

Training the Next Generation of Energy Efficiency Evaluators: A Report from the Field

Edward Vine, Lawrence Berkeley National Laboratory and California Institute for Energy and Environment, Berkeley, CA

William Saxonis, New York Department of Public Service, Albany, NY

Jane Peters, Research Into Action, Portland, OR

Bobbi Tannenbaum, Madison, WI

Bob Wirtshafter, Wirtshafter Associates, Rydal, PA

Abstract

The energy efficiency services sector is an increasingly important part of the global economy, with an increased need for trained evaluators to foster energy efficiency program accountability and improvement. Organizations are experiencing difficulty in finding people who are knowledgeable about and experienced in the evaluation of energy efficiency programs. Accordingly, there is a need to assess the training needs of the energy efficiency evaluation community (for both new and “experienced” evaluators). This paper presents the results of a recent survey conducted by the International Energy Program Evaluation Conference (IEPEC) on energy efficiency evaluation training needs, complemented by a brief survey of members of the 2012 Rome Conference IEPEC Planning Committee on international needs.

Introduction

The energy efficiency services sector (EESS) is poised to become an increasingly important part of the U.S. economy (Goldman et al. 2010). For example, in one analysis of a “high growth scenario,” the EESS may grow to 1.3 million individuals, a four-fold increase in jobs between 2008 and 2020; and in the “low growth scenario,” a two-fold increase in jobs may occur (*ibid*). At the same time, the field of energy efficiency program evaluation has grown in prominence, due to an array of factors, such as increased regulatory requirements and review, the use of energy demand forecasts and bids by independent system operators, and the crediting of energy efficiency in air quality programs and carbon-trading markets. With the increased activity in the energy efficiency arena and the need for trained evaluators, organizations are increasingly experiencing difficulty in finding people who are knowledgeable about and experienced in the evaluation of energy efficiency programs.¹ Accordingly, there is a need to assess the training needs of the energy efficiency evaluation community (for both new and “experienced” evaluators).

We realize that most evaluators learn their trade (evaluation) on the job – in a 2006 survey of energy evaluation and market research professionals, the respondents noted that either they took an evaluation job (38%) or evaluation was a component of their non-evaluation job (29%) (Bensch et al. 2006). For others, evaluation was a topic in their academic field (9%) or they studied evaluation as an academic field (9%). On-the-job experience will remain critical for adding new people to the field of evaluation. At the same time, the evaluation community can promote the professionalism of the

¹ This statement is not based on a scientific survey or analysis, but on informal discussions with experts and practitioners in the field of energy efficiency evaluation (Khawaja 2012; Rosenberg 2012; Violette 2012). In fact, this problem seems to be more challenging for the evaluation community than the rest of the energy efficiency industry: after the regulated energy efficiency industry as a whole declined from 1995-2005, people with evaluation skills migrated out of the field and none came in to replace them (Rosenberg 2012). As a result, most consulting firms specializing in the evaluation of energy efficiency programs are hiring young, smart, enthusiastic, and inexperienced staff and conducting their own in-house evaluation training (Cooney 2012; Peters 2012; Violette 2012; White 2012).

evaluation industry by offering different types of evaluation training opportunities. The training can focus on specific evaluation topics related to evaluation practices and services, or evaluation methods (see Table 1 later in the paper). And the offering of the training can occur in a variety of methods (e.g., workshops, on-line tutorials, webinars, video courses, etc.).

This paper presents the results of a recent survey conducted by the International Energy Program Evaluation Conference (IEPEC) on energy efficiency evaluation training needs. The IEPEC is a non-profit, educational corporation that organizes conferences on the evaluation of energy efficiency programs every two years in the United States - and now annually when including the conferences held outside the U.S. (Vine et al. 2010). IEPEC offers workshops and training the day prior to the conference on topics ranging from introductory statistics, to planning and managing evaluations, and to measuring greenhouse gas emissions. While other organizations have offered multi-day trainings (separate from conferences) and workshops associated with their conferences (e.g., Association of Energy Services Professionals and the Electric Power Research Institute), the IEPEC remains a principal source of practitioner exposure to energy program research. The educational elements of the conferences go beyond formal workshops to include peer-sharing, refereed papers, poster sessions, expert panel discussions, and the all-important informal networking. The Educational Subcommittee of the IEPEC recognized the need to assess the training needs of the energy efficiency evaluation community (not evaluation broadly or energy efficiency broadly), and conducted an energy efficiency evaluation training survey in 2011.

IEPEC Survey

In 2011, the IEPEC sent an online survey² to its database, which IEPEC considered to be the best, readily available database targeted toward the survey's prime audiences.³ The survey included mostly close-ended questions targeted to help IEPEC direct training efforts in the field of energy efficiency program evaluation. The survey was sent to 5,300 e-mail addresses around the world that the IEPEC had collected over the years – of this number, 785 opened their email and 211 answered the survey (~28% response rate), but many key questions, such as course preferences, generated answers from fewer than 50 respondents, since many were not interested in evaluation training at the time of the survey (see below). In addition, some responses for specific questions were low due to skip patterns in the survey.

This sample was a self-selected group of people. However, this list included more than people who had attended an IEPEC conference. The list also included names from other organizations, suggestions from evaluators, etc. And the list went beyond “evaluators” as it included regulators, program administrators, etc. As noted in footnote #2, we feel that the survey was targeted to the right group of people. Furthermore, the goal of the survey effort was to provide general scoping information and to serve as the first step in the research process. We realized that the survey had limitations, but we were not prepared to spend a much larger budget to hire a consultant to conduct a more robust survey effort. Accordingly, we can draw conclusions from those involved with energy efficiency programs, but not the wider evaluation community.

