategy to reach these audiences and recruit them into the program will necessarily be different from the strategies used to reach architects and lighting designers. Having a professional architect marketing to architects has worked well on the daylighting side. LDL and the Daylighting Lab should explore equivalent ways of working with the contracting and engineering professions.
- **Development of a Truly Integrated Approach** -- In developing an integrated approach to energy efficient design, the Alliance and the labs need to develop procedures to ensure that the daylighting and electric lighting components (as well as HVAC and others) are integrated as fully as possible. As an example, when a daylighting project enters the system, the client could also be provided with a description of services related to electric lighting and a meeting could be set up with the electric lighting consultant and the electrical engineer working on the project. Similarly, the LDL staff should ensure that mechanical engineers are brought into the process in a way that will ensure that decreased lighting loads are reflected in the heating and cooling load calculations for the building. Steps have been taken during the past six months to increase such interaction, but these efforts need to be increased and formalized to ensure success.

- **Improved Information Management** -- The present information management system serves largely to track time spent on various activities and to produce reports for the Alliance. To optimize their involvement with and integration into the Commercial Buildings Initiative the labs need to track project contacts and project information in greater detail. A master database is being developed for the Alliance BetterBricks Advisors Service that will likely serve this purpose quite well. Plans to require its use for LDL and the Daylighting Lab should be carried out and its use monitored extensively for the first six months.


**SECTION 1: INTRODUCTION**

1.1 Overview

This Market Progress Evaluation Report (MPER) summarizes the findings from an evaluation of two related market transformation initiatives of the Northwest Energy Efficiency Alliance (Alliance): the Lighting Design Lab (LDL) and the BetterBricks Daylighting Lab (Daylighting Lab in Seattle). The scope of this evaluation includes activities from mid-2000 – mid-2002.

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Following this introduction, the report provides:

- Project History Update
- Summary and Review of LDL and Daylighting Lab Services
- LDL Administration
- Electric Lighting Case Studies
- Daylighting Lab Participant Research and Case Studies
- Surveys with Non-participant Electrical Contractors
- Summary and Recommendations

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2 The scope of this report does not include the BetterBricks Portland Daylighting Lab, which commenced operation in October, 2002, and is also supported by the Alliance.
1.2 Evaluation Objectives and Methodology

This study was designed to address the following research objectives:

- **Program activity** – Provide an update of the program history and activities since the last MPER;

- **Classes** – Review classes, including feedback evaluations, fee structure, new course structure, and use of national figures to teach classes;

- **Website** – Review and assess the website;

- **Information management** – Review and assess the database and information management system, including data quality, usefulness, and capabilities to support program evaluation;

- **Non-participants** – Explore issues related to non-participation of electrical contractors;

- **Marketing** – Assess the transferability of the marketing outreach approach used by the Daylighting Lab for achieving the mission of the LDL;

- **Consultations** – Explore and document how the consultation processes are undertaken, including a characterization of successful projects and lessons learned;

- **Daylighting consultations** – Explore the success of daylighting initiatives and understand the impacts of the consultation and modeling services that are offered;

- **Daylighting impacts** – Assess daylighting energy savings and prepare case studies documenting how daylighting consultations are conducted; and

- **LDL and Daylighting Lab Role within CBI** – Assess the role of the LDL and Daylighting Lab within the Commercial Buildings Initiative (CBI) and make recommendations relevant to ensuring the success of these initiatives.

In conducting this evaluation, the following research was completed:

- **Review of program documentation** – A thorough review of available program documents was undertaken, including status reports, meeting minutes, monthly reports, course schedules and evaluations, database reports, and website statistics.

- **Program interviews** – Interviews were completed with Alliance staff, the LDL program manager, three LDL commercial lighting consultants, the daylighting program manager, two LDL mock-up facility staff, and the librarian/webmaster for both programs.
Interviews with Technical Advisory Committee (TAC) members – Ten TAC members from around the region were interviewed to solicit feedback and input on the TAC process and LDL operations;

Information system review – A detailed review of the program database was completed, as well as interviews with key staff to assess both usefulness and functionality;

Website review – A detailed review and analysis of website usage trends and statistics was undertaken;

Class review – A detailed review and analysis of LDL and Daylighting Lab class attendance and course evaluations was completed, including a comparison of course evaluation results across the various classes;

Electrical contractor interviews – In-depth interviews were conducted with electrical contractors, predominantly those who have not participated in LDL activities, in order to understand the information needs of this market and identify ways to better target these needs;

Electric lighting consultation case studies – In-depth case study interviews were conducted to document successful projects undertaken by the LDL involving electric lighting consultations. Interviews were completed with project staff and with the end-user participants to document the consultation process and highlight expected results;

Daylighting consultation surveys – A broad-based survey was conducted with daylighting consultation clients to document project characteristics, current project status, and assess user experiences;

Daylighting consultation in-depth interviews – Follow-up in-depth interviews were conducted with a sub-sample of daylighting participants for the purpose of conducting a detailed review of specific project details and assessing potential energy savings resulting from the consultations.
SECTION 2: PROJECT HISTORY UPDATE

2.1 Summary of Activities

Table 2.1, below, provides a summary of LDL and Daylighting Lab activities during 1998–2002.

Table 2.1: Summary of LDL Activities 1998-2002

<table>
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<tr>
<th>Activity</th>
<th>1998 Total</th>
<th>1999 Avg/ Month</th>
<th>2000 Total</th>
<th>2000 Avg/ Month</th>
<th>2001 Total</th>
<th>2001 Avg/ Month</th>
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<td>10</td>
<td>62</td>
<td>5</td>
<td>102</td>
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<tr>
<td>Tours - People</td>
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<td>50</td>
<td>630</td>
<td>53</td>
<td>431</td>
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<td>641</td>
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<td>Classes - Number</td>
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Several trends have emerged over the past two years as shown in this table:

- The number of classes, as well as the total number of individuals attending classes, has increased.
- The average number of consultations per month has increased significantly for both the LDL and for the Daylighting Lab.
- The number of mock-ups has remained relatively low, averaging two per month, indicating that this LDL resource is perhaps underutilized.

2.2 Overview of Recent LDL and Daylighting Lab Developments

Over the past few years, the LDL and the Daylighting Lab have undergone several changes. These include:

- Transition to Seattle City Light employees
- Updated curriculum for lighting classes
- Charging fees for classes
- Use of a professional writer to augment articles
- Shifting away from residential lighting
- Staffing changes and augmentation
Transition to Seattle City Light Employees – In December of 1999, the LDL’s Steering Committee decided the best long-term organizational strategy for the LDL was to have staff employed directly by SCL rather than through a third party contract as was done previously. Feedback from LDL staff reflects a generally positive and smooth transition. One difficult issue for them has been adjusting to the policy of SCL of no overtime or compensation time. Employees must fit 80 work hours into a two-week period, which must include travel time when consultants are on the road with classes, thereby sometimes limiting the amount of time that may be devoted to consultation activities.

Updated Curriculum for Lighting Classes – The LDL recently changed its class curriculum and now uses the *Advanced Lighting Guidelines: 2001 Edition* (ALG) produced by the New Buildings Institute, Inc. The ALG creates a sequential curriculum, with classes building upon each other. The idea behind a sequential curriculum is to attract regular attendees and build loyalty, as well as to broaden and strengthen the topics taught.

Charging Fees for Classes – In 2001, the LDL decided to charge $20 for all two-hour LDL classes, with the ALG text included in that fee. The idea of charging for classes was intended to obtain a more formal commitment from class attendees (i.e., if someone pays for the class, they’ll be more likely to attend and be more interested in the subject matter). According to staff feedback, this may not necessarily be the case. Some staff members report that people are more likely to attend if they pay, but are not necessarily more interested in the subject matter. Regardless, the cost is nominal and does not appear to be a critical issue.

Use of a Professional Writer to Augment Articles – As an independent contractor, a lighting designer from New York named Craig DiLouie, has been working with LDL staff members to write articles for the newsletter and for general dissemination via the LDL website. The LDL has contracted with DiLouie for 20 technical articles.

Shifting Away from Residential Lighting – In 2000, the Alliance directed the LDL to focus on commercial lighting markets and to not spend time or resources addressing residential lighting. Previously, the LDL had maintained one staff person for residential inquiries and consultations. According to LDL staff, the transition from dealing with residential to exclusively commercial lighting has been smooth and positive. A small number of questions regarding residential lighting are still received, and these are usually answered over the phone if they do not require more than a few minutes of staff time.

Staffing Changes and Augmentation – One of the commercial consultants of the LDL left for another job in May, 2001 and was replaced by Shaun Darragh in September of 2001. Shaun was previously a professional lighting consultant with NBBJ Lighting, a lighting design firm affiliated with the Seattle-based architectural firm NBBJ. Additionally, the Daylighting Lab added a research associate position for daylighting in order to ease the time demands placed upon the primary daylighting consultant. This position is shared by two graduate students from the University of Washington School of Architecture. In addition to on-going project work, it is envisioned that this new position will also take on the Puget Sound area as a marketing representative for the Daylighting Lab and create stronger ties within the region.
2.3 Actions Taken on Previous Evaluation Recommendations

Our previous interim evaluation of the LDL provided specific recommendations grouped into two broad categories: (1) LDL Outreach Strategy, and (2) LDL Operations.

2.3.1 Outreach Strategies

In the area of LDL outreach strategy, we recommended that the LDL expand its technical assistance outreach (electric lighting consultations and mock-ups) and utilize a more proactive outreach approach (based upon the Daylighting Lab model). Both of these recommendations were recently implemented, in part, through the establishment of staff responsibilities that are aligned in a territory-manager strategy. Within this strategy, the LDL envisions that proactive outreach will be undertaken with key firms in the target market.

Another recommendation focused on the TAC process and, specifically, on ensuring that the members on the TAC could truly provide the strategic input necessary to ensure the successful development of the LDL. Based upon observations of TAC meetings, as well as the interviews conducted with a subset of TAC members, the TAC process has improved. One gap that appears to remain is that of representation by professionals who have experience using the electric lighting and mock-up services (as opposed to the Daylighting Lab services). In order to focus on integrated lighting solutions, it will be increasingly important to have TAC members who are able to contribute to this objective.

One outreach strategy that we identified in our earlier MPER was for the LDL to sponsor ongoing informal roundtable lunches throughout the region. We continue to believe that such a venue would provide the LDL with increased visibility and, at the same time, help to facilitate valuable networking opportunities among lighting professionals interested in energy-efficient design.

2.3.2 Lab Operations

Four recommendations were offered in the previous MPER regarding the operation of the LDL: (1) explore options for a contact management system, (2) expand class and service evaluation forms, (3) modify status reports to include an analysis of trends, and (4) monitor website user navigation trends.

Shortly after the last MPER, the LDL initiated a process to design a contact management system that would serve as the focal point for tracking LDL activities in the marketplace. For a variety of reasons, including problems with the selected contractor, this project stalled and did not produce a contact management system for the LDL. However, the LDL used SCL staff to produce a database that satisfied the basic reporting requirements.

Class evaluation forms were expanded and utilized in all of the LDL education classes.
Feedback forms for other participants (electric lighting consults, Daylighting consults) have not been implemented, in part, because of an Alliance request that this be delayed pending results
of the evaluation. Monthly status reports have not been modified to include an analysis of trends as was recommended. Website use has been monitored on a regular basis using software purchased for this purpose.
SECTION 3: SUMMARY AND REVIEW OF LDL AND DAYLIGHTING LAB SERVICES

The Lighting Design Lab and Daylighting Lab provide the following core services, each of which is discussed below:

- Classes
- Web-based information resources
- Consultations
- Mock-ups (LDL only)
- Modeling studies (Daylighting Lab only)

3.1 LDL and Daylighting Lab Classes

Daylighting and electric lighting design classes are provided in Seattle and in various locations throughout the Pacific Northwest region. Provided below is a summary of research related to these courses.

3.1.1 2001 Course Offerings and Attendance

In 2001, the Lighting Design Lab and Daylighting Lab conducted 52 formal classes covering 12 different lighting design topics attended by 947 students. In addition, numerous informal seminars were also provided (most notably in the area of daylighting) to approximately 500 people. 2001 also marked a change in course curriculum. The LDL switched from its own curriculum to the Advanced Lighting Guidelines: 2001 Edition (ALG) lighting design text as the basis of all classes. This switch was made because the ALG provides a sequential approach to the training curriculum and because it enables the LDL and the Daylighting Lab to utilize a variety of training materials (including textbooks) that are available electronically and updated periodically to ensure that state-of-the-art design techniques and technology are included. This is expected to result in cost savings over time as the labs will not have to spend their own time and resources required to develop updated curriculum.

Table 3.1, below, provides a summary of course attendance, by location and type of course held during 2001, the most recent year for which complete data were available at the time of the evaluation. (Note that these are formal course offerings and do not include informal in-office seminars and presentations. For the Daylighting Lab, these informal activities constitute a large part of the overall work conducted).
Table 3.1 – Formal LDL Courses: 2001 Location & Attendance

<table>
<thead>
<tr>
<th>Class Name</th>
<th>Seattle</th>
<th>Seattle</th>
<th>Callison</th>
<th>Seattle</th>
<th>Vandervort</th>
<th>Seattle</th>
<th>Guastler</th>
<th>Portland</th>
<th>Boise</th>
<th>Spokane</th>
<th>Eugene</th>
<th>Bozeman</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daylighting 101-Schematic Design</td>
<td>23</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>149</td>
</tr>
<tr>
<td>Daylighting 102-Physical Modeling</td>
<td>12</td>
<td>18</td>
<td></td>
<td>23</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>Daylighting Forum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Daylighting Seminar</td>
<td></td>
<td></td>
<td>12</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Sub-Total</td>
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<td></td>
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<td>26</td>
<td>12</td>
<td>10</td>
<td>55</td>
<td>90</td>
<td>38</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>266</td>
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<tr>
<td>Controls &amp; Commissioning</td>
<td>13</td>
<td>15</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>35</td>
<td>31</td>
<td>42</td>
<td>24</td>
<td></td>
<td>160</td>
</tr>
<tr>
<td>Lighting Audit Retrofits &amp; Calculations</td>
<td>44</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>33</td>
<td></td>
<td>16</td>
<td>93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Lamp &amp; Ballast Technologies</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>38</td>
<td></td>
<td>*</td>
<td>22</td>
<td></td>
<td>86</td>
</tr>
<tr>
<td>Lighting for Assisted Living and Multifamily</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>13</td>
<td>21</td>
<td>9</td>
<td>14</td>
<td>12</td>
<td>74</td>
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<tr>
<td>Efficient Lighting Basics Class</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
<td>9</td>
</tr>
<tr>
<td>ALG: Energy Impacts &amp; Policies</td>
<td>14</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>16</td>
<td>19</td>
<td></td>
<td>72</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALG: Lighting &amp; Human Performance</td>
<td>21</td>
<td>*</td>
<td>10</td>
<td>10</td>
<td>24</td>
<td>19</td>
<td></td>
<td>84</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALG: Lighting Design Considerations</td>
<td>33</td>
<td></td>
<td>16</td>
<td>17</td>
<td>10</td>
<td>16</td>
<td>11</td>
<td>103</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Total</td>
<td>165</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>47</td>
<td>131</td>
<td>103</td>
<td>112</td>
<td>112</td>
<td>123</td>
<td>123</td>
<td>123</td>
<td>681</td>
</tr>
<tr>
<td>TOTAL</td>
<td>200</td>
<td>26</td>
<td>12</td>
<td>10</td>
<td>102</td>
<td>221</td>
<td>141</td>
<td>112</td>
<td>112</td>
<td>123</td>
<td>123</td>
<td>123</td>
<td>947</td>
</tr>
</tbody>
</table>

*Classes were held, attendance was not recorded

As shown in this table, Boise had the greatest level of class attendance throughout the year, followed closely by the LDL in Seattle. Class attendance in Portland was noted to be lower than anticipated. This was attributed, in part, to offering the classes in Tualatin, a suburb of Portland, a location out of the way for design professionals working in downtown Portland.

