Building Bridges Between Energy Efficiency Program Evaluation and Greenhouse Gas Mitigation Quantification Protocols

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Abstract

Markets and regulatory imperatives are emerging that will assign value to grid-connected and site-specific avoided emissions where the emission reduction source is energy efficiency (EE) programs. However, while EE programs – and the associated reduced combustion emissions from generating grid-connected electricity in the U.S. – are increasingly a qualifying activity for these markets, the protocols of the emissions markets and EE sector have not been mapped onto each other. This paper examines some of the gaps – and what needs to happen to close those gaps – to ensure that energy efficiency initiatives play a significant role in GHG mitigation efforts.

Introduction

The development of standard EE protocols has made it possible to reliably quantify grid-connected energy savings from EE site-based projects *and* programs. In parallel developments, emission mitigation verification and certification protocols are also in widespread use. The emergence of air pollution markets and regulatory requirements present the prospect of monetizing reliably quantified avoided emissions associated with these energy savings – and in the process improve the return on investment on EE site-based projects and programs. While the site-specific *project*-oriented measurement and verification (M&V) protocols (such as the International Performance Measurement and Verification Protocol[1] (IPMVP)) link relatively well to emissions mitigation protocols, the links between EE *program* impact evaluation protocols and the emissions mitigation protocols are tenuous. Now, while policy is still in the development stages, it is time to strengthen those links.

Thus, a premise of this paper is that the EE community must engage environmental policy makers and administrators to both understand and influence the rule-making that will govern emission reduction claims and credits from reduced energy consumption. These rules will not be set by the EE community but by various environmental authorities. It will be critical to demonstrate to these environmental policy and rule makers that we have developed practical, repeatable and cost-effective monitoring, evaluation, verification, and reporting approaches at both the EE project and program levels. In particular, we must increase the awareness of shared objectives and key protocol concepts that the EE and emissions protocols have in common. This can then lead to published guidelines from the EE community on how to gather data and report savings in ways that will suit most emissions trading and regulatory needs.

The purpose of this paper is to explore how the efforts to measure energy impacts of EE programs and the design of these programs can be coordinated with emission reduction measurement to

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[1] *International Performance Measurement & Verification Protocol, Volume I*, the International Performance Measurement & Verification Protocol Committee, Revised March 2002.

reduce the uncertainty of both the energy and emissions impacts. Also, the paper will show that methods already exist for solving key problems. This will be accomplished by:

- Reviewing some current U.S. examples of policies, programs, and mechanisms that are bringing together EE initiatives and pollutant information needs.

- Identifying a variety of EE and emission protocols for M&V, documentation, and reporting (and relevant source materials).

- Examining the California Energy Efficiency Evaluation Protocols[2] and the GHG Protocol for Project Accounting[3] – example approaches for converting energy savings into emission credits, and the concepts and measurement approaches in EE protocols that are likely to be most essential to emissions trading rule-making or regulation.

- EE outreach to environmental policy makers, designers of programs, and the rule-making program administrators.

Background

This section of the paper briefly reviews some examples of the types of programs, mechanisms (how a program operates), and credits/instruments (how program benefits are denominated) currently used in the U.S. and their applicable emission types. First, some definitions are provided.

Cap and trade program. A cap and trade program establishes an allowance system (e.g., for electric generator units – EGUs). These programs are enforced through the issuing of a limited number of allowances – authorizations to emit – that are equal to the emissions cap. In the case of a load-based cap and trade program, if a facility emits more than the number of allowances it owns, it can comply either by operating fewer hours, by applying a control technology to reduce emissions, or by purchasing allowances from the market. The decision of an individual EGU on how to comply with the program is typically made on an economic basis.

Voluntary Greenhouse Gas Mitigation Programs: Credits, offsets, and reductions. Programs can offer different instruments – credits, offsets, certified reductions, or allowances – depending on the program objectives. These are typically equivalent in the amount of CO_2 they represent, with greenhouse gas (GHG) markets now standardizing on each of these instruments representing one hundred metric tons of CO_2 equivalent (Mt CO_2e). These instruments vary primarily by the types of projects that are eligible. For energy efficiency projects (site-specific) and programs (aggregations of projects) to be an eligible source for tradable instruments, the relevant market must accept grid-connected purchased electricity reductions. The market will typically provide guidelines for GHG emission rates to be used for electricity production (typically specified for a given period of years and geography, e.g., U.S. average emission rate during 2001-2003).

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[2] *California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals*. Prepared for the California Public Utilities Commission by the TecMarket Works Team, April 2006. This paper considers two of the Protocols: the Impact Evaluation Protocol and the Measurement and Verification (M&V) Protocol.

[3] *The GHG Protocol for Project Accounting*. World Resources Institute and the World Business Council for Sustainable Development, December 2005.