The survey respondents were associated with many types of organizations, but consulting firms proved the most common (almost 29%) (Figure 1). The second largest category was government (about 18%), followed by utility companies (16%) and four other affiliations each representing 12 percent or less. The diversity of the affiliations highlights a challenge to meeting the

² The online method was chosen due to its lower cost (compared to mail or phone), the format of the database (already formatted for email; phone numbers and postal mail addresses were lacking for most people on the list), and because all of the people on this list had access to the internet.

³ Potential candidates for the proposed training would generally be limited to those involved with energy efficiency programs, so that is why the survey was sent to IEPEC email addresses. Evaluators in the education field, for example, would likely have limited interest in studying energy billing analysis techniques.

training needs of the evaluation community. A consulting firm implementing energy program evaluation may, for example, have a strong interest in obtaining training for new employees in survey design techniques and statistical analysis. On the other hand, regulators, policy makers, and utility managers may have an interest in training to further a basic understanding of evaluation results; effective management of evaluation-related consultant contracts; and enhanced skills for communicating evaluation results to the public.

The diversity of evaluation approaches, needs and expertise for many evaluation activities introduces an additional challenge. Evaluation of energy efficiency programs requires knowledge and expertise in multiple overlapping areas including evaluation approaches, statistics, energy engineering, econometric modeling and sociology, to name a few. As a result, energy evaluation professionals come from a wide variety of disciplines, and while they may be an expert in one area, they may have knowledge gaps in another. Many of these experts may also have little or no exposure to energy programs, the energy industry, or basic energy terminology.

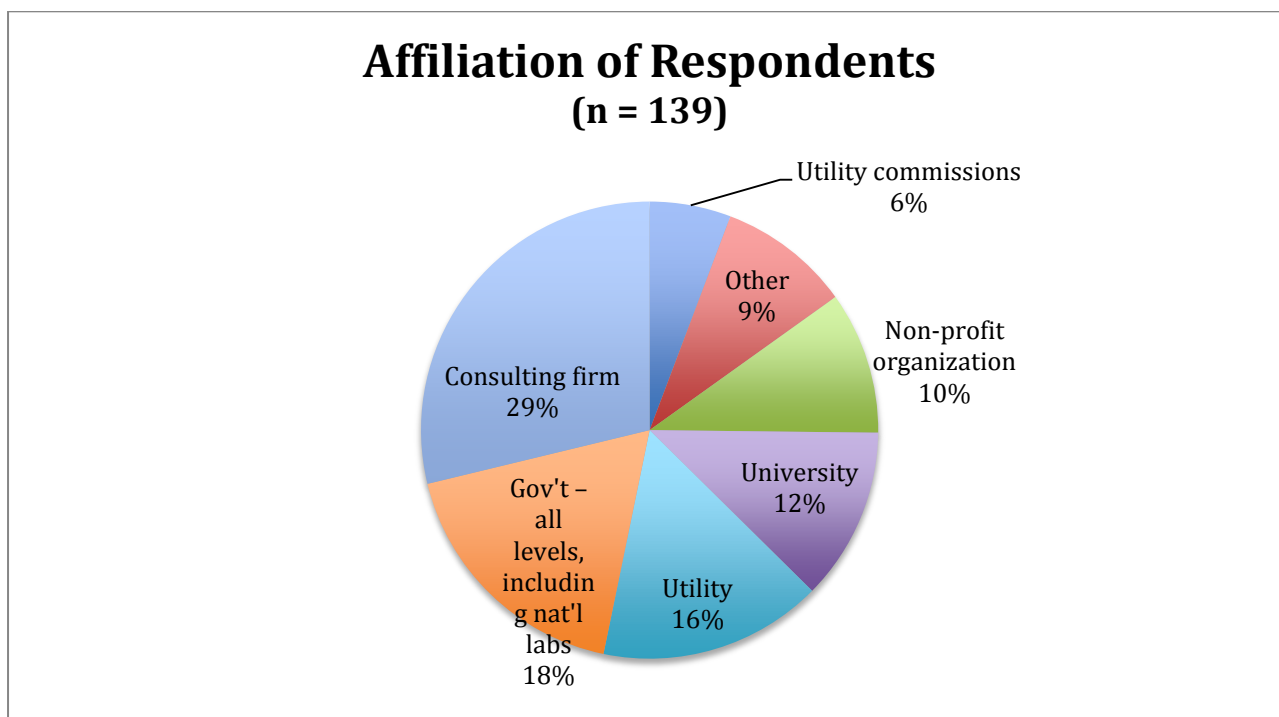


Figure 1. Affiliations of Survey Respondents

The majority of the respondents had attended two IEPEC conferences or less. And in terms of evaluation experience (as reflected in the metric, “years in energy program evaluation”), evaluation experience took on a barbell shape with most respondents falling in the 0-3 year range or the 10 years+ category. This does not reflect the number of evaluations worked on per year or the size of their firm’s energy evaluation practice. And we expected most experienced evaluators to be less interested in training than those newer to this field.

About 62 percent (130 responses) were interested in energy program evaluation training now for themselves or for their staff, while the remaining were not interested in training “at this time.” More than one-half of respondents interested in training agreed with statements identifying the lack of evaluation training opportunities, costs and travel as barriers. Agreement with the lack of training opportunities as a barrier was highest and was higher (statistically significant at the 95% level) than costs (Figure 2). It is important to note that if training was provided within their country, more people would be able to obtain training, since it is easier to get approval within one’s country, compared to obtaining approval from senior management for out-of-country training, and the costs are lower (there was a statistical difference at the 90% level between cost and travel). As discussed

later in this paper, the travel barrier is probably an important motivation for seeking other opportunities for obtaining training. This barrier may have been further aggravated by a generally weak economy in the United States and in many parts of the world. Frequently, public and private organizations curtail expenditures in discretionary areas such as non-essential travel.