### 3.1.2 2001 Course Evaluations

Course evaluation summaries for 2001 were made available to the evaluation team and served as the basis for this analysis. The class evaluation form used by the LDL for these classes is comprised of eight questions. The first four questions ask about the instructor’s presentation, clarity of information presented, usefulness of information and class material expectations ranked on a scale from “outstanding” to “poor.” Questions five through seven ask what topics participants liked best and least about the class, as well as what other topics participants would like to have covered. Question eight asks if students would be interested in classes via the Internet.

Participation in this course evaluation process is quite good: in almost half of the classes taught in 2001, 75% or more of the class attendees filled out an evaluation form. In an additional 33% of the total classes taught, at least 50% filled out a class evaluation. The high completion rate implies that students have a strong interest in these courses and that this process provides reliable information on what class attendees thought of the class and what they would like to see in future classes.
Overall Satisfaction with Courses
Class attendees were asked to rank specific elements of the class as “poor,” “below average,” “average,” “above average,” or “outstanding.” For the purpose of this analysis, the responses were coded on a scale from one to five, with one being “poor” and five being “outstanding.” With these rankings, the average score of each question from each class was calculated. As a representative proxy for overall satisfaction with the course, a single average was calculated for the first three questions:

- “Overall, how do you rate the instructor’s presentation?”
- “How do you rate the clarity of the information presented?”
- “How do you rate the usefulness of the lighting information presented?”

Table 3.2 shows the average score for each course.

Table 3.2 – Average Score for Each Course in 2001

<table>
<thead>
<tr>
<th>Class Name</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daylighting Seminar</td>
<td>4.60</td>
</tr>
<tr>
<td>Lighting &amp; Human Performance</td>
<td>4.46</td>
</tr>
<tr>
<td>Daylighting 101-Schematic Design</td>
<td>4.45</td>
</tr>
<tr>
<td>Daylighting 102-Physical Modeling</td>
<td>4.36</td>
</tr>
<tr>
<td>Energy Impacts &amp; Policies</td>
<td>4.28</td>
</tr>
<tr>
<td>Controls &amp; Commissioning</td>
<td>4.25</td>
</tr>
<tr>
<td>Lighting for Assisted Living &amp; Multifamily</td>
<td>4.18</td>
</tr>
<tr>
<td>Lighting Audit Retrofits &amp; Calculations</td>
<td>4.16</td>
</tr>
<tr>
<td>New Lamp &amp; Ballast Technologies</td>
<td>3.92</td>
</tr>
<tr>
<td>Lighting Design Considerations</td>
<td>3.85</td>
</tr>
<tr>
<td>Daylighting Forum*</td>
<td>N/A</td>
</tr>
<tr>
<td>Efficient Lighting Basics Class*</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*The Daylighting Forum and the Efficient Lighting Basics Class do not have overall averages because they were only taught once throughout 2001.

Overall, the scores are high and indicate that satisfaction with the LDL and Daylighting Lab course offerings is high, with Daylighting-related courses generally scoring the highest. Scores varied slightly depending upon the instructor for a particular course, but patterns are not strong enough to identify significant differences.

Course Expectations
Eighty-seven percent of class attendees said the course material was what they expected; only 5% said the material was not what was expected and 8% of those filling out an evaluation did not answer the question. Because such a high percentage of attendees reported that the classes met their expectations, it appears that the course curriculum is on track and that the classes are being marketed to the right audiences.
Old Curriculum vs. New Curriculum Expectations

Three courses within the new ALG curriculum were taught in 2001:

- Lighting & Human Performance
- Energy Impacts & Policies
- Lighting Design Considerations

In order to assess attendee satisfaction with the new course material relative to the old material, we compared how well these courses met attendee expectations. In both the old and new curricula, a large majority of attendees (82% and 79%, respectively) said the material covered in the class met their expectations. As indicated in Figure 3.2, expectations are being met equally well using both sets of curricula.
Importantly, the switch to ALG does not appear to have adversely affected the satisfaction of class attendees; the LDL and Daylighting Lab should feel confident as they proceed with increased utilization of this curriculum to obtain the benefits earlier described.

**Interest in Web-based Classes**

The final question on the evaluation form asks course participants about their interest in participating in web-based distance learning opportunities. Forty-eight percent of the students said they would be interested in LDL and Daylighting Lab classes via the Internet; twenty-two percent said they would not be interested, 27% did not answer the question, and 1% said they may be interested, but did not give a definite yes or no.

The results of this analysis are important because, at present, the LDL and Daylighting Lab’s travel expenses account for a large percentage of the total teaching budget. Distance learning opportunities may, in the future, provide an efficient vehicle for the LDL and Daylighting Lab to provide introductory classes without incurring the labor, travel, and logistical expense of providing this service on site. If some or all classes were taught via the Internet, this could also free-up staff resources to work on other projects. The Lighting Research Center (LRC) has developed a course sequence that is available via the internet and the LDL will be advertising the availability of these classes via its website.
3.2 Web-based Information Resources

The Lighting Design Lab website disseminates information about LDL and Daylighting Lab services and lighting technology to its targeted audiences. As part of this evaluation, data from the website was collected and analyzed to characterize how the website is currently being used, and to identify ways it can potentially be improved and used more effectively.

As indicated in the figures on the following pages, the website is certainly attracting an increasing number of visitors. The figures also indicate, however, that the number of repeat visitors (i.e., those using the site on a regular basis) has remained relatively constant, and that visitors are not accessing the full depth of content on the site. Given the limited audience for the LDL site (i.e., regional lighting specifiers), it is not to expect that there will be continued growth in users. Figure 3.4 summarizes relevant website visitor statistics.
Analyzing the total sessions in a given month over a period of time is another important tool for understanding how users are interacting with the website and what their patterns may be. Figure 3.5 shows the average number of pages viewed per session; these data show that the average number of pages per unique visitor has steadily declined since peaking in June 2001. This could mean that repeat visitors know where to find the information they seek.
Similarly, as illustrated in Figure 3.6, the average session length declined over time, before leveling off in August 2002. LDL staff note that, while more can be done to make users stay on the site longer and generate more page views per session, part of the reason for fewer downloads is the transfer of all residential lighting to a different site. Residential page hits used to make up a significant amount of traffic. Those users arriving at the web site via old, outdated residential lighting links, are now taken to a page offering them the new residential lighting links. Those users passing through to the residential content only show as having viewed a single page and therefore lower the overall average of pages viewed.

**Figure 3.6 – Average Session Length: May 2000 – December 2002**
In summary, an analysis of trends in the LDL website use indicate that:

- Total number of visitors has increased steadily, but the bulk of this appears to be accounted for by one-time visitors.
- Total pages accessed by visitors, on a monthly basis, has remained relatively static.
- Average number of pages accessed per sessions declined steadily after peaking in June 2001, then leveled off in Summer 2002.
- Average sessions length declined steadily before picking up again in Summer 2002.

The website clearly plays an important role in the broader visibility of the LDL and Daylighting Labs. If the website is to remain a cornerstone of the LDL and Daylighting Lab outreach strategy (beyond general information and class registration), then additional research and planning may be required to provide direction in this area. We recommend, as a first step in this process, that the LDL staff conduct surveys with current users to identify and prioritize areas within the website that are most useful to them.

### 3.3 LDL Electric Lighting Consults and Mock-Ups

In order to assist lighting designers, architects and a variety of other target audiences, the LDL provides lighting design and efficiency consultation services and mock-ups. These services are described briefly below.

#### 3.3.1 Electric Lighting Consults: Overview

Lighting consultations are conducted with architects and/or design teams, business owners, interior designers, electricians or electrical engineers, other individuals that may be involved in the lighting design process, or end users. In many instances, consultations are provided for end-users through a utility account representative and, in such cases, the utility representatives act as intermediaries and the LDL consultant may not meet directly with the end-user.

The goal of a consult is to provide general input and, if appropriate, specific recommendations to increase the efficiency or effectiveness of the lighting design. Most consults last one to two hours and many consultations include the review of existing lighting design plans. If a project has detailed lighting design plans, it is easier to review these plans and make specific notes and recommendations about existing lighting choices. If a project does not come with lighting design plans (and blueprints), recommendations for location and types of lighting can be made but they are necessarily more general. Computer rendering and modeling can be provided to illustrate the visual impacts of the design recommendations, particularly if a client would like to make a comparison between different lighting strategies.

Electric lighting consultations usually start with a telephone call from an interested individual who has been referred to the LDL by a utility representative or other party. As described by the LDL staff consultants, there is an informal internal process to direct inquiries to the appropriate staff person. Local contacts are often invited to visit the LDL in-person for an in-depth consultation or to use the lighting library, housed at the LDL, as an additional resource for lighting information. If the interested party is calling from outside the Puget Sound area, design...
plans are often mailed to the LDL for review and subsequently discussed over the phone. If necessary and determined to be appropriate, LDL personnel may go on-site to evaluate a project and make recommendations. When asked about the value of implementing a more formal screening criteria for consulting services, one consultant did not feel that such criteria were necessary, indicating that the exclusion of potential clients would have its risks and that small projects can sometimes lead to bigger ones.

Electric lighting consults are documented with notes maintained in the consultants’ files. The amount of notes and documentation maintained usually depends on the type of consultation. Before providing feedback or recommendations to their clients, LDL consultants consider a variety of lighting issues such as lighting requirements, code compliance, energy efficiency, new technologies, budget considerations and quality control. Subsequent LDL communications can involve some combination of phone conversations, exchanges of email and/or written reports depending on the specific needs of the client. With a walk-in consultation, the only documentation of the visit is probably the sign-in sheet at the front desk; a project with plans mailed to the LDL is more likely to have its own file with ideas and suggestions written-up. There are no written expectations for account or file management.

The level of involvement of Lab staff can vary considerably depending on the stage of project, complexity, and/or the needs and expertise of designers. On a typical consult, recommendations are discussed informally, usually by phone rather than in-person. Some may last only a few minutes with consultants providing specific direction, information or advice. The majority of consults do not involve written evaluation, reporting or design recommendations. Some consults, however, can involve extensive collaboration with others and include long-term participation in complex projects.

Consultations do not typically involve any formal follow-up, nor is any required. The LDL staff expressed concerns that following up on all consults would be time consuming and potentially burdensome to their clients. Staff felt their role was most effective when they guided clients to an effective lighting design solution which clients then felt ownership of. While respect for their client is extremely important, there is a clear downside. It is likely that some level of proactive follow-up would be well received by the customer and would reflect well upon the LDL from a customer service and a strategic marketing perspective. The lack of specific tracking means that staff do not have knowledge of (1) the actual impact of the consultation, (2) what, if any follow-up information or services might be required or desired, (3) why the LDL recommendations were or were not implemented, (4) how they might be involved in subsequent projects with the client. These types of feedback loops are essential to the long-term refinement of Lab services and outreach.

The staff described a collegial and informal collaborative process where the primary consultant involves other consultants as necessary. Examples were given where the primary consultant might use other LDL staff to provide specific supplemental information, locate resources within the library, provide daylighting design assistance, or simply bounce ideas off of a colleague. Overall, they expressed and demonstrated a willingness to work with each other, respect for their individual expertise, as well as a willingness to bring the appropriate resources to bear on a client’s behalf. They reported that the existing processes of assigning work were adequate
and expressed some concern that new strategies or recommendations to change these processes would be cumbersome and unnecessary.

### 3.3.2 Electric Lighting Mock-Ups

Mock-ups offer customers a means of testing alternative products and experiencing the quality of light resulting from their product selections. Mock-ups generally involve the simulation of specific work environments using lighting technology, office furniture, and other items supplied by the LDL and the client. Some carpentry, such as building walls, and painting is also done to suit the wants and needs of the client. Eight hours of labor is provided for each project at no cost, after which users are charged for labor at a rate of $40 per hour. Three days of complimentary viewing time are included, with any time beyond this initial three days charged at $70 per day.

The mock-up facility at the LDL is, at 1200 ft$^2$, the largest and most comprehensive in the Northwest and is capable of handling almost any type of project. Depending upon the scope and size of the project, mock-ups can take anywhere from a half an hour to 2 weeks to complete. Typically, there are three types of mock-ups: (1) product evaluations, which account for approximately 50%, (2) application comparisons, making up another 25%, and (3) testing of new ideas, which account for the remaining 25% of projects.

Mock-ups are primarily managed by one of the staff lighting consultants, and implemented by the mock-up team consisting of 2-3 individuals. The LDL works mainly with design teams/lighting designers (about 30% of the time) and architects (also 30% of the time) most of whom come from the Seattle/Puget Sound area and western Washington. The remaining 40% of the mock-ups are done for electricians, business owners and other groups.

In 2001, approximately 25 mock-ups took place at the LDL. In all cases, energy-efficient lighting choices were recommended. In a few cases, the LDL has declined a customer use of the mock-up facility because the customer was unwilling to explore energy efficient options in their design. Twenty-five mock-ups, or approximately two per month, indicates that the mock-up facility remains unused for potentially long periods of time. Even if a typical mock-up were to last for one week, this would mean the facility is unused for over half the time over the course of a year. Consideration should be given to actively marketing this service so that the cost to maintain this space is allocated over a large number of projects.

### 3.4 Daylighting Lab Consultations and Modeling Studies

Although under a separate contract from the LDL, the Daylighting Lab is housed at the same facility and, to an outsider, is viewed as an integral component of the LDL. Daylighting consultations have been generally carried out distinct from the electric lighting consultations. We provide here a very brief description of the daylighting consultation services. More extensive information and insight is contained in Section 6, in which we discuss results from the survey of daylighting participants and in-depth case studies of several projects.
The project manager of the Daylighting Lab has engaged in proactive regional marketing over the past two years, resulting in a wide variety of work from architects around the region. These marketing efforts, often centered on a brown-bag seminar on daylighting and the Daylighting Lab’s services, often serve to establish a relationship between the Daylighting Lab and the architecture firm, after which discussions take place about specific projects.

Consultations typically involve a physical model that can be tested in the Daylighting Lab. Physical models are sometimes shipped from within the region or are hand delivered. According to discussions with the project manager, about 20% of daylighting consultations are initiated in the schematic design phase (when the building form is determined), and another 60% are initiated during the design development phase. Another 10% are initiated during the contract drawing phase and a small percentage are initiated during the programming conceptualization stage.