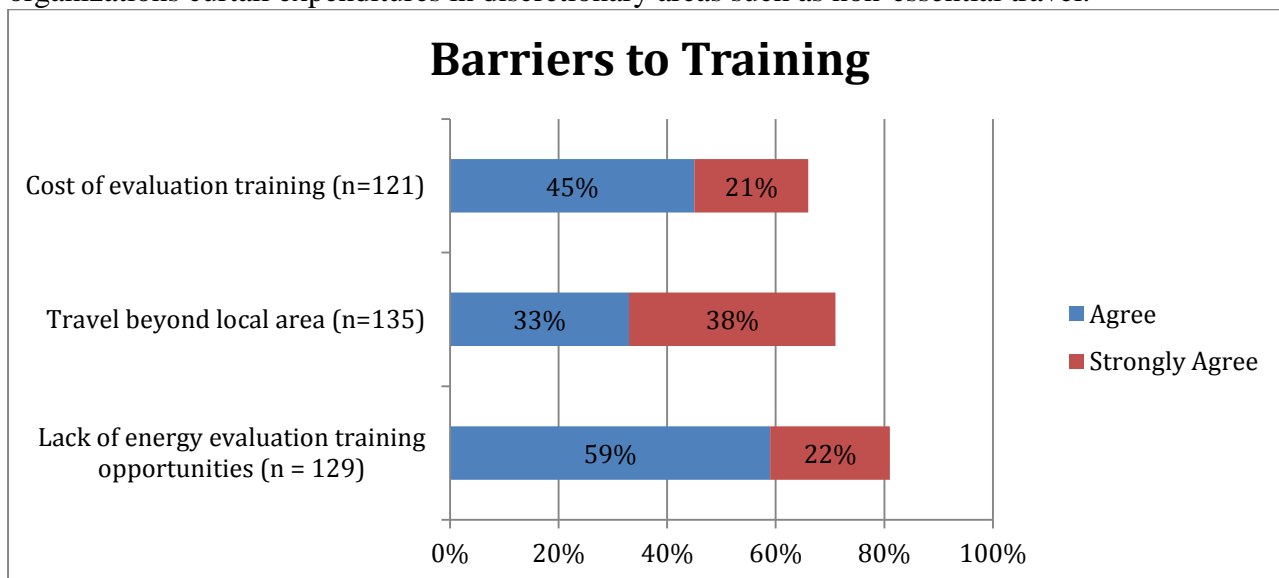


Figure 2. Barriers to Training

Respondents indicated the preferred course level for possible evaluation courses (beginner, intermediate, advanced). They were also asked about potential evaluation topics to be taught: impact evaluation, process evaluation, market evaluation, survey data collection, monitoring and verification (M&V) on-site analysis and metering, market assessment and statistics for evaluators.⁴ For respondents interested in training for themselves, the level of interest in all the major course topics (e.g., process, impact) was roughly equal (Figure 3). Also, there was strong interest in all three levels of evaluation courses (i.e., beginner, intermediate, advanced).

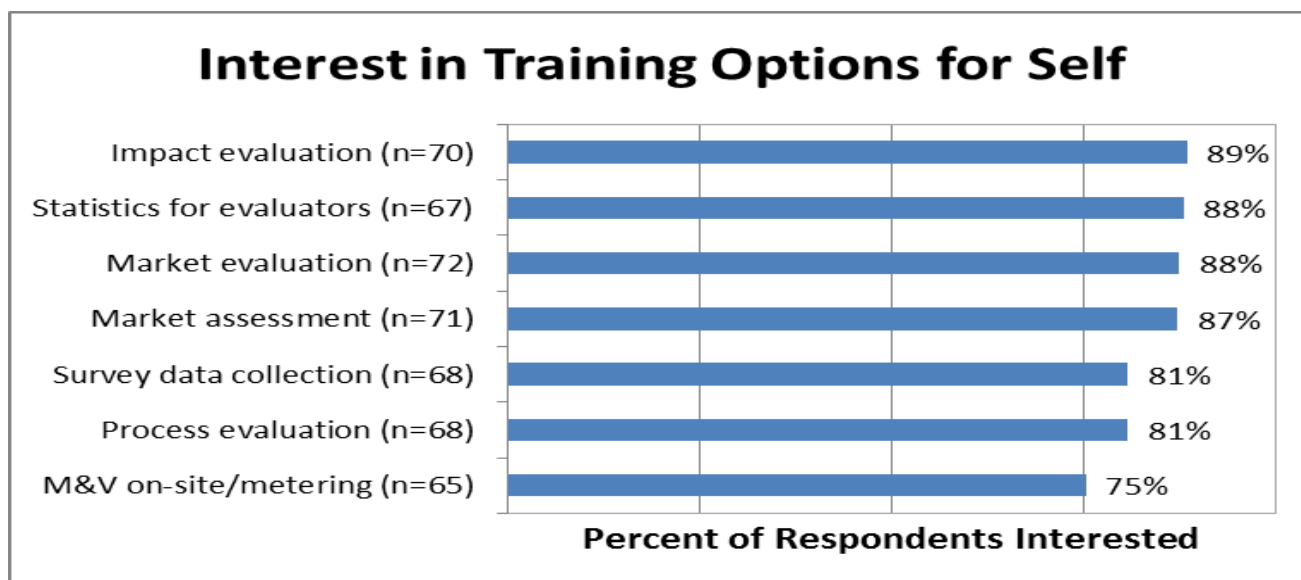


Figure 3. Interest in Training Options for Self

⁴ These topics were a subset of a longer list of evaluation topics that the IEPEC Education Subcommittee chose to be on the survey.

A closer look at the results shows some distinctions among the course types. For impact evaluation, there was a preference for the beginning and intermediate levels, but for M&V metering, the intermediate's level was the clear choice (Figure 4). Clearly, there was relatively little interest in advanced courses, although those interested in market assessment and process evaluation had a greater interest in such advanced courses (compared to other courses).

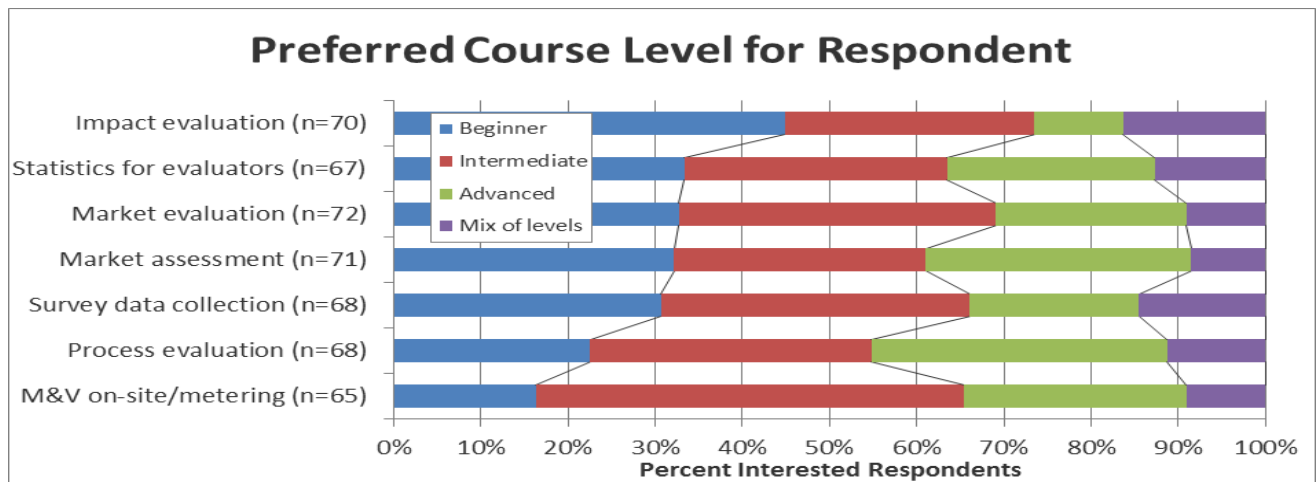


Figure 4. Preferred Course Level for Respondent

Respondents were asked about the type of evaluation training venue that *they preferred*: as part of the IEPEC conference, a webinar or online presentation, in-person training at various locations, or video course. By a wide margin, webinar/on-line was the preferred venue for providing training with in-person training a distant second (Figure 5). Including training as part of the IEPEC was the least popular option. This may well reflect the barriers mentioned above, particularly the cost of training and the difficulties in traveling beyond the local area.