A list of features designers reported investigating during their daylighting consultations includes (not in any particular order of significance):

- Window placement and size
- Passive solar heating and cooling
- Sky lights
- Solar tubes
- Light shelves
- Overhangs and other shading devises
- Energy savings of daylighting options
- Daylighting values on floor surfaces
- Glazing and glass types
- Building orientations
- Reflective solar glare and heat gain impact in exterior environmental
- Interior partitions
- Heat load measurements
- Glare measurements
- Balance between natural and electric lighting
- Use of efficient electric lighting
- Interior wall geometry
- Building from and orientation
- Spatial programming

As with electric lighting consultations, there is no formal system of follow-up in place at this time. However, it is much easier to follow-up on daylighting consultations because of the established relationships between the Daylighting Lab and architecture firms across the Northwest. At the time of the interviews, only a handful of projects had actually been built. In the upcoming months, several additional building projects will be completed that originally had consultations completed two years ago. This pace will pick up as the number of projects being completed projects increases. This will provide additional opportunities to examine these projects and evaluate the use of daylighting and the effectiveness of the Daylighting Lab’s consultations.
SECTION 4: ADMINISTRATION

Two areas of administration were explored during the course of this evaluation: (1) the information management systems, and (2) the Technical Advisory Committee (TAC) input process.

4.1 LDL and Daylighting Lab Information Management

The LDL information management system consists largely of a database that has been developed with the assistance of Seattle City Light to track program activities. The database is supplemented with information that is maintained by the individual consultants in the form of paper and electronic files. Daylighting Lab projects are tracked separately in an Excel spreadsheet, also supplemented by information maintained in consultant project files. Note that, in March 2003, the Alliance intends to implement a central database for tracking all LDL and Daylighting Lab projects. The results presented below present the situation that was found in January 2003 and represents the situation for the past two years.

4.1.1 LDL Database Overview

The complete structure and relationships in the LDL program database are shown in the figure in Appendix A. This figure denotes the various tables contained within the database, the data that are contained within these tables, and the relationships that have been established among these tables and data.

From the perspective of LDL staff, the database is accessed as an application program that resides on the City of Seattle central server. Users are provided with a very clean interface through which a series of data entry and reporting screens may be used. The user interface, and indeed the overall structure of the database, is driven by employee activities. For example, if an employee spends time preparing for a class, then this time is logged in the database as an employee activity. Similarly, if an employee is working on web development or consultations for customers, these are also logged as activities. There are presently 44 different types of employee activities. While some require a contact and description, many are administrative in nature and therefore do not require this information.

The contacts portion of the database contains information on LDL users including, for example, customers who receive mock-up services or attend a class. Mock-ups services will also likely show up in the activity table as an employee activity. A customer attending a class would be associated with a particular class. Contacts may also be associated with one or more tables within the database to identify participation in classes, attendance at an LDL event, etc.

Visitors are tracked through a set of tables that track, for example, the utility service area of the person visiting the LDL. These data originate from the LDL visitor’s log that people fill out upon arrival at the front desk of the LDL.
4.1.2 Database Assessment

In assessing the LDL database, we have considered three key areas:

- Data comprehensiveness and quality
- Overall usefulness of the database to LDL staff
- Database structure and design

Data Comprehensiveness and Quality

The completeness of the data in the database is not as high as the LDL project manager would like, and steps are being taken to resolve this. For example, the database tracks hours that consultants spend on various LDL-related activities, and the overall total sums to 8730 hours which is obviously too low (with a potential of up to 2080 hours per employee per year for the 5 professional staff members). Until recently, LDL staff has not paid particularly close attention to the quality and thoroughness of the data being entered. As discussed in more detail below, this is because the database is not viewed as being of value to staff in their day-to-day business. Because the data are admittedly incomplete, we did not spend a great deal of time checking for errors and/or completeness.

The Alliance has expressed concerns regarding the quality of the data and a general desire to have greater information on the consultation services provided by the LDL. While information on LDL consultant activity is contained within the database, it is relatively limited in both its content and its utility in understanding what has occurred in a particular consult. Perhaps most importantly from an evaluation or program planning perspective, the data on consultations do not provide detailed information on specific projects that would be sufficient for understanding potential savings resulting from LDL consultations. For example, building types and addresses are not tracked.

Usefulness to LDL Staff

From the perspective of the manager of LDL, the database serves the primary function for which it was designed – producing monthly summary reports of staff activities to fulfill the LDL contract requirements with the Alliance. However, interviews with LDL consulting staff indicate that the usefulness of the database is limited from a broader staff perspective.

This perspective is driven by three factors:

- The design of the database is primarily activity-focused rather than contact-focused;
- The existing, pre-programmed reports do not provide LDL staff with meaningful information in return for the data they provide; and
- The network server is too slow to justify its use for short/quick interactions.

Gaining cooperation from staff in using a database requires that staff see value in entering data. With the existing database, the reports that are generated do not address the needs of project staff. Additionally, staff are not able to access the database while they are traveling, thereby limiting their ability to either access or update files while they are away from the office teaching classes.
As noted above, the database is primarily structured to track activities rather than to manage contacts. For the database to function as a contact management database there should be an option from the contact page to identify an activity. We recommend there be four general categories of activities: (1) visitors, (2) class, (3) technical consultations, and (4) other. Each of these activity categories would have its own table of information, with a link to the contact ID table. Not only would this simplify the structure of the database, but it would also highlight the importance of identifying clearly, for each activity category, the information necessary for tracking and evaluating the success of activities in each of these areas.

Enhancing the usefulness of the database for LDL staff will likely increase both the quality and quantity of the data tracked. If structured differently, the database may serve as a more effective tool for LDL staff to track their clients, and for the LDL to better understand the markets that it endeavors to influence. Additionally, the database could then be used more strategically for marketing LDL services.

4.1.6 Tracking Daylighting Lab Projects

Daylighting Lab project information is tracked with Microsoft Excel-based data spreadsheets, developed and maintained by the Daylighting Lab project manager. Information recorded in the spreadsheets includes:

- Project Number
- Architect
- Primary Contact Name
- Primary Phone
- Project
- Project Type
- Brief Description
- State
- Status

During the evaluation, it was observed that some of these fields were not consistently populated. Moreover, the project description data were very brief and limited in their usefulness. At the time of our daylighting activity evaluation, a new project database, using Microsoft Access, was under development by support staff at the Daylighting Lab. An evaluation of this new database was not undertaken for this MPER. Our primary recommendation regarding data tracking at the Daylighting Lab is that the Alliance program manager work closely with the Daylighting Lab staff to ensure that future database development efforts include sufficient detail to support future evaluation needs.

4.2 Technical Advisory Committee Development

The Technical Advisory Committees (TACs) were established in 1999 as a means of achieving greater Lab outreach throughout the Northwest region. TACs were created in Boise, Montana, Portland, Seattle and Spokane to provide input to the Lab regarding local market conditions and professional needs related to lighting design and efficiency. They meet quarterly through either
telephone conference calls or in-person meetings. Ten TAC members (two each from Boise, Portland and Spokane; three from Seattle and one from Montana) were interviewed about three topic areas: (1) TAC process and impact, (2) Lab services and (3) Lab feedback. The results from the interviews are detailed in the following sections.

4.2.1 TAC Process and Impact

Most TAC members reported that much of their input revolves around the classes offered by the Lab. Curriculum, charging for classes and marketing approaches were the three most prominent topics on which TAC members commented. When asked where the TAC had the most significant input in 2001, half of the members interviewed said curriculum changes. Other areas of significant input mentioned by interviewees were educating Lab users in changes in code, how to use the Lab’s resources, and how the Lab can achieve more exposure and educational outreach.

TAC members were also asked what they thought the strengths and weaknesses of the TAC process were. Seven of the 10 members interviewed said the strength of the TAC is the opportunity to provide feedback as well as share suggestions and offer direction. TAC members also reported that a key strength of the process lies in bringing together people with a diversity of viewpoints. One factor that limits the overall value of the TACs is that the members are located in geographically dispersed areas and therefore cannot frequently meet in person in Seattle. It was felt that the use of conference calls has been successful in overcoming this limitation, but that there remains considerable value in face-to-face meetings.

The professional interests of the TAC members with whom we spoke appear to be well aligned with the mission of the Lab and should therefore serve the objective of the TAC process. Several TAC members said they feel that they are able to contribute unique suggestions to the Lab because of their individual professional focus.

4.2.2 TAC Input on Lab Services

Since many of the TAC members are also professional lighting designers, we took the opportunity to solicit feedback on their experiences with the LDL and Daylighting Lab consultation services. TAC members were also asked about their personal use of the following services: (1) electrical commercial consults, (2) electric commercial mock-ups, (3) daylighting consults, (4) daylighting modeling (5) Lab web site and (6) other Lab information resources (e.g., newsletter, articles, case studies, technical information, etc.)

Eight out of the 10 TAC members interviewed said they had never used the electric commercial consult service offered by the Lab. Four out of the 10 members said they had used the daylighting consult service offered by the Daylighting Lab.

Only one of the ten committee members interviewed actively used the Lab’s commercial mock-up facility. The TAC member found the mock-ups to be an invaluable tool and has used the Lab’s mock-up room on several occasions. Two of the committee members interviewed said they had only observed a mock-up in progress and one of the committee members said that while they had never used the mock-up facility, they would like to in the future.
Three of the 10 TAC members had used the Lab’s daylighting modeling facility. All three of these modeling services were effective in impacting the design and incorporating more daylight into the final design.

Nearly all of the committee members (eight out of 10) interviewed had visited the Lab’s website at least once. Five of the ten interviewed reported various reasons for using the website including: looking for examples of other projects, using the manufacturer representative locator, looking up the course listings, and information sharing.

### 4.2.3 Lab Feedback

TAC members who had used the Lab services were also asked several general questions about the Lab services. TAC members were asked if they agreed with the design practices and technologies recommended by the Lab. Except for one person, all of those interviewed said that they generally agreed with the recommendations of the Lab. Committee members noted several reasons for this general agreement including: (1) the emphasis on energy efficiency combined with design quality, (2) helpful and knowledgeable staff, and (3) well-informed recommendations.

Daylighting classes have recently been held in the offices of design professionals, while general lighting classes have continued to be held at “neutral” locations. When asked to weigh the advantages and disadvantages of these, TAC members generally saw merit in both. They liked the idea of reaching out to specific firms because it would draw some lighting professionals that might not otherwise attend a Lab class; they also acknowledged that smaller firms might be left out if classes were taught only in the newer, individual firm-focused approach. Another TAC member said the politics of the smaller towns served by the Lab (in this case, Missoula) might interfere because of fierce competition between firms.

TAC members were also asked if they could think of any examples of recent successful projects in their area that the Lab had some influence on. Six of the ten said they could not think of any projects, but the remaining four did. Interestingly, all the examples were daylighting (three elementary schools, two churches and the Idaho Place project in Boise) and none focused on electric lighting.

When asked if they thought the Lab was making progress in its efforts to transform lighting design practices, every TAC member agreed. One member (a manufacturer’s representative) gave an example from her research on the use of lamps approximately five years ago. About 70% of all orders in western Washington at that time were T8s and electronic ballasts, while the national average was around 30%. This difference, according to the TAC member, was in part due to the Lab’s efforts to promote energy efficient lighting technologies.

Committee members were also asked if lighting professionals in their respective areas use the Lab as much as they could. Nine of the ten interviewed said professionals did not use the Lab as much as they could. The main reason reported cited for this was the distance between Seattle and the outlying areas served by the Lab.
In summary, the TAC process is serving its intended function of providing input to the design and delivery of services throughout the Northwest region. The greatest level of TAC input appears to be in the area of education and training. TAC members are very familiar with the Daylighting service offerings and less familiar with the electric lighting consult offerings. Ironically, very few of the TAC members have ever utilized the Lab’s electric lighting consultation services. It may be worth familiarizing TAC members with the electric lighting consult and mock-up services as these elements of comprise a large portion of the staff time.
SECTION 5: ELECTRIC LIGHTING PROJECT EXAMPLES

Lighting design consultations are an important component of the LDL service offerings and, as such, represent a key tool for the Alliance in its efforts to achieve market transformation in energy efficient lighting design practices. In order to learn more about the consultation process and the impact these consultations have within the broader marketplace, we evaluated a series of consulting project examples. We describe the objectives and methodology of this effort below.

5.1 Objectives and Methodology

The primary objectives of this research were to:

- Provide an in-depth characterization of the consultation process;
- Understand the results of these consultations; and
- Assess implications for market transformation.

We first asked each of the three LDL lighting consultants to provide four of their best projects that could be used to highlight various aspects of the consultation process and illustrate the positive impact that the LDL has had in working with clients. We then met individually with each of the LDL commercial lighting consultants for the purpose of (1) better understanding their approach to electric lighting consultations, and (2) to discuss in detail the four projects they had selected. Through a discussion centering on examples of the consultant’s best work, we were able to explore how they conduct their business, gain insights into what constitutes a successful project (from their standpoint), and understand the impact of such consultations in the marketplace. Following our discussions with LDL staff, we interviewed the recipients of the consulting services to determine what measures were taken as a result of the involvement of the LDL and to obtain constructive feedback on their experiences.

For each project, we interviewed the LDL consultant, the relevant intermediary (i.e., utility representative, architect, lighting designer) and, if applicable, the recipient of LDL services (i.e., facility representative). In cases when the end-user contact was no longer on staff, we attempted to locate another individual within the organization who was familiar with the project. A summary of whom we spoke with at each facility is provided in Table 5.1. Detailed descriptions for each of these projects are provided in Appendix B.
### Table 5.1 – Consultation Interviews Completed

<table>
<thead>
<tr>
<th>Project</th>
<th>LDL Consultant</th>
<th>Intermediary</th>
<th>End-User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milgard Manufacturing</td>
<td>Yes</td>
<td>Yes (SnoPUD)</td>
<td>No (contact no longer on staff)</td>
</tr>
<tr>
<td>Starbucks</td>
<td>Yes</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>Snohomish County PUD</td>
<td>Yes</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>Cannon House</td>
<td>Yes</td>
<td>Yes (SCL)</td>
<td>Yes</td>
</tr>
<tr>
<td>North Cascades Environmental Learning Center</td>
<td>Yes</td>
<td>None</td>
<td>No (contact no longer on staff)</td>
</tr>
<tr>
<td>Jackson Lake Lodge, et. al.</td>
<td>Yes</td>
<td>Yes (BPA)</td>
<td>No (unable to reach)</td>
</tr>
<tr>
<td>Hood River Coffee Company</td>
<td>Yes</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>EOU Library</td>
<td>Yes</td>
<td>Yes (Oregon Trail Electric Coop)</td>
<td>No (unable to reach)</td>
</tr>
<tr>
<td>Montana DEQ</td>
<td>Yes</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>Group Health Cooperative IT Center</td>
<td>Yes</td>
<td>Yes (SCL)</td>
<td>No (asked by utility rep. to not contact)</td>
</tr>
<tr>
<td>City Architecture Department</td>
<td>Yes</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>Great Falls International Airport</td>
<td>Yes</td>
<td>None</td>
<td>No (already interviewed for daylighting case study)</td>
</tr>
</tbody>
</table>

#### 5.2 What We Learned: The Consultation Process

We provide below a summary of the project interviews, staff perspectives on the consultation process, and feedback on client satisfaction.