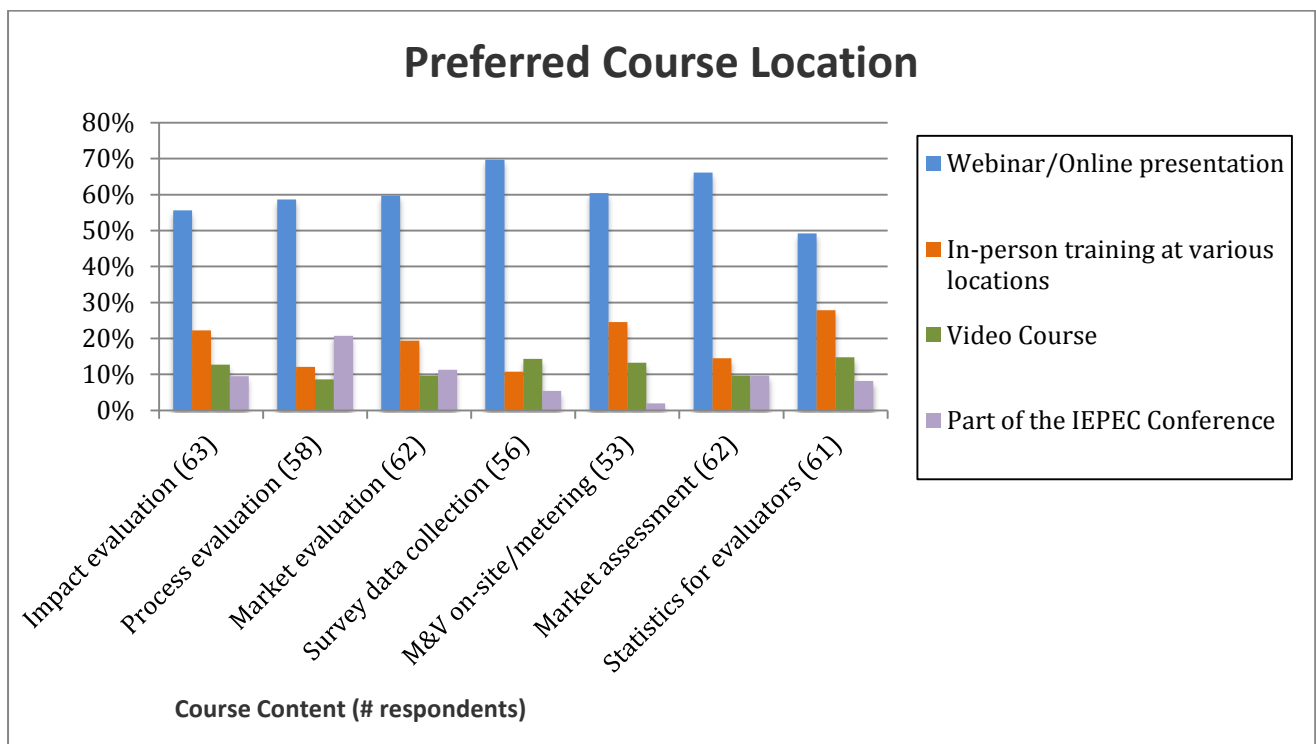


Figure 5. Preferred Course Location

When the respondents were addressing the *training needs of their colleagues and staff within their company*, all the major course topics (e.g., process, impact) generated interest, with impact evaluation generating the most interest and M&V metering, the least (Figure 6).

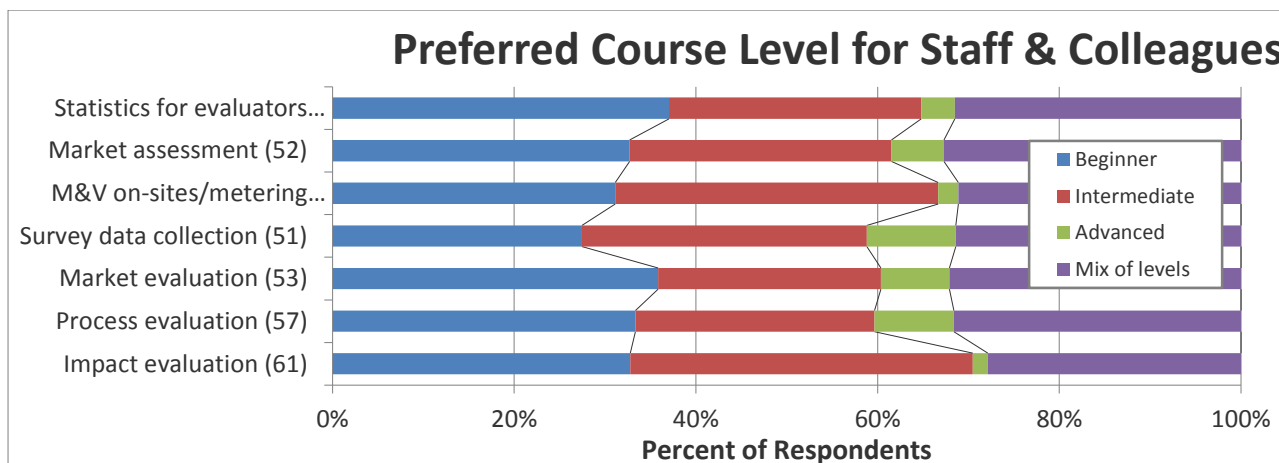


Figure 6. Preferred Course Level for Evaluation Topics for Colleagues and Staff

There was a strong preference for beginner and intermediate level courses. Again, by a wide margin, webinar/on-line was the preferred venue with in-person training a distant second for their colleagues and staff (Figure 7). One respondent noted a need for video courses about more advanced evaluation topics, since most training that was accessible to this respondent was on basic evaluation ideas. For this person, cost was a barrier because the respondent would have to travel, mostly out of country, to take advantage of in-person training. Thus, the respondent would like to see more on-line courses with a robust content.

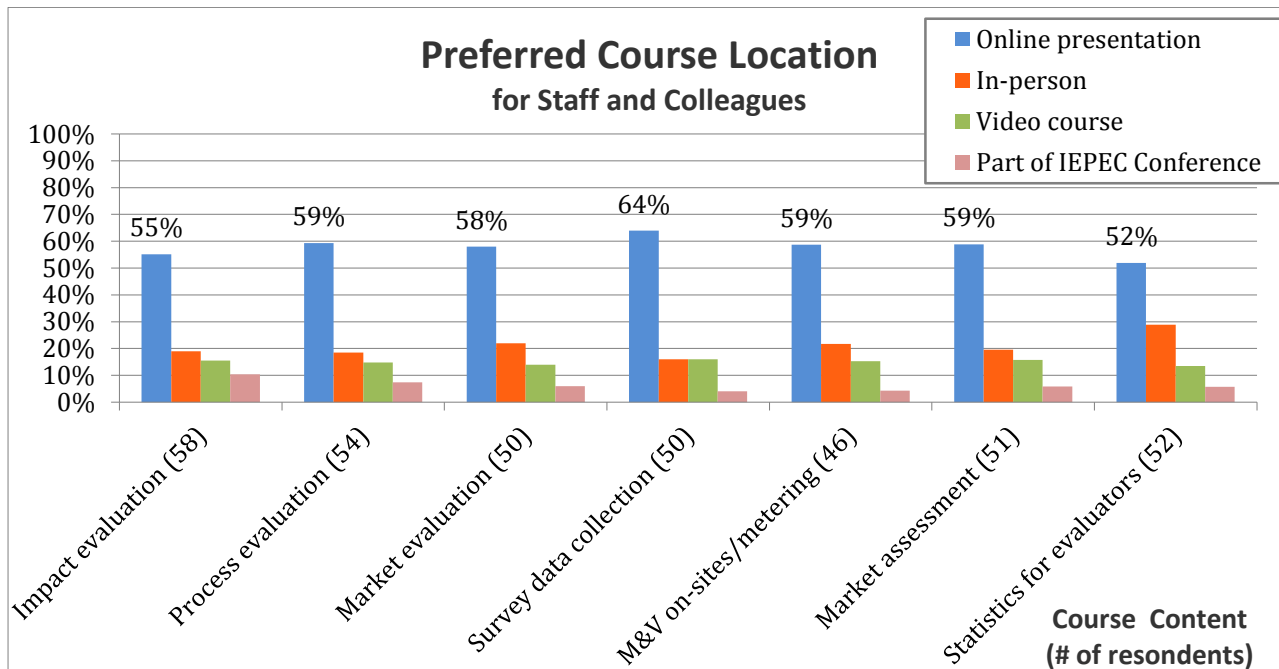


Figure 7. Preferred Course Location for Evaluation Topics for Colleagues and Staff

Speaking for themselves and colleagues/staff within their company, respondents were asked about their interest in each of the more focused course topics related to evaluation practices and regulatory policies, and evaluation methods. (Table 1):

Table 1. Interest in Specific Course Topics

Topic	Count	Percent (N=211)
Evaluation and Regulatory Practices		
1. Best practices in evaluation	60	28
2. Developing an evaluation plan for one program	56	26
3. Communicating evaluation results to stakeholders	55	26
4. Developing a strategic plan for evaluating multiple programs	52	25
5. Evaluation and regulatory policy	50	24
6. Pros and cons of deemed EM&V databases	48	23
7. Analyzing evaluation data on regional or national basis	47	22
8. Selecting and managing an evaluation contractor	45	21
9. Developing a RFP for a program evaluation	44	21
Evaluation Methods		
1. Use of logic models	49	23
2. Billing analysis	49	23
3. Use of non-parametric tests	42	20
4. Developing a deemed EM&V database	41	19
5. Applications of geographic information systems	41	19
6. Use of logit models	41	19
7. Developing a technical reference manual	40	19
8. Verifying and certifying greenhouse gas emissions from energy-efficiency projects	39	18
9. Developing fixed effects models	38	18

For courses related to evaluation and regulatory practices, the lowest rated was developing a RFP for a program evaluation with 44 (21%) votes, and the most popular course was on best practices in evaluation with 60 (28%) votes – not a large difference. For courses related to evaluation methods, the counts were somewhat lower than the first set of courses: the lowest rated was “developing fixed effects models” with 38 (18%) votes, and the two most popular courses, logic models and billing analysis, receiving 49 (23%) votes – again, not a large difference. In summary, while the topics are quite diverse, there was interest in all of these topics, so that training in evaluation should not be limited to one or two subject areas.

The survey explored less traditional forms of communication (e.g., social media, video-sharing (such as YouTube), a blog), and respondents indicated the least interest in social media (such as Facebook and Twitter) and more interest in YouTube and blogs (Figure 8).⁵ Since there are few evaluation training offerings via distance-learning, this represents an important opportunity for the evaluation community. Despite years of rave reviews for IEPEC, interest in having the conference every year in the US was also mixed.

⁵ One respondent suggested <http://homeenergypros.lbl.gov> as a social site to add evaluation threads and blogs.