##### 5.2.1 Summary of Project Interviews

Table 5.2, below, provides a summary of the status and results of each project selected by the LDL consultants.
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Highlights</th>
<th>Results at Time of Interview</th>
</tr>
</thead>
</table>
| Milgard Manufacturing  
*Industrial lighting retrofit* | Worked with utility representative. Opportunity to recommend an energy efficient fluorescent lighting system in a manufacturing setting (where industry norms are metal halide). | Project not complete. The Milgard contact is no longer employed at the company. |
| Starbucks  
*Retrofit of all North American stores* | Worked with store designers. Helped validate Starbucks’ own research by providing with a comparative lighting demonstration. Provided useful resource for high profile client. Significant market impact. | Project complete. Efficient lighting is reportedly being installed in nearly 4,000 North American stores. Customer reported that LDL impact on corporate decision making was insignificant. |
| Snohomish County Public Utilities  
District Operations Center  
*Retrofit of daylight and electric light* | Worked with utility. Combined LDL daylighting and electric lighting services were provided. Potential energy savings identified, and design team awareness was increased. | A decision has not yet been made as to whether or not the project will be completed. |
| Cannon House  
*Lighting evaluation* | Worked with facility owner. Lighting in new construction had to be totally reworked to comply with code. There is a high probability that LDL recommendations will be implemented | This project is not yet complete; they plan to follow some of the LDL’s recommendations. |
| North Cascades Environmental Learning Center  
*Review of new construction lighting plans* | Worked with SCL. Intervention to improve light quality and efficiency, replacing incandescent track lighting with fluorescent lighting. | The project contact is on sabbatical; impact of LDL recommendations is unknown. |
| Jackson Lake Lodge  
& other Grand Teton Facilities  
*Hospitality facilities retrofit* | Collaboration with BPA. Multiple facilities were involved in this project that provides an example of energy savings and improved lighting in high-traffic areas. | This project is on-hold. The key decision maker was not aware of LDL recommendations. |
| Hood River Coffee Company  
*New commercial & industrial lighting* | Worked directly with business owner. This project involved a willing and motivated client. The LDL provided a quick turnaround consult and client implemented 4 LDL recommendations | Project complete. Implemented some LDL recommendations. |
### Eastern Oregon University Library
**Retrofit to balance daylight and electric light**

- Client is now taking LDL classes.
- Decisions pending.
- LDL recommendations impacted by budget constraints
  Probably will de-lamp, only.

### Montana Department of Environmental Quality
**Retrofit to balance daylight and electric light**

- Worked with Montana DEQ. Large, prominent, public facility (high visibility).
- Complex lighting design project.
- Project is not complete.
- No decision expected until April 2003.

### Group Health Cooperative Information Technology Center
**Office space retrofit**

- Collaboration with Seattle City Light. Energy efficiency and creative lighting design for improved employee productivity
- LDL recommendations were not implemented.
- Key decision maker reportedly did not consider LDL recommendations.

### City of Seattle Architecture Department
**Retrofit of historic office space**

- Worked with City of Seattle’s Architecture Department to design effective lighting in a historic space
- Project not complete.
- No decision made.
- Planning to implement LDL’s recommendations.

### Great Falls (Montana) International Airport
**Major re-lighting (renovation), integration of daylight and electric light**

- Worked with CTA Architects. Large, prominent project involving state-of-the-art, advanced lighting systems.
- Project not complete.

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### 5.2.2 Staff Perspectives on the Consultation Process

Our interviews with staff revealed no unanimous definition of what constitutes an exemplary project. Each consultant offered independent ideas about what makes up a successful project. Some of their ideas include:

- When a project changes a client’s opinion regarding energy efficient technology and lighting, particularly when they come to the LDL with a preconceived notion of what they think about energy efficient lighting.
- When a consultation results in a good lighting design that is not only energy efficient, but also effective.
- When everyone is involved in a collaborative effort: architecture and lighting need to be linked while guiding clients towards an idea. The best way to engage the design process is with collaboration.
- Guiding clients to smart solutions in which they have ownership.

Each consultant valued their role in influencing clients’ lighting decisions. They also indicated that successful consultations are not necessarily measurable on a project-by-project basis. While the involvement of the LDL in a particular project often comes after many major lighting decisions have already been made, the consultant’s ability to educate project participants will influence decisions on future projects. For this reason, it is important to consider the long-term impact that consults may have on their clients as well as the measurable impact of a specific LDL consult.
After our broad question regarding what is involved in a successful consult, we specifically asked each consultant how the size and scope of the project, the level of involvement of the consultant, the interest of the client, and the potential for energy savings each affected their determination of a successful consult.

- **Size and scope** – When asked how the size and scope of a project influenced their thinking about the success of a project, most consultants felt that they matter but were not a paramount concern. On the whole, they felt they are successful anytime they help solve a problem. Consultants also felt that a small project with low visibility could be valuable based on other considerations such as technical challenge, changing a purchasing decision, or educating a client who will likely adopt energy effective lighting design in the future. Each consultant, did however, express appreciation for higher profile projects that have a broader reach or impact.

- **LDL’s level of involvement** – The level of involvement of the LDL and the timing of that involvement seemed to have significant impact on consultants’ attitude toward a project. Each acknowledged that it is preferable for the LDL to get involved early in the design decision making process, that early involvement creates a greater probability for a positive impact and that many, if not most, of the consults they participate in occur after the initial designs have been completed.

- **Client interest** – Consultants placed a high value on a client’s degree of interest in lighting design. A client who is interested and motivated is more likely to follow recommendations on specific projects and to involve the LDL in projects in the future. One consultant suggested that he is likely to put more effort forth for someone who seems serious about lighting and LDL services.

- **Energy savings** – Promoting energy efficient lighting is an essential element of a consultant’s work and each staff member takes energy efficiency seriously. Yet it is only one of several significant factors in lighting design consultation. One consultant said he considers any type of (energy efficient) change as progress, but people need realistic suggestions, and energy savings is not always the most important. Quality of lighting must also be emphasized and sometimes the most appropriate lighting design is not the most energy efficient.

Overall, the consultants exhibited a professional attitude about their work and an interest in providing quality services for their clients. This is reflected in some of the following comments:

- Our customer service is the same, no matter the project size
- The earlier we get involved, the better
- People need to leave here with something they can actually do
- Receptivity of the client is important. Developers tend to be risk averse so we must demonstrate when we can that there is no risk (with energy efficient lighting concepts). Demonstration projects are essential to educate this audience
The staff demonstrated an obvious source of pride and purpose in providing information, education, and recommendations to people (architects, business owners, designers) whose interests include energy savings. However, one consultant said he had seen too many lighting retrofit projects that were designed only to save money and that had failed to achieve this objective or had done so at the expense of other meaningful considerations. He cited several examples of energy efficient retrofits where people are asked to work with less light or lower quality light. This consultant underscored the importance of a project being energy effective, rather than only energy efficient.

Our discussions also revealed a significant issue about how the electrical lighting consultants and the daylighting consultants interact differently in the marketplace. One consultant estimated that 5% of his consults involve daylighting consultants and offered the important observation that while the Daylighting Lab “usually works with architects, we are usually not working with architects.” The implication here is that the daylighting consultant is often involved in the initial design process and better able to influence the outcome. Conversely, the electric consulting staff are often engaged after initial designs are completed so that their ability to influence both an individual project and the market is more limited. Clearly, early intervention by LDL consultants in the design process will be most effective in impacting the market. The development of specific strategies concerning who the consultants target, what specific services they offer, and strategic planning on how to best participate in the design process would help best apply LDL resources to meet their market transformation goals.

The LDL consultants also voiced some frustration with a significant barrier that restricts them from freely participating in the marketplace. Because the LDL is publicly funded, the staff and services are not supposed to compete with the private sector in the provision of services. This limits, for example, their ability to provide detailed lighting design services that might be provided by a less qualified, more expensive designer working in the private sector.

5.2.3 Client Satisfaction

Based on our interviews with end users, the consultation process and LDL services work very well. We asked both the LDL consultants and the clients to rate the LDL services on a scale of 1-5 by combining (1) the overall importance of LDL input to the project, and (2) the quality of services that LDL staff delivered. A comparison of responses to these questions is provided in Table 5.3.
As highlighted in this table, clients rate the LDL highly in all categories and are satisfied, overall, with the services they received. Perhaps most importantly, there do not appear to be any significant gaps in the perceptions of LDL staff and the users of these services.

### Table 5.3 - Satisfaction Comparison (Average)

<table>
<thead>
<tr>
<th>Project</th>
<th>LDL</th>
<th>Client</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milgard Manufacturing</td>
<td>4.75</td>
<td>4.00</td>
</tr>
<tr>
<td>Starbucks</td>
<td>4.75</td>
<td>4.25</td>
</tr>
<tr>
<td>Snohomish County PUD</td>
<td>4.75</td>
<td>4.50</td>
</tr>
<tr>
<td>Cannon House</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Jackson Lake Lodge, et. al.</td>
<td>4.25</td>
<td>4.50</td>
</tr>
<tr>
<td>Hood River Coffee Company</td>
<td>4.75</td>
<td>4.50</td>
</tr>
<tr>
<td>EOU Library</td>
<td>4.25</td>
<td>5.00</td>
</tr>
<tr>
<td>Montana DEQ</td>
<td>5.00</td>
<td>4.25</td>
</tr>
<tr>
<td>Group Health Cooperative IT Center</td>
<td>4.75</td>
<td>4.25</td>
</tr>
<tr>
<td>City Architecture Department</td>
<td>5.00</td>
<td>4.75</td>
</tr>
</tbody>
</table>

5.2.4 Consultation Process Summary

Analysis of the interviews with LDL consultants and with project participants reveals some significant though contradictory findings. Clearly, the LDL staff takes customer service very seriously; the tone and content of our interviews with them reveal a strong and unbiased commitment to serving the needs of their clients. Similarly, the customer satisfaction ratings reflect favorably on the services that are provided. From this vantage point, the LDL consults are successful; they provide valuable information and quality customer services.

The consultants, however, were asked to provide examples of exemplary or successful consults and, of the 12 we researched, only 2 projects were actually completed at the time they were provided. In many cases, the consultants were unaware of the actual status of the projects. Also, after the LDL consultant had delivered the recommendations to the client, there was little, if any, follow through. One could argue that any definition of project success must include the successful implementation of LDL recommendations. Further, one could argue that any approach to market transformation would include an account management strategy that would track projects to completion, require ongoing dialogue with project team members concerning what can be done to promote the implementation of recommendations, and a post-consultation evaluation that would determine what worked and what did not in the consultation process.

If the Alliance’s only desire is that LDL provide quality education and design consulting as well as quality customer service, then one can conclude, based on the results of these interviews and the project examples, that the LDL consultants are successful at what they do. If, however, one of the Alliance’s main objectives is to promote measurable impacts in the marketplace, then the twelve projects selected by the consultants indicate that the Alliance must provide more specific direction as to how consults should be first screened and then what depth and extent of follow-up should be required.
5.4 Summary

We discuss below significant implications for market transformation, as well as steps that may be taken for improving the overall effectiveness of the consultation process.

5.4.1 Implications for Market Transformation

One of the objectives in reviewing these project examples was to assess any implications for market transformation that might be identified. The reason for our interest in market transformation is two-fold: (1) the Alliance’s primary motivation in funding the LDL is to achieve market transformation and, (2) the stated mission of the LDL is “to transform the Northwest lighting market by promoting quality design and energy efficient technologies.” To the extent that these projects are representative of the broader set of consultations, several significant issues arise:

- **Varying Levels of Understanding for Market Transformation Objectives** -- During our interviews with LDL consultants, we asked each to define market transformation and the role the Lab plays in this effort. While each consultant provided thoughtful responses to these questions, they did not share a common perspective on the issue nor did they provide a consistent message that would reflect the Lab’s proactive effort to articulate their market transformation goals and strategies. One consultant suggested that market transformation was “people making changes in buying decisions because of our input.” Another said market transformation is the “easing of client’s reliance on the LDL.” Another consultant provided a concise perspective on market transformation involving two factors: understanding new technology, and transforming design practice.

- **Energy Savings Impacts** -- It is clear that in each consultation the end users were encouraged to examine and consider energy efficient lighting systems. Feedback from clients indicates LDL staff played an important role in ensuring that energy efficient alternatives were considered. In the instances where Lab recommendations were installed, it is expected that energy savings will be realized. However, in 10 of 12 cases, the Lab recommendations have not (yet) been implemented. It is therefore not possible to assess the energy savings impacts of these consultations, and in several instances it appears that energy savings are unlikely to materialize.

- **Limited Interaction with Design Professionals** – One of the most surprising observations to arise from the review of these consultation examples, is the fact that the involvement of lighting design professionals is very limited. In most cases, the ability of the Lab staff to effect long-term changes in the marketplace through the consultation process is therefore limited because they are typically dealing with the owner of the facility (or a utility representative acting as an intermediary). The prospects for secondary effects in the market as a result of the consult would therefore appear to be quite low. To the extent that the selected consultations are representative of the broader set of LDL consultations, this brings into questions the overall role of consultations (and who is targeted for them) in the market transformation process.
5.4.2 Recommendations for Consultations

In reviewing our interviews with Lab staff and these case studies, we identified three areas that, if addressed by the Alliance and LDL, would further the ability of the Lab to have more significant impact in the market – clarifying the overall objectives of the consultation offering, screening of projects, and follow-through.

Clarifying the Objectives of Consultations – Based upon our experiences in reviewing these example projects, it appears that it would be useful for the Alliance and the LDL to clarify the specific objectives for the consultations. This would include addressing the role of consultations in transforming the market, specifically defining what constitutes a successful consultation, and determining what types of market actors need to be targeted in order to have the desired impact.

- **Screening projects** – The LDL is sensitive to meeting the needs of all commercial and industrial customers and, accordingly, has an open door approach that provides information and services to whomever seeks such services. However, because the overall caseload is substantial (250+ consults in 2001), it would clearly be beneficial to screen projects based on potential for achieving long-term impact in the market. A variety of screening filters would enable the Lab staff to evaluate each project based on the potential for short and long-term influence. The impact of consulting services in market transformation would be greater in projects that are likely to be replicated by a company or a lighting designer. This would argue for selecting projects that involve a design professional, or other decision-makers that are likely to be involved in a substantial number of subsequent projects. A screening process, working in concert with a strategic marketing plan, can make best use of the consultant’s time and expertise. It need not exclude providing services to small clients, yet it will allow a more appropriate allocation of LDL resources.

- **Follow-Through** – As noted, the LDL consultations take several forms. During our discussions with LDL consultants, as well as subsequent research with end users, it became clear that there is generally little or no follow-up with customers. The LDL consultations warrant follow-through. A simple account management standard that required follow-up phone calls to clients would provide a number of important benefits for clients, consultants and LDL management. These benefits include:
  - Improved customer service
  - Strengthened relationships with market actors
  - Determination if any further information is needed to help move a project forward
  - Better understanding of how Lab services have been utilized
  - Better understanding of how the decision-making processes function and how LDL services could be more effectively delivered
SECTION 6: DAYLIGHTING LAB PARTICIPANT RESEARCH AND CASE STUDIES

In order to obtain more information regarding the impacts of the Daylighting Lab, research was conducted with participating customers to assess their experiences and identify actions taken as a result of consultations with Daylighting Lab staff. This research was completed in two steps: first, a broad-based telephone survey was completed with participants; second, in-depth case study interviews were conducted with a representative sample of these participants. The results from these two sequential research activities are provided below.

6.1 Daylighting Lab Participant Surveys

Telephone surveys were completed with participants in 90 Daylighting Lab consultations. The objectives of these surveys included:

- Obtaining detailed project-specific information that is not tracked by the Daylighting Lab.
- Soliciting project feedback from participants.
- Exploring participant attitudes and awareness toward daylighting.

A related objective was to provide a basis for the selection of projects for more detailed interviews and case study analysis (see Section 8). The survey instrument can be found in Appendix C.

6.1.1 Status of Projects

As shown in Figure 6.1, very few of the projects for which daylighting consultations were provided were completed at the time the interviews were conducted. Several of the projects were found to be in various stages of construction and will be complete within the next six months. Follow-up with these projects, once completed, will yield valuable information about the impacts of the program.
6.1.2 Significance of Daylighting Projects

In order to gauge the significance of the daylighting component within the overall project, we asked designers to rank its significance in the projects for which consultations were provided. As shown in Figure 6.2, project designers ranked daylighting as “extremely significant” in a little over 40% of the projects surveyed.
Figure 6.2 – Significance of Daylighting Component within Project

6.1.3 Influence of Daylighting Lab Consultation

Feedback on Daylighting Lab services was solicited to help us understand how influential the Daylighting Lab efforts have been. We also sought to understand how satisfied participants were with the services they received, and what recommendations they had for service improvements. As illustrated in Table 6.1, fully 55% of projects noted that their consultation was either fairly or extremely influential.

Table 6.1 - Daylighting Consultation Influence Ranking

<table>
<thead>
<tr>
<th>Influence</th>
<th>Respondents Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't Recall</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Not at all influential</td>
<td>6</td>
<td>7%</td>
</tr>
<tr>
<td>Not very influential</td>
<td>14</td>
<td>16%</td>
</tr>
<tr>
<td>Somewhat influential</td>
<td>19</td>
<td>21%</td>
</tr>
<tr>
<td>Fairly influential</td>
<td>33</td>
<td>37%</td>
</tr>
<tr>
<td>Extremely influential</td>
<td>38</td>
<td>42%</td>
</tr>
<tr>
<td>N/A</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Total Projects</td>
<td>90</td>
<td>100%</td>
</tr>
</tbody>
</table>

6.1.4 Satisfaction with Daylighting Lab Services

Participants are highly satisfied with the Daylighting Lab services, as shown in Figure 6.3.
Representative comments included:

- “Found Joel great to work with, [the Daylighting Lab is a] great facility. Innovation, collaboration, professionalism”
- “Very helpful pointing out items which would have been problematic otherwise and helping with solutions”
- “Crucial information, wouldn’t be able to determine light behaviors any other way”
- “Terrific job, [the] Daylighting Lab helped sell [daylighting] ideas to [the] client”
- “Joel was difficult to reach and (the architect) didn’t know if there were other people to talk to”
- “[Played] lots of phone tag, but overall very happy”

6.1.5 Designer Familiarity and Use of Photocontrols

Participants were also asked to rank their knowledge of photocontrol systems. Fully 57% of respondents rank their understanding a 1 or 2, indicating that a majority of respondents feel they know very little about photocontrols.
Table 6.2 - Participant Self-Ranking of Familiarity with Photocontrol Systems

<table>
<thead>
<tr>
<th>Photocontrol Familiarity Self-Ranking</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
</tr>
<tr>
<td>0 – no understanding</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5 – excellent understanding</td>
<td>4</td>
</tr>
<tr>
<td>Total Respondents</td>
<td>51</td>
</tr>
<tr>
<td>N/A</td>
<td>18</td>
</tr>
<tr>
<td>Total Contacts</td>
<td>69</td>
</tr>
</tbody>
</table>

Similarly, participant likelihood of using photocontrols in future designs clustered in the “maybe” and “probably” categories, with few saying they would “definitely use photocontrols.”

Table 6.3 - Participant Likelihood to use Photocontrols in Future Building Designs

<table>
<thead>
<tr>
<th>Use of Photocontrols</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
</tr>
<tr>
<td>Definitely Not</td>
<td>0</td>
</tr>
<tr>
<td>Probably Not</td>
<td>1</td>
</tr>
<tr>
<td>Maybe Not</td>
<td>4</td>
</tr>
<tr>
<td>No Opinion</td>
<td>6</td>
</tr>
<tr>
<td>Maybe</td>
<td>19</td>
</tr>
<tr>
<td>Probably</td>
<td>13</td>
</tr>
<tr>
<td>Definitely</td>
<td>8</td>
</tr>
<tr>
<td>Total Respondents</td>
<td>51</td>
</tr>
<tr>
<td>N/A</td>
<td>18</td>
</tr>
<tr>
<td>Total Contacts</td>
<td>69</td>
</tr>
</tbody>
</table>

6.1.6 Recommendations Offered by Participants

Respondents offered a variety of comments about possible service improvements. We have grouped these recommendations into three broad categories:

Recommendations for Products and Services

- Clarify services, perhaps detail a menu
- Provide a process checklist and a typical process calendar
- Follow-up with consults
- Provide a list of additional steps to follow once the consult is complete
- Provide computer modeling
- Address less expensive daylighting solutions, especially for projects on tighter budgets
- Include in services exterior environmental impact studies
- Begin consult as early as possible in the project design process
The purpose of the Daylighting Lab case study evaluation was to identify the strengths of, and additional opportunities for, the Daylighting Lab services through in-depth interviews with designers and building owners. We provide below an introduction to the goals, sample structure, and interview procedure of this effort. We then discuss the type of projects included in our interviews and their daylighting and lighting characteristics, followed by two sections describing the influence of the Daylighting Lab and estimated energy savings as described by the interviewees. In the final two sections we use this information to provide an assessment on the overall market impacts of the Daylighting Lab services and observations on other opportunities.

6.2.1 Overview and Goals

The purpose of the in-depth interviews was to gain a better understanding of the daylighting aspects and the design process of the projects and, specifically, how the Daylighting Lab impacted the design process and the installed daylighting system. There were four over-arching questions that we sought to answer within the context of the specific daylighting projects discussed during the interview:

- Is the Daylighting Lab being influential?
- Is any energy being saved as a result of the Daylighting Lab’s efforts?
- What else could the Alliance be doing to get more energy savings?
- What were the missed opportunities?
6.2.2 Sample Design and Methodology

Using the results of the 90 telephone surveys we developed a list of projects for further interviews. The selection goals were to:

- Maximize the diversity of building types
- Maximize the diversity of projects by location
- Emphasize those projects furthest along in the construction process
- Emphasize larger projects, while maintaining diversity in size
- Maximize the number of design teams interviewed

The interviews began with the key contact listed in the database, who was inevitably the design architect. At the end of each interview respondents were asked for the names of other influential participants in the process, usually the electrical engineer and occasionally a second architect, a mechanical engineer or an owner.

Ultimately, 52 interviews were conducted with one to four people on 30 projects, averaging 1.4 interviews per project. If a contact expressed hostility (noted in two calls, total) we discontinued the conversation. If an initial contact was unreachable after three tries over the course of a week, we moved on to a second choice project. Secondary interviews were pursued even more aggressively, waiting up to three or four weeks before giving up. The interview guide covered the following general topics:

- Daylighting design
- Electric lighting system
- Energy savings
- Critical decision points
- Daylighting Lab contact and assistance

The results from these 52 interviews are reported by project, not by respondent. All of the interviews for a single project were done by one interviewer, and were used to inform a holistic assessment of that project. If an architect was responsible for more than one project on the target list, the same interviewer also followed the other project to completion. In order to maximize the number of design teams interviewed, interviews were not conducted on more than two projects per architect. The final tally of interviewees was:

- 27 architects (3 with double interviews for two projects)
- 10 electrical engineers
- 2 lighting designers
- 7 mechanical engineers
- 1 owner
- 1 site representative
- 1 general contractor

Figure 6.4 shows the final distribution of our sample, by state.
Figure 6.4 – Interview Targets and Achieved Sample by State

Figure 6.5 shows our sampling results by project status. Our basic goal was to select more projects that were close to completion, although we attempted to collect data for the full range of project design and construction. This was done in order to increase the potential pool of on-site evaluations. In addition, it was reasoned that we were likely to get a fuller case history from projects that were further along in the construction process. As a result of this decision we were more likely to talk to projects that had been contacted by the Daylighting Lab earlier in the study period and less likely to talk to the most recent projects.

Figure 6.5 – Goal and Achieved Sample by Project Status
6.2.3 Daylighting Strategy Findings

Our first questions of the interview asked about the overall daylighting system and approach. We asked about general building layout and other site issues, as well as specific issues such as glazing type and shading strategy as a means of getting the respondent thinking about the project and engaged with the interview.

We also asked specifically about the primary daylighting strategies. The projects used a range of daylighting strategies including sidelighting, skylighting, clerestory windows, light shelves, atriums, and roof monitors. Sixty percent (60%) of the projects used some combination of daylighting strategies. By far, sidelighting and skylights were the most common methods. Seventy-three percent (73%) of the projects used sidelighting and fifty percent (50%) used skylights. Twenty-five (25%) of the sample specifically mentioned the use of light shelves. We found no trends in daylighting strategy by building type.

We asked specifically when daylighting was first introduced to the project. The interviews revealed that the idea to include daylighting in the design was introduced early – by conceptual design – 87% of the time. However, even when the idea to include daylighting was introduced early, the actual development of the daylighting system did not come until later. If the daylighting system was not given form and direction early, these projects tended to face the same challenges of achieving daylighting integration as those projects that did not decide to integrate daylighting until later in the design process.

In 73% of the projects, the idea to include daylighting was reportedly introduced by the architect. In only 13% of the projects did the owner introduce the idea to integrate daylighting. This finding, however, may be a function of interviewing primarily architects.

Very few of the projects had calculated, or could even easily estimate, the percentage of the total building area that was daylit. The interviewers defined daylit area as any area of the building where half of the electric lighting could be turned off and there would still be sufficient light for the use the space was designed for. The reported daylit area ranged from 0% to 100%, and averaged 49%. The estimated daylit area tended to be higher for schools and lower for offices, but there was no trend by building size. Because few of the respondents had calculated the percentage before being asked the question, these values may not be particularly reliable.

Many design teams reported that they had reduced the area of glazing, relocated the glazing, used higher performance glazing materials, and/or modified the shading strategy based on input from the Daylighting Lab. A number reported that this project was their first time using techniques such as skylights or light shelves.

6.2.4 Electric Lighting Findings

We asked for descriptions of the electric lighting systems, specifically how they responded to the daylighting. We also asked the interviewee to describe any automatic or manual lighting control system. We were often referred to engineers to get this information, as many architects tended to be sketchy on the details of the lighting system. In general, these projects had fairly sophisticated lighting designs. Direct/Indirect systems were mentioned by 30% of respondents,
typically in schools, and 20% of respondents mentioned T5 fixtures. Most of the lighting made use of efficient fluorescent sources.

In the majority of projects (80%) the electric lighting system was reportedly designed at least in part in response to the daylighting system. On the simplest level, the electric lights were laid out or were circuited to allow for switching of the electric lights in response to the available daylight.

Sixty percent (60%) of the projects made use of automatic photocontrols to control the electric lighting. In half of those cases, the electric lights were switched and in the other half, they were dimmed. We estimate that about one-third of the projects were likely to have electric lighting that was fully integrated with the daylighting, with careful layout, source selection, automatic controls and careful commissioning.

Unfortunately, of all of the aspects of the daylighting system, photocontrols were the item that was the most likely to be cut out of the project before completion, with cost often mentioned as the reason. The designers also frequently mentioned concerns about user acceptance, commissioning and maintenance of a system with photocontrols.

Electrical engineers typically reported that they were asked to do a daylighting design by the project architects. For some this was a new experience, while others felt that they already knew how to do this. None of the electrical engineers reported receiving any reports or guidance from the Daylighting Lab.

### 6.2.5 Critical Decision Points

We asked a series of questions probing the critical decision points related to daylighting, including, “What were some of the most critical decision points in your design process?” and “Who were the most influential players?” Table 6.4 shows the responses to the first question. The most common response (30%) was that the critical decision point came at the conceptual stage and dealt with layout, massing and sighting issues.

Table 6.4 shows the responses to the question regarding the influential players. Just as the designer was reported to be the most common person to introduce the idea of including daylighting in the design, they were also typically (67%) the most influential player in the...
resulting design of the daylighting. The client was also reported to be very influential (40%), however this influence was usually exerted through the budget. In 20% of the projects, the Daylighting Lab was mentioned as being significantly influential.

### Table 6.5 – Most Influential Players

<table>
<thead>
<tr>
<th>Players</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch/ Designer</td>
<td>67%</td>
</tr>
<tr>
<td>Owner/ Client</td>
<td>40%</td>
</tr>
<tr>
<td>Daylighting Lab</td>
<td>20%</td>
</tr>
<tr>
<td>Other</td>
<td>17%</td>
</tr>
</tbody>
</table>

We also asked, “What is needed to guarantee the success of the daylighting system?” The responses are presented in Table 6.6. In just under half of the projects, the respondents did not feel there was anything further needed to guarantee the success of the daylighting system. The most common concern was operation and maintenance. The designers for about one-third of the projects stated that the full success of the system depended on the operation and maintenance, including commissioning (Cx), of the daylighting system. This concern was most frequently directed toward the lighting controls, especially photocontrols. Other factors mentioned as having an impact on the success of the daylighting system were funding and material/equipment selection. Design integration was mentioned as a concern for one project still in the early phases of the design process.

### Table 6.6: What Is Needed to Guarantee Success?

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>None / Don’t Know yet</td>
<td>44%</td>
</tr>
<tr>
<td>O&amp;M (including Cx)</td>
<td>34%</td>
</tr>
<tr>
<td>Funding</td>
<td>9%</td>
</tr>
<tr>
<td>Material/Equipment Selection</td>
<td>6%</td>
</tr>
<tr>
<td>Design Integration</td>
<td>3%</td>
</tr>
</tbody>
</table>

We asked if the interviewees perceived any future risks to the daylighting system. Forty percent (40%) of the interviewees perceived a future risk. In two-thirds of these cases, the concern was due to uncertainty about the correct performance of the daylighting system. By far the most common concern was whether photocontrols would perform as promised. People expressed concern that photocontrols might turn the lights on or off at the wrong times, annoy occupants, require too much effort to commission or maintain or not save the amount of energy hoped for. Concerns were also expressed about the daylighting distribution system, such as whether light shelves would really reflect light as promised, whether there would be enough daylight, or whether there would be glare problems. Only one or two interviewees expressed concerns about leaks, overheating, correct occupant use of the blinds, cleaning or maintenance of the glazing.

In the other third of the cases, the greatest perceived risk came from the budget. The concern was that features of the daylighting system, especially photocontrols, would be cut from the project due to budget constraints. Many of the interviewers made the point that the earlier the daylighting system was introduced to the project, the more daylighting would be integrated into the design and the less likely it was to be cut from the project.
6.3 Case Study Analysis: Daylighting Lab Influence

After we probed for critical decision-making points and issues, we asked specifically about the influence of the Daylighting Lab. This section presents the responses to a series of questions and summarizes the influence and impact of the Daylighting Lab based on the overall responses, sophistication and “stories” of the interviewees.