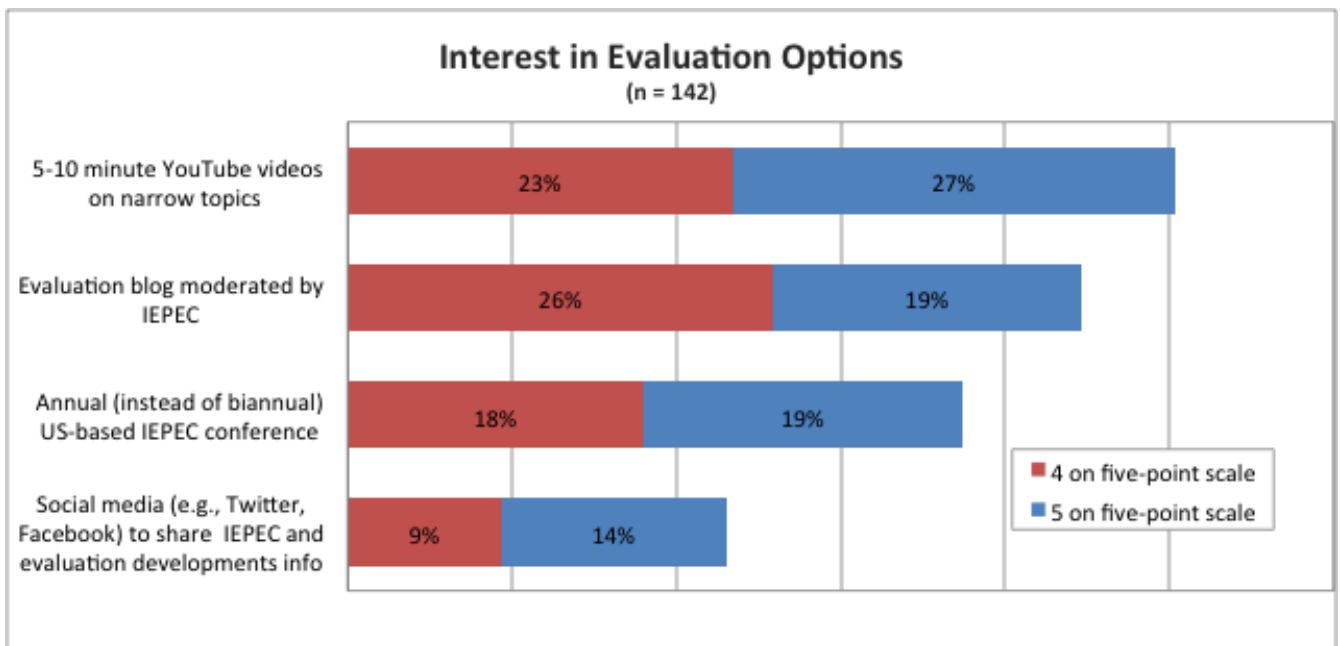


Figure 8. Interest in Program Evaluation Activities

Evaluation Training

Several organizations are starting to meet this need by providing energy program evaluation training (Vine et al. 2010). The Efficiency Valuation Organization (EVO) offers a professional certification course on measurement and verification, as well as a course on the International Performance Measurement and Verification Protocol (EVO 2010). The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) offers a measurement and verification training course (ASHRAE 2010). The Association of Energy Services Professionals (AESP) offers two training courses on the principles of research and evaluation (AESP 2010). As noted in Bensch et al. (2006), evaluators also rely on the evaluation literature and publications as well as attending conferences and workshops. A major evaluation conference is the one sponsored by the IEPEC; evaluation is also featured in other energy efficiency conferences and meetings held by the American Council for an Energy-Efficient Economy (www.aceee.org) and the Consortium for Energy Efficiency (www.cee1.org). In this manner, organizations can hire high potential employees who have been trained in energy efficiency or they can increase the skill levels of existing employees.

The majority of program evaluation practices used in the energy efficiency environment arose from the rich history of literature on program evaluation outside of energy efficiency. Many of the researchers who began in the industry over 30 years ago were experts in fields outside of energy efficiency who adapted known program evaluation methods to better fit the evaluation of energy efficiency programs. These individuals continue to be part of the fabric of evaluation, often helping to craft protocols around the country. Academics outside of energy efficiency are continuously evolving methods for reliably assessing processes and impacts from large and complex programs. To continue to update our methods for energy efficiency programs, our industry needs training that is not strictly associated with energy efficiency evaluation. Only then, can the next generation of researchers take what academics are considering and adapt methods and ideas for energy efficiency.

The Evaluator's Institute (TEI), headquartered in George Washington University, is an example of this type of training. TEI offers a set of courses leading to certificates in program evaluation and quantitative analysis. All program evaluation, regardless of where it occurs, mirrors the issues and difficulties faced in evaluation of energy efficiency programs. Participants in TEI often discuss difficulties of bias due to non-response, issues with handling multiple stakeholders, and

how to adequately determine impacts from complex programs; all areas with which energy efficiency evaluation grapples. The American Evaluation Association (AEA) provides short, targeted presentations regarding relevant issues for program evaluation. These are free to members and take about 20 minutes (a “coffee break”); a level of time that works well with the schedule of busy professionals. These cover the gamut from the theory of change online software to self-tagging qualitative methods to non-parametric statistics. Additionally, there are many PowerPoint presentations available for members to peruse such as “choosing the optimal survey mode” or “hints for making logic models worth the time and effort.” AEA maintains a weekly email to interested members that provides links to future “coffee breaks,” tips (that link back to presentations), and RFP opportunities.

Additional Suggestions

Suggestions were made by respondents on different topics in open-ended questions, such as: content of courses, targeting of courses, method of training, and coordination with other organizations.

Content of courses: some respondents wanted training on more complex quantitative evaluation methods, and a more comprehensive approach (program evaluation along with program design and implementation, program management, market analysis, etc.) to evaluation.

Targeting of courses: some respondents suggested that training efforts focus on the needs of regulatory staff and program administrators.

Training methods: some respondents recommended that IEPEC consider longer training courses (1-2 weeks) that delve deeply into evaluation topics. At the same time, others suggested that IEPEC continue to explore less traditional forms of communication (e.g., social media, YouTube, a blog) to train people on evaluation (although, as noted above, most people noted a low priority for social media). In these forums, participants could share information or post questions to other evaluation professionals. And others preferred online or computer based training because it was easily accessible without spending a lot of money on travel expenses. AEA members have been blogging and providing information via social media for a while and may be an important resource in determining what their members have found to be useful. The use of social media for evaluation training will need to be revisited.

Coordination: As noted above, several organizations offer evaluation training. Several respondents advised that IEPEC should coordinate and collaborate (instead of compete) with other organizations to provide the best training for the industry. Similarly, a few respondents noted that IEPEC could work with a university (or universities) to develop an energy evaluation curriculum, provide opportunities for on-site training, create distance learning programs, and create Master's and Ph.D. programs that emphasize behavior, technology, evaluation, market analysis, utility and regulatory contexts, and policy. In 2006, IEPEC prepared a directory of energy and energy-related programs at colleges and universities in the United States as a stepping stone for encouraging students' (high school, undergraduate, and graduate) involvement in the energy program evaluation field (www.iepec.org/IEPECHome.htm?links.htm). This directory needs to be updated.

International Evaluation Needs

In early 2012, a brief survey was sent to members of the 2012 IEPEC Rome Conference Planning Committee to assess their evaluation training needs. Since the sample size is small (6), this is more of a qualitative discussion rather than a quantitative analysis. Many of the respondents noted that there was a need for training more people in their country in the evaluation of energy efficiency programs for the following reasons: (1) more jurisdictions are continuing to develop and implement energy efficiency programs and evaluation plans; (2) there have been audits of national energy agencies pointing out problems with existing monitoring and evaluation activities and the need to

correct for these deficiencies, and the agencies have responded with improved evaluation services but still lack trained manpower to conduct these services; and (3) national programs for energy efficiency (e.g., white certificates scheme, tax rebates for retrofits, pilot projects on improving the energy efficiency of the building stock, etc.) have led to increased capacity building (via workgroups and committees, seminars, and information sharing) in multiple organizations (e.g., professional organizations, government agencies (local, national and regional), utility companies, energy service and energy performance companies and their subsidiaries) for improving energy savings calculations and evaluation.