6.3.1 Primary Services Provided by the Daylighting Lab

We found the Daylighting Lab to be providing three primary services:

- Pre-design advice
- Marketing (i.e., helping with the initial sale of daylighting to the client)
- Daylighting analysis and modeling

Many of the designers were familiar with the Daylighting Lab before they began work on the project. Many had become familiar with the services of the Daylighting Lab through training courses offered by the Daylighting Lab, or had known Joel Loveland previously. Typically, they initiated the contact and invited the Daylighting Lab to provide input to their project.

The Daylighting Lab often provided initial advice to the designers about daylighting systems that were appropriate to their project, as well as strategies and potential pitfalls. Less frequently, the Daylighting Lab was brought in to make a presentation to the client to help the design team sell the idea of incorporating daylighting into the project. The Daylighting Lab was able to provide an authoritative endorsement of the energy, aesthetic and other intangible benefits of daylighting. The designers who made use of this service frequently commented that the Daylighting Lab’s presentation was instrumental in getting daylighting included in the project.

The most common service, and the one that the designers mentioned as being the most useful, was analysis and modeling of the daylighting distribution. The design team’s physical models were either sent or brought to the Daylighting Lab in Seattle to test under the overcast sky simulator and heliodon to analyze sun angles, sun penetration and daylight distribution. The Daylighting Lab then provided the designer with a video and/or analysis report.

The architects most commonly reported that this process was useful in helping them to fine-tune their design, to size or locate apertures, maximize daylight penetration and block any undesirable direct sun penetration. Less frequently, but still commonly, they mentioned studying glare, daylight levels, or balanced daylight distribution. We would consider the study of sun angles and sun penetration to be elementary information, with glare, daylight levels and daylight distribution to demonstrate a more sophisticated understanding of daylight design. Thus, many of the designers were judged to require fairly basic help.

A few projects mentioned Daylighting Lab assistance with the selection or layout of electric lighting fixtures. A few mentioned requests for electric lighting specifications that were not available. A few mentioned that they had to go elsewhere to get further information on glazing materials. None of the engineers reported having any contact with the Daylighting Lab, or
receiving any information from the Daylighting Lab. When we asked architects about the reports of the Daylighting Lab the typical response was: “I know it’s here somewhere…” It was very clear that the architects valued the reports of the Daylighting Lab, but not being passed on to the engineers. The one exception to this was an integrated architectural and engineering firm (A/E) where the architects and engineers on the project all worked together in the same office.

6.3.2 Potential Further Assistance

We asked each case study respondent what other assistance the Daylighting Lab could provide. Sixty percent of the respondents said “nothing” (note that the broader-based survey yielded several suggestions for additional assistance). Many respondents followed up with comments such as, “They’re doing a great job.” One respondent, who received assistance on shading recommendations only, happily commented that the Daylighting Lab gave her specifically what she asked for and did not try to sell any additional services. She was pleased that the assistance provided by the Daylighting Lab was tailored to her specific needs, as opposed to one canned response to all projects. Specific suggestions for additional services that could be provided include the following:

- Additional guidance on how to proceed after initial design
- More quantified estimate of energy savings
- Reports (i.e., paper copies of findings and recommendations)
- Help with specifications (both glazing and electric lighting system)

6.3.3 Who Is the Daylighting Lab Influencing?

As part of our analysis, we provided a post-interview assessment of the attitude, sophistication and influence of the Daylighting Lab on the design team relative to daylighting.

We found that most of the designers had a very positive attitude relative to daylighting. This is not surprising considering most of the designers specifically sought out the aid of the Daylighting Lab. Also not surprisingly, we concluded that the Daylighting Lab generally had a greater effect on the designers with less sophistication.

Interestingly, some of the architects who professed the greatest knowledge of daylighting, and/or who billed themselves as “green architects,” often described building designs that seemed more likely to be over-glazed, have glare problems, or challenging designs that engendered more corrective suggestions from the Daylighting Lab. They also seemed less receptive to suggestions, and less likely to be appreciative of the Daylighting Lab’s services.

Less sophisticated architects were often very pleased with the learning experience working with the Daylighting Lab, although they tended to think some of the suggestions were too easy and low-tech, like using white interior surfaces or adding a skylight or two.

The influence of the Daylighting Lab was almost entirely limited to architects. Very few of the mechanical or electrical engineers we interviewed had any direct interaction with the Daylighting Lab and many of them were not even aware of the involvement of the Daylighting Lab in the project.
6.3.4 Is the Daylighting Lab Influential?

Based on the respondents’ feedback on the Daylighting Lab services and our assessment of its impact on the specific projects, we attempted to quantify the influence of the Daylighting Lab on the various phases of a project. Table 6.7 shows the percentage of respondents who indicated an influence by project phase.

**Table 6.7 – Daylighting Lab Influence**

<table>
<thead>
<tr>
<th>Daylighting Lab Influence on:</th>
<th>Respondents who indicated an influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice of Daylighting System</td>
<td>20%</td>
</tr>
<tr>
<td>Development Of Daylighting System</td>
<td>77%</td>
</tr>
<tr>
<td>Electric Lighting</td>
<td>20%</td>
</tr>
</tbody>
</table>

The influence of the Daylighting Lab has clearly been focused on the development of the daylighting system. In 77% of the projects, the Daylighting Lab influenced the development of the daylighting system, but in only about 20% of the projects did the Daylighting Lab influence the initial choice of the daylighting system, or the electric lighting system. In general, the Daylighting Lab has been assisting architects in the development of already selected daylighting systems. However, the emphasis tends to be on building layout and architectural elements, not electric lighting systems and photocontrols.

We conclude that the assistance of the Daylighting Lab is enabling architects, who are already committed to daylighting, to design better and more effective daylit buildings. The Daylighting Lab, however, is having far less of an impact on the decision of whether to include daylighting in the first place, what daylighting strategy to adopt, the integration of electric lighting with the daylighting, or other subsequent engineering decisions related to the integration of the daylighting system. Much of this is still occurring on these projects, but without obvious influence of the Daylighting Lab.

6.4 Case Study Analysis: Energy Savings

The attitude of the majority of the designers was a general confidence that energy would automatically be saved through the use of daylighting. However, energy savings were rarely quantified. Only seven of the 30 projects had even attempted to quantify energy savings. Typically, the energy savings of the daylighting system were only modeled or calculated when necessary to qualify for standards such as LEED or when mandated by governmental regulations.

When energy savings were estimated, these were usually only the savings due to lighting energy, as opposed to complete building savings incorporating changes in heating or cooling loads. The whole building lighting energy savings estimates for the seven projects ranged from 20% to 46%. Furthermore, when the savings were calculated, they were compared to a code compliant baseline building rather than the actual design. Additionally, they were compared with standard electric lighting practices and without the improved daylighting elements. As a result, we find the estimates of energy savings from the interviews to be not useful.
The designers’ attitudes revealed that energy savings were rarely the dominant motivation for the inclusion of daylighting. Most often, the architects were using daylighting for aesthetic purposes. Energy savings were considered important, but most of the projects would not have justified the use of daylighting on energy cost savings.

Given the number of small projects, schools, and low-intensity use buildings in our sample, it is also clear that the buildings included in the program were not selected to maximize energy savings. Discussions with Alliance staff reveal that no specific building types were targeted. The completed projects are merely a reflection of what “came through the door” as a result of the many marketing and educational activities that were conducted. Opportunities to maximize energy savings from daylit buildings are discussed further in the final section of this report.

6.5 Case Study Analysis: Market Transformation Impacts

The influence of the Daylighting Lab has the strong potential to extend beyond the specific projects we studied, to future projects by the influenced design teams. Two-thirds of the respondents indicated that they learned more about daylighting through process. Many architects commented specifically about learning more about sun angles and penetration due to the modeling studies. Others commented on trying new approaches in this project that they would consider for future projects, if this project were successful. These designers should be able to approach future projects with a better understanding of daylighting and a larger repertoire of strategies to use.

There is also the potential for a ripple effect beyond the direct influence on the architects. Engineers are being challenged to consider and design daylit systems, even if the Daylighting Lab is not directly influencing their choices. These engineers do perceive that knowledge about daylighting is a marketable skill. With the help of the Daylighting Lab, architects are designing buildings with better daylighting than they would have done otherwise. Once constructed, these buildings are then likely to serve as demonstrations of successful daylighting for other future projects, and may thus influence other architects, engineers, building owners or occupants in their future decisions.

6.5.1 Potential Daylighting Energy Savings

In assessing market transformation impact, the question arises “What is the success of the program to date relative to the opportunity?” A secondary question is “What is the best strategy to reach the greatest opportunity?”

In order to assess these questions we did a rough analysis of the daylighting energy potential of new buildings in the Northwest. First, we plotted information on the amount of new construction area (square feet) by building type and by state. This data, shown in Figure 6.6, was obtained from the Ecotope report on New Construction in the Northwest.

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Next, we did a loose estimate of the daylighting potential of these buildings. We used lighting power densities as reported in the Ecotope survey, hours of operation as reported in California’s Savings by Design program and our own rough estimate of the percentage of floor space that could likely be daylit by side-lighting or top-lighting strategies for each building type, along with a best guess on approximate lighting energy savings potential for each category. Figure 6.6 also shows the results of the calculation. Total potential daylight energy savings for the buildings built that year are estimated at 17 gigawatt-hours per year or 1.94 average annual MW of capacity, and whole building energy savings would likely be even greater.

Figure 6.6 – New Construction Floor Space and Daylight Savings Potential, by Building Type in the Northwest (1998).

Totaling results from Figure 6.6 across all four states, the building types with the highest potential energy savings are as shown in Table 6.7.

Table 6.7 – Rank of Building type by Percentage Total Daylight Energy Savings Potential

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Percentage Total Daylight Energy Savings Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>20%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>19%</td>
</tr>
<tr>
<td>Retail</td>
<td>17%</td>
</tr>
<tr>
<td>Warehouse</td>
<td>17%</td>
</tr>
<tr>
<td>Education</td>
<td>7%</td>
</tr>
<tr>
<td>Grocery</td>
<td>6%</td>
</tr>
</tbody>
</table>

* Manufacturing SF based on warehouse SF, since no manufacturing numbers available
These numbers are very rough, and furthermore, will vary each year as the proportion of new construction square footage by building types varies with the real estate and construction market. However, it is clear from this simple analysis that office buildings, retail, manufacturing and warehouses represent the largest daylight energy savings opportunities. Educational buildings and grocery stores are significant, but secondary. If grocery stores were included with retail (since they are a very similar function, building type and ownership), those two categories combined would have the single greatest potential at 24%.

As a test, we repeated this calculation for the California new construction market, using a longer-term database from 1995 through 1998, to see how much variance there was in the results. The ranking of the building types and magnitude of savings remained the same. For the California analysis, we took it one step further, and compared two types of daylighting systems: those buildings that might require some architectural finesse in order to get the daylighting design system working well versus those buildings that use very simple systems that can be easily optimized and replicated. The results showed that roughly 64% of the energy savings could result from the simple buildings, (retail, grocery, manufacturing, warehouse, schools (25% of SF), offices (25% of SF); while 36% of the energy savings form those buildings requiring more design finesse, i.e. all other buildings.

Educational buildings have, to date, been the primary recipients of the Daylighting Lab’s efforts, and offices a secondary recipient. All other building types constitute less than 20% of the buildings contacted by the Daylighting Lab. The analysis presented above in Figure 6.6 and Table 6.7 suggests that there are significant energy savings to be achieved by prioritizing of the Daylighting Lab’s marketing and outreach efforts. In this scenario, educational buildings would have a lower priority than offices, and top priority would be given to “big box” type buildings, including retail, grocery, warehouse and manufacturing. Schools may provide an easy entrée to teach architects about daylighting strategies, but clearly other building types will result in greater energy savings.

### 6.5.2 Other Program Opportunities

We identified several missed opportunities that the Daylighting Lab should try to capture, including:

- **Reach out to engineers** – The interviews revealed that the Daylighting Lab is having a very limited impact on the engineers. Engineers, both electrical and mechanical, reported no personal contact with the Daylighting Lab and no information received via reports or studies. The Daylighting Lab has an opportunity to educate engineers about daylighting in the same way that it is educating architects.

- **Encourage engineering integration with daylight design** – When electric lighting is integrated with the daylighting it is at the instigation of the architect. Unless told to do otherwise, the electrical engineers typically report designing the electric lighting system without considering the potential contribution of daylight. The electrical engineers that did work on integrated electric lighting systems said that they enjoyed the project. We estimate that about one third of the projects achieved full integration of the lighting system.
We did not talk to enough mechanical engineers to get a sense of their approach to design integration. However, their specific lack of interest in talking to us (as evidenced by the high proportion on un-returned phone calls from this group) suggests that daylighting integration is not a key concern in their practice.

- **Support the use of automatic photocontrols** – Many projects that had photocontrols were still in the design process and photocontrols tended to be one of the features most susceptible to being cut due to budget or a lack of confidence in the technology.

The bulk of savings that can be garnered from a daylighting strategy come from reducing the electric lighting in response to the available daylight. Many of the projects depended on manual switching instead of automatic photocontrols to reduce the lighting level. Although 60% of the projects reported making use of photocontrols, most of them were only using them in a limited scope.

- **Develop a regional network of other daylight resources outside of the Daylighting Lab** – A few respondents commented on wishing for more information on daylighting products and wondering where to go to find the information. A few went to other private consultants and/or manufacturer’s representatives in the area. A few commented on the Daylighting Lab not having the time to return phone calls or provide follow-up analysis. All of these issues could be addressed by helping to develop a regional network of other resources on daylighting.

### 6.5.3 Other Program Recommendations

In our discussions with program participants, other opportunities to improve the program services or administration were identified:

- **Report project energy savings** – It was essentially impossible to track the energy savings from these projects. Many respondents wished they had the information, but clearly they did not have the means or motivation to generate it on their own. This is an easy and obvious role for the Daylighting Lab, both to better serve its clients and also to better track its own progress.

- **Develop a list of standard services** – We suggest that now that the program has become established it would be useful to establish a list of standard services offered to the participants. Such a list could help clarify what services are available from the Daylighting Lab, versus from other sources, and also clarify client contact efforts among members of the program staff. A list of services might include such items as:
  - Selling to client (speeches, presentations)
  - Design concepts (teaching, charrettes, case studies)
  - Design optimization studies (physical, computer modeling)
  - Illumination report (isolux plots, peak/average footcandles)
  - Energy report (whole bldg. U-value, SHCG, internal gains)
  - Tech sheets, sample specs (3rd party reports)
  - Supplier referral (networking, web access, case studies)
– Commissioning guidelines (KISS, field experience)
– Verification of operation (incentive programs, LEED cert. M&V)
– Operation guidelines (operator training)

**Track project contacts and progress** – A number of respondents reported phone calls not returned or promises not kept. As the program grows, with more staff, the challenge of keeping track of the status of multiple projects will grow exponentially. Maintaining a tracking database of program contacts and project status would greatly facilitate both internal services and program evaluation. A tracking database could be used to communicate program status and needs to other staff working with the same client. Information easily compiled in a tracking database include:

– Contact names, addresses, phones and e-mails for all key players
– Project statistics (building type, size, location, start date)
– Services provided (list per above, by whom, to whom, on what date)
– Energy estimates (results of the energy report above)
– Other useful information on the project, such as photographs, costs, details that might be a useful reference for future projects or a case study

### 6.6 Case Study Analysis: Summary

In this section we summarize the results of our analysis as they apply to the case study.

**Is Any Energy Being Saved?** – We believe that energy is indeed being saved as a result of the program efforts, however it is difficult, and indeed probably impossible at this point, to quantify. The most reliable energy savings would seem to be from the envelope improvements encouraged by the Daylighting Lab. Improvements to aperture design are likely to result in reducing both heating and cooling loads. Lighting energy savings also exist, but again are difficult to quantify. The lighting energy savings are probably significantly less than their potential, given the daylight design of the buildings.

**Is the Daylighting Lab Being Influential?** – The Daylighting Lab is helping architects to produce better daylit buildings. The resulting buildings seem likely to have better lighting quality, better envelope efficiency, and more cost-effective use of resources. Most of the architects being influenced are already committed to daylighting. These architects are learning more about both the basics and the fine points of daylighting than they knew previously due to interaction with the Daylighting Lab. The Daylighting Lab has helped convince some owners to pursue a daylit building.

The Daylighting Lab, however is not being influential on the engineering design of these buildings. Electrical and mechanical engineers are being indirectly challenged by their architects to design daylit buildings, and thus they are learning about new techniques and products. They are not, however, receiving this learning experience directly from the Daylighting Lab.
What Else Could the Alliance Be Doing to Get More Energy Savings? – The biggest opportunity for achieving greater energy savings would seem to be targeting other building types and larger buildings that promise greater potential energy savings, for less staff effort. Encouraging greater involvement of the Daylighting Lab with the project engineers offers the potential for better design integration across lighting and mechanical systems. Supporting the adoption of automatic photocontrols will promote greater, and more reliable, energy savings resulting from the projects.
SECTION 7: SURVEYS WITH NON-PARTICIPANT ELECTRICAL CONTRACTORS

7.1 Introduction

7.1.1 Background and Methodology
Historically, the LDL has worked most closely with architects, lighting designers and end-user customers. While the Lighting Design Lab has not traditionally targeted electrical contractors, this group is often cited having substantial influence over lighting design decisions and therefore constitutes a potentially important market for the LDL. In order to understand why this group has not fully utilized the LDL and its services, and to determine if this group constitutes a viable opportunity for the LDL, a survey was conducted with electrical contractors in the Puget Sound region.

Specific objectives of the surveys were to:

- Assess current usage of the LDL by electrical contractors;
- Assess current awareness of the Lighting Design Lab in the electrical contracting market;
- Understand general lighting practices among electrical contractors;
- Identify market transformation opportunities within the electrical contracting market;
- Determine strategies for marketing the LDL and its resources to electrical contractors.

The survey instrument was developed for both contractors who had used the LDL’s electric lighting consults or the LDL’s mock-up facility (participants) and contractors who had not used the LDL consultation or mock-up services (non-participants). Contractors who had used other LDL services (e.g., classes, displays, information, etc.) were classified for analysis purposes as non-participants. A copy of the survey instrument is included as Appendix D. In total, 15 interviews were completed.

The survey instrument had four sections: (1) awareness of the LDL; (2) interest in LDL services, (3) lighting decisions and (4) company information. The findings are organized as follows:

- Company Characteristics
- Awareness of LDL Services
- Potential Interest in LDL Services (non-participant results only)
  - Electric Lighting Consults
  - Electric Lighting Mock-Ups
  - Lighting Classes
  - Library of Resources

4 All fifteen respondents reported that they were aware of the existence of the LDL.
– Additional Services
  ▪ Lighting Decisions
  ▪ Marketing Approach/Strategy
  ▪ Analysis/Conclusion/Recommendations

The sample for this survey was drawn randomly from the National Electrical Contractors Association’s (NECA) online membership directory for King, Pierce, and Snohomish counties in Western Washington. In total, 46 companies were called and interviews completed with representatives of 15 firms: 12 with non-participant contractors who had never come in contact with the LDL, and 3 with participant contractors who had some previous experience with the LDL.

7.1.2 Company Characteristics
To classify their responses, and determine the scope and size of the electrical contracting companies interviewed, contractors were asked the following general questions about their companies: (1) How many lighting professionals\(^5\) are employed full-time at their companies? (2) How many projects does their company work on in a year? and (3) What are the typical markets they work in? Table 7.1 summarizes the responses to these questions.

<table>
<thead>
<tr>
<th>Contractors</th>
<th>No. of Employees</th>
<th>Projects per Year</th>
<th>Market Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-Participants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>100+</td>
<td>Maintenance</td>
</tr>
<tr>
<td>2</td>
<td>65</td>
<td>N/A</td>
<td>“Anything and Everything”</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>24-36</td>
<td>Commercial, Industrial, Marine</td>
</tr>
<tr>
<td>4</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>5</td>
<td>250</td>
<td>200</td>
<td>Commercial, Industrial, Residential</td>
</tr>
<tr>
<td>6</td>
<td>4-19</td>
<td>12</td>
<td>Commercial, Hospitality</td>
</tr>
<tr>
<td>7</td>
<td>15</td>
<td>30</td>
<td>Commercial, Health Care, Industrial</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>5-10</td>
<td>Commercial, Government, Health Care</td>
</tr>
<tr>
<td>9</td>
<td>100-500</td>
<td>200</td>
<td>Commercial, Residential, Tech., Exhibits</td>
</tr>
<tr>
<td>10</td>
<td>125-300</td>
<td>20</td>
<td>Commercial, Industrial</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>6</td>
<td>Commercial, Industrial, Municipal</td>
</tr>
<tr>
<td>12</td>
<td>150</td>
<td>80-100</td>
<td>Commercial, Health Care, Financial, Institutional</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>400</td>
<td>150+</td>
<td>Commercial</td>
</tr>
<tr>
<td>2</td>
<td>100+</td>
<td>100</td>
<td>Commercial, Institutional</td>
</tr>
<tr>
<td>3</td>
<td>350-500</td>
<td>100</td>
<td>Commercial, Industrial, Health Care</td>
</tr>
</tbody>
</table>

The range of full-time employees among respondents varied from one to 500. Responses were varied when asked how many projects a year their contracting companies work on in a year, and ranged from half a dozen to 200. There were four firms in the 10-30 range, and another four that ranged from 100-200.

\(^5\)“Lighting professional” was defined as a contractor, consultant, electrician, engineer or any one else with professional lighting qualifications.
The most common markets that contractors named in the survey were commercial offices, general commercial, institutional, industrial, multi-family residential, medical and municipal. These markets align closely with the markets in which the LDL has historically provided services.

### 7.2 Awareness of LDL Services

The surveys first aimed to gauge the awareness, understanding and current usage levels of the LDL among the contractors we interviewed. All 15 said that they were aware of the Lighting Design Lab. The three participants were, overall, enthusiastic about the LDL and its services. The 12 non-participant contractors, on the other hand, knew very little about the specific services offered by the LDL, and showed relatively little interest in using those services. These findings indicate that the LDL has extensive brand recognition in the region, but that the depth of understanding related to specific services may be improved.

**Non-Participants**

Table 7.2 highlights the services that non-participants were aware of. All of the non-participant contractors said they have known about the existence of the LDL for several years. Non-participants said they learned of the LDL primarily through direct mail, but other sources noted by contractors were word of mouth and NECA.

<table>
<thead>
<tr>
<th>Service</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays</td>
<td>4</td>
</tr>
<tr>
<td>Can’t Recall/Don’t Know</td>
<td>3</td>
</tr>
<tr>
<td>Mock-Ups</td>
<td>2</td>
</tr>
<tr>
<td>Advice</td>
<td>1</td>
</tr>
<tr>
<td>Information</td>
<td>1</td>
</tr>
<tr>
<td>Literature</td>
<td>1</td>
</tr>
</tbody>
</table>

Two of the non-participant contractors had taken classes offered by the LDL and accessed the information resources of the LDL. These contractors were asked if they would use these services again, and both said they would definitely use them again, and noted that these services provide good information to help better themselves as professionals.

**Participants**

Overall, the three participant contractors were very knowledgeable about the LDL. The awareness and subsequent use of the LDL by these participant contractors indicates that mock-ups and information resources are the top services contractors know about and use. The awareness and usage of the services of the LDL are as follows:
Table 7.3 – Awareness and Usage of LDL Services by Participants

<table>
<thead>
<tr>
<th>Services</th>
<th>Awareness</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mock-Ups</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Information/Lighting Resources</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Classes</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Product Information</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Electric Consults</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Daylighting Consults</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Daylighting Modeling</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Displays</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

All of the participant contractors said that they would re-use the services they had previously used, most often noting knowledgeable and helpful staff, great resources for new ideas, convenience, and flexibility of the facility (specifically regarding the mock-up room). While feedback from participant contractors was positive, one said he did not have much occasion to use the mock-up facility on a regular basis. He did say, however, that when he does, it is used as a third-party resource to show his clients the fixtures and explain the possible lighting options. Participants were also asked if they could recommend any improvements for the LDL. Only one gave any recommendations, and said he would like more parking options near the LDL as well as an expanded facility overall.

7.3 Interest in LDL Services (Non-Participants)

The survey attempted to determine interest in LDL services among non-participants. Non-participant contractors were given an overall description of the LDL, as well as detailed descriptions of individual LDL services, and then asked several questions about how these services might be of use to them.

Table 7.3 – Interest in LDL Services among Non-Participants

<table>
<thead>
<tr>
<th>Services</th>
<th>Yes</th>
<th>Maybe</th>
<th>No</th>
<th>Did Not Know</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Lighting Consults</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Electric Lighting Mock-Ups</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Classes</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Library</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>

Considering the overall lack of detailed familiarity with services available from the LDL, the fact that the majority of contractors were interested in these services indicates that marketing to these contractors may have a good response. Non-participants most often said they have established relationships with lighting professionals, or tend to rely on their own experience if they have any problems or questions. They were comfortable with the process they already have established, and the LDL is currently seen as an outsider in that process.
7.3.1 Electric Lighting Consults

To better understand the current practices of non-participants, as well as to aid in understanding the scope of LDL services that might be useful for LDL services, we asked what resources they presently use in addressing questions relating to lighting design and/or product specification. Responses on this topic were varied.

Table 7.4 – Lighting Design Resources Identified by Non-Participants

<table>
<thead>
<tr>
<th>Responses</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rely upon their own expertise</td>
<td>4</td>
</tr>
<tr>
<td>Ask a manufacturer’s representative</td>
<td>3</td>
</tr>
<tr>
<td>Rely on their own expertise, but may also consult with lighting designers and manufacturer’s representatives</td>
<td>3</td>
</tr>
<tr>
<td>Utilize on-staff lighting designer</td>
<td>1</td>
</tr>
<tr>
<td>Utilize an outside lighting consultant or engineer</td>
<td>1</td>
</tr>
</tbody>
</table>

As shown in Table 7.4, a majority of non-participants report that they rely primarily upon their own expertise supplemented with input, as necessary, from trusted advisors such as manufacturer’s representatives. When we described the service offerings of the LDL and asked if the electric lighting consults service might be useful to them, responses were mixed as shown in Table 7.5.

Table 7.5 – Non-Participant Interest in LDL Electric Lighting Consultation Services

<table>
<thead>
<tr>
<th>Responses</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>Maybe</td>
<td>4</td>
</tr>
</tbody>
</table>

While non-participants are generally confident with the quality of their work, there are indications that some may be receptive to the objectivity and credibility the LDL would offer in selling clients on their project recommendations. Three of the five non-participants who felt the LDL consults would be useful to them said the Lab would help in: (1) convincing owners and clients of lighting decisions, and (2) showing that recommendations are given without bias from a manufacturer. Interestingly, this benefit of enhanced third-party credibility is very similar to observations made by architects who have utilized the services of the Daylighting Lab.

Those who said the electric lighting consulting service might be useful to them emphasized that they generally feel confident in their own skills as designers. Importantly, however, one of these contractors also said the LDL might be helpful as a third-party resource to show his customers exactly what the design will include.

Those non-participants who were not inclined to view the consulting services of the LDL as being useful to their businesses highlighted two issues that may be important for the LDL to consider if it targets this market: (1) their projects aren’t that big, and (2) jobs happen quickly and time is limited.
In summary, responses to the questions regarding electric lighting consults indicate there is a potential interest in the credibility that LDL consults may bring to a project, particularly if the consultation process is designed and implemented in a manner that is responsive to the scope and time constraints of each individual project.

### 7.3.2 Electric Lighting Mock-Ups

Following the questions regarding the electric lighting consults, contractors were asked a similar series of questions about the electric lighting mock-up service at the LDL. First, contractors were asked what they do now if they want to evaluate a product in a realistic setting. Similarly to the electric consults, responses varied:

#### Table 7.6 – Current Actions Taken by Respondents to Evaluate a Product

<table>
<thead>
<tr>
<th>Responses</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop their own mock-up on-site</td>
<td>5</td>
</tr>
<tr>
<td>Don’t find a mock-up necessary</td>
<td>4</td>
</tr>
<tr>
<td>Trial and error (on-site)</td>
<td>1</td>
</tr>
<tr>
<td>Rely on catalogs</td>
<td>1</td>
</tr>
<tr>
<td>Utilize an outside engineering firm</td>
<td>1</td>
</tr>
</tbody>
</table>

As shown above, most report that they will, if necessary, develop a mock-up on-site. Even so, contractors reported they do not do mock-ups very often, and they are typically done only on special projects, or if there are problems with the current lighting system.

Non-participants were then given a description of the mock-up service, and asked if they thought this type of service might be helpful to them.

#### Table 7.7 – Interest in LDL’s Mock-Up Services

<table>
<thead>
<tr>
<th>Responses</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td>Maybe</td>
<td>4</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>1</td>
</tr>
</tbody>
</table>

Although non-participants generally didn’t see the need to use the mock-up facility, several said they would use the facility under the right conditions: (1) if they would not be able to do an appropriate mock-up on-site, (2) if a project was “more sophisticated,” or larger than the typical projects they work on.

Non-participants again stressed the importance of time and money with these questions. Several said they generally have a limited amount of time on projects and limited budget, and putting together a mock-up at the LDL might not be timely or cost effective.

One non-participant contractor, however, did say it would be interesting and helpful if the LDL put together one or several sample mock-ups with new technologies and invited contractors to the LDL to view them. This particular person felt he did not work on large-enough projects to
warrant a mock-up at the LDL’s facility, but said it would be very helpful to see different types of products and technologies on display. This could be a very interesting marketing opportunity for the LDL and could be very useful in launching a marketing campaign targeting contractors, particularly those who work on smaller projects.

Mock-ups are one service the LDL offers where clients can potentially incur a small fee, depending on labor, viewing time, storage and other factors. These fees were described, and the contractors were asked if they would be willing to pay them. All of the non-participant contractors said they would be willing to pay for the mock-ups and most said (1) the fees seem very reasonable and (2) if a mock-up was needed, the fees would be paid without hesitation.

While non-participant contractors said they did not see the mock-up service as being useful overall, there may be ways to modify it so that it is useful to contractors, particularly those who work on small-scale projects. The mock-up facility also can be used as a way to attract contractors to the LDL, by installing new demonstration products and technologies. Promoting the mock-up facility through targeted open houses or brown-bag breakfasts may be a way to spread word and increase utilization.