On the other hand, two respondents noted that there was no need for training more people in their country in the evaluation of energy efficiency programs for two primary reasons. First, there was the lack of an evaluation culture on programs, plans and strategies, reflecting the inability of policy makers to design long-term strategies for energy, so that there was no need for a defined role for energy efficiency evaluation in their country. Secondly, for those countries with energy efficiency policies and programs, there was no regulatory pressure for evaluation as in other countries where public utility commissions or international directives require evaluated results. As a result, professional evaluators work in a range of fields without a specific energy focus, and they often move on to the next project when the evaluation of an energy efficiency program is finished.

For those countries willing to provide access to training, most people go to the IEPEC and AESP conferences and/or participate in the evaluation activities of the Consortium for Energy Efficiency. If training was provided within their country, more people would be able to obtain training, since it is easier to get approval within one's country, compared to obtaining approval for out-of-country training. The training would most likely be organized by a government agency, since they are already providing training on other energy efficiency activities, such as energy audits, energy performance certificates, and local action plans. In some cases, the training could be provided by professional organizations or consulting companies. Currently, universities do not appear to be offering courses on energy program evaluation, although they do offer related courses on energy policy evaluation, environmental impact assessment, and assessment of environmental plans and programs.

The IEPEC conferences (especially the one held in France in 2010) have trained people in other countries. One respondent suggested that IEPEC organize a summer school for PhD or other post-academic students, and another suggested that IEPEC collaborate with organizations in their own country to offer training. For example, the National Association of Regulatory Utility Commissioners (NARUC) conducts international education programs with energy regulators in Europe, Africa, Asia and Latin America/Caribbean, and while evaluation is not a driving force, it is sometimes discussed. These programs result in a two-way learning experience linking a specific U.S. regulatory commission with an international regulatory counterpart to develop and bolster its institutional capacity and practices in energy regulation. Finally, one respondent suggested that, instead of usual training, IEPEC and others could conduct seminars about experience sharing or how training works in other countries/contexts.

Conclusions

The findings from the above research indicate that the training of evaluators (both new and experienced) is a high priority for a significant segment of the evaluation community. While there is a clear need to develop an array of evaluation opportunities (via workshops, webinars, videos, etc.) for educating evaluators on a variety of evaluation topics related to evaluation methods and services and evaluation methods, most respondents were interested in webinars and YouTube videos on specific topics in responding to the barriers to training. The training will also need to serve a wide range of interests including regulators, policy makers and evaluation practitioners. However, in order to meet these challenges, leaders in this field (e.g., IEPEC, AESP, NARUC, ASHRAE) will need to coordinate and collaborate on evaluation training. Furthermore, colleges and universities will need to

be included and involved in training the next generation of evaluators, particularly at the intermediate level (compared to the basic level of training that is currently available).

Acknowledgements

We would like to thank the following people: members of the IEPEC community and the 2012 Rome Conference IEPEC Planning Committee who responded to the surveys, Sam Braithwait and her colleagues who managed the survey, and Mary Sutter and the reviewers who commented on an earlier draft.

References

- American Society of Heating, Refrigerating, and Air-Conditioning Engineers [ASHRAE]. 2010. “Determining Energy Savings from Performance Contracting Projects – Measurement and Verification” training course; website: www.ashrae.org.
- Association of Energy Services Professionals [AESP]. 2010. “Principles of Research and Evaluation” training course; website: www.aesp.org.
- Bensch, I., L. Skumatz, and E. Titus. 2006. “Evaluators Look in the Mirror: AESP/IEPEC Survey on Hot Topics and Industry Perspectives,” *Proceedings of the 2006 ACEEE Summer Study on Buildings*, Washington, DC: American Council for an Energy Efficient Economy.
- Cooney, K. 2012. Personal communication with Kevin Cooney, Navigant Consulting, April 25, 2012.
- Efficiency Valuation Organization [EVO]. 2010. “Certified Measurement and Verification Professional Certification” and “Fundamentals of Measurement & Verification: applying the New IPMVP” training courses; website: www.evo-world.org/index.php?option=com_content&task=view&id=278&Itemid=337.
- Goldman, C., M. Fuller, E. Stuart, J. Peters, M. McRae, N. Albers, S. Lutzenhiser, and M. Spahic. 2010. *Energy Efficiency Services Sector: Workforce Size and Expectations for Growth*. 2010. Berkeley, CA: Lawrence Berkeley National Laboratory.
- Khawaja, S. 2012. Personal communication with Sami Khawaja, The Cadmus Group, April 25, 2012.
- Peters, J. 2012. Personal communication with Jane Peters, Research Into Action, April 25, 2012.
- Rosenberg, M. 2012. Personal communication with Mitch Rosenberg, DNV KEMA, April 25, 2012.
- The Evaluators’ Institute. Last accessed on February 24, 2012, <http://tei.gwu.edu/>.
- Vine, E. N. Hall, K. Keating, M. Kushler and R. Prael. 2010. “Emerging Issues in the Evaluation of Energy Efficiency Programs: The US Experience,” *Proceedings of the 2010 International Energy Program Evaluation Conference*. Paris, France.
- Violette, D. 2012. Personal communication with Dan Violette, Navigant Consulting, April 25, 2012.
- White, C. 2012. Personal communication with Carol White, National Grid, April 25, 2012.