7.3.3 Lighting Classes

In order to better understand non-participant contractors’ needs for lighting education, we described the curriculum offered by the LDL, including class topics, and asked contractors if they thought these types of classes would be useful to them or their staff. Similar to the consults and mock-ups, results were mixed.

Table 7.8 – Interest in LDL Classes

<table>
<thead>
<tr>
<th>Responses</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>Maybe</td>
<td>3</td>
</tr>
</tbody>
</table>

Those contractors who said the classes would be useful to them were very enthusiastic and viewed them as an opportunity to learn more about their industry. While they feel comfortable with their knowledge and expertise (as identified earlier), these contractors felt that continuing education is always a good idea, and they also acknowledged the fact that there is a lot of information they do not know about.

One contractor expressed his interest in the LDL offering accreditation for electricians in continuing education. While he did not know the exact requirements of the annual renewal of accreditation, he felt the lighting classes would be an excellent way to provide this type of education. Providing electrician accreditation courses is an interesting idea, and could help the LDL class attract and influence a large number of contractors and electricians.

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6 Two of the non-participants had attended a LDL class, although their involvement with the LDL was limited so that they were considered non-participants for questions other than the one addressed in Table 5.8.
The contractors who said the classes either would not or might be useful felt they did not have a need for continuing education or did not view classes such as this as a priority. Similarly to responses throughout the rest of the interviews, these contractors reiterated their confidence in their own expertise, and showed little interest in the classes of the LDL. They also felt the classes might take up too much time for what they would be worth, particularly for the smaller companies.

7.3.4 Library Resources

Contractors generally depend upon a lot of technical information, particularly the specification of fixtures, ballasts and lamps. The LDL library offers this type of information, and this service was described to contractors to gauge whether or not it would be useful to them. Non-participant contractors, overall, showed more interest in this service than in the other services.

<table>
<thead>
<tr>
<th>Responses</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>Maybe</td>
<td>3</td>
</tr>
</tbody>
</table>

Contractors were mainly interested in the access to references, information and specification information, and mentioned they would find the library even more useful if most of the information were available online.

Several contractors felt the LDL library would probably not be useful because they already have an abundance of catalogues and specification information, or rely on manufacturer’s representatives if they have any questions. This is another area in which contractors feel comfortable and confidence in their own expertise and established resources. Many contractors interested in the LDL library said the largest obstacle they would face in utilizing the service is remembering the LDL when a question arises. Increased marketing by LDL would diminish this problem.

7.4 Lighting Decisions

Participant and non-participant contractors were briefly questioned regarding the lighting decisions they make on projects. Overall, the difference in answers between participants and non-participants were not significant. The results of these questions are discussed below.

7.4.1 Use of Standard Lighting Layouts

Contractors were asked if they use standard lighting layouts for similar types of projects. Somewhat surprisingly, a majority of contractors report that they do not use standard layouts.
Table 7.11 – Respondents Using Standard Layouts

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
</tr>
<tr>
<td>No</td>
<td>11</td>
</tr>
</tbody>
</table>

The contractors not using standard lighting layouts overwhelmingly said every job they work on is different, and they treat it as such. Those contractors using standard lighting layouts said (1) they have theories for certain types of applications, (2) they have worked on many similar projects and have found what works best, (3) they only do non-standard layouts if the architect or owner requests something in particular and (4) their company has standard schedules, including lighting density calculations.

### 7.4.2 Formal Training in Energy Efficient Lighting

Contractors were asked if they had ever had any formal training in energy efficient lighting technologies, and if so, what types of training they had received. While approximately one half of the contractors surveyed reported that they had some level of training in energy-efficient lighting technologies, it appears that the other half has thus far had little exposure to these topics.

One contractor with whom we spoke was also an electrical engineer, with professional training in lighting design. He was also LEED certified, had the *Advanced Lighting Guidelines*, and was a member Illumination Engineering Society (IES). Four non-participant contractors, and two participant contractors, had some formal training in lighting, and all of the respondents said they had taken classes, seminars and workshops, many through the Illuminating Engineering Society (IES). Seven of the non-participant contractors and one participant contractor said they had not had any formal training in energy efficient lighting technologies. Some of these noted, however, that they had some informal training, such as reviewing industry literature, and contact with manufacturer’s representatives.

When asked how they learn about the most current lighting technologies and practices, contractors gave several answers, but mentioned the same sources of information: word of mouth, manufacturer’s representatives, trade publications/literature, advertising, catalogs, trade shows (the NECA convention was most often mentioned and Light Fair), IES and lighting consultants.

### 7.4.3 New Lighting Technologies and Practices

The contractors surveyed were asked whether they use and recommend energy efficient lighting options on projects, and if so, what percentage of the time they recommended these options. All fifteen contractors said they used and regularly recommended what they consider to be energy efficient lighting options.

When asked how often they use and recommend new lighting technologies on projects, the results were mixed. Contractors mainly said they try to recommend new technologies as much
as possible, but their recommendations depend on the type of project and have to be cost-effective and reasonable to the customer. One contractor said he recommends new technologies because with electricity rates higher than ever before people tend to pay more attention to ways energy can be saved.

Costs of new technologies are an extremely important factor in the contracting business, particularly when lowest bids (not necessarily quality of work and products) are rewarded. While many energy efficient technologies are also the newest technologies, this is not always the case, and the LDL has the potential to be an educator in this regard.

### 7.5 Marketing Approach and Strategy

In a final question, contractors were asked what they felt is the best way for the LDL to reach electrical contractors such as themselves. Several contractors touched on similar and generally traditional strategies (e.g., direct mail, email, telephone, the Internet). The responses included:

- Reach out to contractors similar to the way a manufacturer’s representative would (i.e., regular office visits, information sharing, relationship-building etc.)
- Newsletter with short, specific technical synopses of new technologies, and information on the lighting market
- After-hours or happy hour professional gatherings held on a regular basis at the LDL to present new technologies and practices
- Advertising/marketing through NECA, contracting/trade publications
- Direct mail, e-mail, telephone, the Internet (e.g., search engines)

The common theme throughout these responses is that, even though they may find the services useful and interesting, contractors typically do not have the time to use LDL resources on a regular basis. The results throughout this survey show the reliance that contractors have on manufacturer’s representatives. If the LDL can tap into the manufacturer’s network, it should be able to target electrical contractors successfully. The most interesting and potentially effective approach, therefore, might be to establish even stronger relationships with the manufacturer’s representatives than the LDL already has, and to develop specific strategies for coordinating efforts to reach electrical contractors.

Contractors are important to the lighting market, and contractors noted that the information they receive should be geared towards them. One contractor mentioned his desire for more specific technical information, rather than design-oriented information he has previously seen with the LDL. While the LDL currently targets primarily architects and lighting designers, the more technical needs of contractors will need to be taken into consideration if this market is targeted directly.
7.6 Summary

In summary, the LDL has the potential to reach the electrical contracting industry, and may want to modify its marketing efforts to reach this important segment of the lighting industry. The findings from this survey show that there are several obstacles, as well as several opportunities, that the LDL must address if it wants to target electrical contractors.

One obstacle is that contractors are used to being actively pursued by manufacturer’s representatives; as a result, they tend not to be proactive in seeking out new information sources. Therefore, if the LDL wants to reach electrical contractors, one potentially effective way would be to adopt some of the methods used by manufacturer’s representatives.

Other significant findings include:

- Electrical contracting is a very competitive market. Most electrical contracting jobs are awarded to the lowest bidder, rather than the contractors with the highest quality products. The cost effectiveness of energy effective design will need to demonstrated and readily evident.
- Contractors are extremely sensitive to time, particularly in the bidding process. Any interventions concerning the bidding process will need to reflect this.
- Contractors tend to rely either on their own expertise in design-build work, or on the expertise of outside consultants with whom they have established relationships such as manufacturers’ representatives, engineers, or in-house lighting designers.
- Contractors did not show a strong need or a desire for the electric consulting and mock-up services of the LDL. However, contractors indicated that they are interested in using the LDL as a third-party resource to visually show their clients lighting options.
- The main reasons why the contractors said the services of the LDL might not be useful to them are lack of time, confidence in their own expertise, and lack of perceived need given the small size and simplicity of many of these projects.
- Of all the LDL services, contractors showed the most interest in the library, particularly with regard to product specification information.


SECTION 8: SUMMARY AND RECOMMENDATIONS

8.1 Summary of Key Findings

Key findings from this evaluation include:

- **Increased use of LDL and Daylighting Services** – As shown in Figure 8-1, both LDL and the Daylighting Lab have expanded their services across the board. The LDL and Daylighting Lab have each continued to provide a wide range of services throughout the region, including electric and daylighting consultations, mock-ups, classes, and information resources. Both the Daylighting Lab and LDL have significantly increased the number of consultations provided.

![Figure 8-1: Trends in LDL and Daylighting Lab Services](image)

- **Classes Well Received** – We conducted a thorough review of course evaluations and, by all accounts, LDL courses are very well received. These evaluations indicate that class participants are highly satisfied with the course offerings and experiences. Staff members are supportive of the change to a course curriculum based upon the Advanced Lighting Guidelines. This approach provides a solid set of reference materials and will be updated as necessary, thereby ensuring that LDL courses are kept up to date with minimal effort.
New Database Anticipated – The Alliance plans to implement a new data tracking system for both the LDL and the Daylighting Lab during 2003. This is important because current information management systems for both the LDL and the daylighting programs are not sufficient for tracking project information necessary to support the Alliance’s market transformation and evaluation objectives.

Success of Daylighting Lab Marketing Approach – The peer-to-peer marketing approach utilized by the Daylighting Lab is successful in developing relationships with key architects in the region and ensuring timely intervention in projects. However, because the approach has been directed almost exclusively at architects there has been minimal contact with or influence on other important groups such as electrical and mechanical engineers. There are indications that the same relationship-based approach may be effective with these other groups, but that it will need to be tailored to the needs and work patterns of each target audience. During 2002, the LDL also started to use this relationship-based marketing approach, including enhanced coordination of marketing efforts with the Daylighting lab.

Electric Lighting Consultation Market Impacts – Interviews with electric lighting project participants indicate a very high level of satisfaction with LDL electric lighting consultations. However, many consultations are conducted on behalf of utility account representatives or directly with the end user; architects, lighting designers, and other design professionals are not typically involved. Because of this, it is not clear whether these projects will play a significant role in transforming the market. The market impact of such consultations may be improved if, for example, up-front screening and project follow-up were undertaken.

Daylighting Consultation Market Impacts – Daylighting participants have given very high marks to the daylighting consults and their services. Better quality daylighting projects are resulting than would have resulted in the absence of the program. Though not purposely targeted, daylighting projects are concentrated in schools and offices, whereas technical potential for daylighting energy savings is higher in other building types. Energy savings for current projects is difficult to estimate.

Electrical Contractors as a Potential Market – Interviews with electrical contractors indicate that they are potentially interested in services provided by the LDL, but are not likely to seek out these services in a proactive manner. This suggests that marketing and outreach efforts to this target market should be modeled on ways in which other vendors work with these contractors. Manufacturers’ representatives, for example, often provide on-site product demonstrations and information seminars, thereby minimizing interference with day-to-day workflow.
8.2 Key Recommendations

Key recommendations from this evaluation include:

- **Development of a Strategic Marketing Plan** -- During the course of this evaluation, the Alliance launched its Commercial Buildings Initiative (CBI). During the almost two-year development process of CBI, the LDL and Daylighting Labs operated without specific strategic direction from the Alliance. Such direction is critical, particularly in the areas of marketing and service definition, if these programs are to achieve their full potential. Development of a strategic direction will require the Alliance and the labs to work together to identify specific target markets and develop concrete marketing mechanisms for reaching these target markets. Within the development of this strategy, the following elements should be considered:
  
  - **Refined Definition of Services Offered** -- At present, the LDL provides a very flexible set of hands-on services including electric lighting design consultations and electric lighting design mock-ups. Each of these services is intended to provide designers and other interested parties with information that may be used to help inform their lighting design projects. While the flexible service approach has served the LDL well in an infrastructure capacity, a refined definition of services for both the LDL and the Daylighting Lab will create greater clarity in the marketplace and enable staff to focus their consulting efforts with customers. Specifically, we encourage the labs to identify three to four specific levels of service offerings for clients, each of which includes a clear explanation of what clients can expect from each service.

  - **Screening of Projects for Consultations** -- Concurrent with a refined definition of consultation services, the Alliance and LDL should define a way to screen projects so that consultation services are provided mainly to projects likely to have secondary effects in the broader market. On a related note, LDL should consider placing expectations upon the customer in return for the value of services received from the LDL. For example, if mock-up services are provided, the LDL might require that it be allowed to review the overall lighting strategy and provide efficiency-related comments on this overall design.

  - **Expanded use of Proactive Marketing** -- With respect to electric lighting consults, the LDL presently serves in a relatively passive capacity, responding to referrals, telephone inquiries, and walk-ins, supplemented by some general awareness advertising and mentions by instructors during LDL courses. Conversely, the daylighting consultation approach has been more proactive in identifying firms with which it wishes to work and marketing directly to these firms. This is typically accomplished through a low-key brown bag seminar, followed by a question and answer period that often starts to involve the daylighting consultant in current design projects. As a result of this effort, the daylighting consultants are able to work more closely with project architects...
early in the design process; that, in turn, provides a better chance for influencing the design. The LDL has taken steps in recent months to implement a similar approach, based upon a territory-based account representative approach. The Alliance and LDL should build upon this approach as a key element of the marketing strategy.

- **Customer Follow-up** – More active follow-up with customers will help to ensure that all questions are answered and pave the way for further involvement in future significant projects. Follow-up procedures for all services should be formalized for both LDL and the Daylighting Lab.

- **Targeting Electrical Contactors and Engineers** -- Two audiences that have thus far not been actively approached by either LDL or the Daylighting Lab are electrical contractors and engineers. The marketing strategy to reach these audiences and recruit them into the program will necessarily be different from the strategies used to reach architects and lighting designers. Having a professional architect marketing to architects has worked well on the daylighting side. LDL and the Daylighting Lab should explore equivalent ways of working with the contracting and engineering professions.

- **Development of a Truly Integrated Approach** -- In developing an integrated approach to energy efficient design, the Alliance and the labs need to develop procedures to ensure that the daylighting and electric lighting components (as well as HVAC and others) are integrated as fully as possible. As an example, when a daylighting project enters the system, the client could also be provided with a description of services related to electric lighting and a meeting could be set up with the electric lighting consultant and the electrical engineer working on the project. Similarly, the LDL staff should ensure that mechanical engineers are brought into the process in a way that will ensure that decreased lighting loads are reflected in the heating and cooling load calculations for the building. Steps have been taken during the past six months to increase such interaction, but these efforts need to be increased and formalized to ensure success.

- **Improved Information Management** -- The present information management system serves largely to track time spent on various activities and to produce reports for the Alliance. To optimize their involvement with and integration into the Commercial Buildings Initiative the Labs need to track project contacts and project information in greater detail. A master database is being developed for the Alliance BetterBricks Advisors Service that will likely serve this purpose quite well. Plans to require its use for LDL and the Daylighting Lab should be carried out and its use monitored extensively for the first six months.