A Regulatory Example – EPA's Clean Air Act

In 2004, the U.S. Environmental Protection Agency (EPA) issued *Guidance on State Implementation Plan (SIP) Credits for Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures.* This document focuses primarily on NO_x emission reductions as a means of achieving compliance with the Clean Air Act for ozone. Issuance of this guidance was prompted by the recognition "that areas of the country continue to experience challenges in meeting air quality standards" (page 1).

The document lays out a basic four-step methodology that can be applied to EE projects "to be able to quantify estimated emission reductions with acceptable certainty to allow the reductions to be credited" (page 11). The steps cover: (1) estimating the energy savings; (2) converting the energy impacts into estimated emission reductions (amount and locations of emission reductions); (3) determining the (net) emission reduction impact (e.g., establishing that the impact is "surplus," and is beyond what is already being credited); and, (4) documenting the monitoring, data and reporting needed to establish the net impacts. The IPMVP is cited as a protocol that may be useful to Step 1 for estimating savings from individual projects (rather than an entire program or policy).

However, to the extent that cap and trade programs tend to become the primary mechanism for controlling emissions (e.g., NO_x, SO_x), reductions associated with voluntary programs – such as EE programs – may not be a viable part of these emissions crediting systems. By limiting total mass emissions (for source categories including electric generating units), cap and trade programs automatically account for any action that reduces emissions, including energy efficiency and renewable energy. In the absence of any retirement of allowances commensurate with the EE program emission reductions, the EE emissions may not be considered surplus to (in addition to) the emissions reductions attributable to the cap and trade program[4].

GHG Credit and Instrument programs

In the U.S., there is as yet no binding GHG regulation. However, there is movement in this direction at the state and regional levels. In this section, three emissions programs are briefly summarized. Each program targets GHG mitigation, and the first program is a currently operating voluntary market.

Chicago Climate Exchange. The Chicago Climate Exchange (CCX) is a voluntary, self-regulated organization that operates as a cap and trade program along with project-based offsets[5]. It primarily supports the following instruments: Greenhouse Gas Emission Allowances[sm] (for net increases in stored carbon); Certified Emission Offsets[sm] (for carbon mitigation tonnage realized in specified

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[4] The authors are aware, for example, of the state of Wisconsin's conclusion regarding using public benefits program-attributable emission reductions in their SIP to meet Rate of Progress (reduction) requirements. The state's Department of Natural Resources decided not to use the voluntary reductions in part because once the Clean Air Interstate Rule (CAIR) becomes effective, the state will no longer be allowed to take NOx emission credits from voluntary sources due to the emissions trading program which caps NOx emissions under CAIR. Further, the state is not permitted to take credit for voluntary SOx emission reductions (from EE programs) because the Acid Rain Trading Program caps emissions. Thus, it is clear that the emissions reductions associated with the EE programs help reduce air pollution, but the existing and planned emissions crediting systems will not use them (personal communication from Bart Sponseller, Bureau of Air Management, DNR, March 2006).

[5] Climate Exchange is the parent company of the Chicago Climate Exchange and the European Climate Exchange.

future time periods); and Certified Early Action Credits[sm] (for mitigation tonnage from qualifying projects in earlier time periods). All of these instruments apply to *direct* emissions reductions (or sequestration) at the CCX members' facility and do not qualify indirect, grid-connected electricity project impacts, such as reductions in emissions from site-specific EE projects or sponsorship of EE programs (e.g., by a utility).

However, the CCX also offers to members who are not primarily engaged in electricity generation the Electricity Purchase Opt-in Program[sm] to accept reduction commitments for purchased electricity. Members who participate in this option receive Greenhouse Gas Emission Allowances[sm] (at a rate of 0.61 metric tons CO_2 for each megawatt-hour that is below the member's CCX reduction schedule).

Regional Greenhouse Gas Initiative (RGGI). RGGI is a cooperative effort by nine Northeast and Mid-Atlantic states to pursue the development of a regional cap-and-trade program. The intent of this source-based cap and trade program is to initially cover CO_2 emissions from power plants in the region, and the annual nine-state CO_2 cap is 136 Mt CO_2e (total emissions produced by the nine RGGI states in 2001 were 590 Mt CO_2e). RGGI is scheduled to come into force in early 2009, and may then see the first compliance-driven sales as power producers seek offsets.

Western Regional GHG Cap and Trade System (California, Oregon, Washington, Arizona, and New Mexico). Five Western states have decided to form a regional GHG trading scheme. From the perspective of policy makers in California, the sectors to be included in the system will go beyond the power sector to also include large industrial subsectors that are major emitters (e.g., oil refining, cement). In California, the initial policy direction is a market-based cap and trade system. However, a regulatory approach may be implemented in tandem with a cap and trade scheme, with existing regulatory policies for utility portfolio minimums for energy efficiency and renewables to remain in place. There is the expectation that linkages will be pursued with RGGI and the European Union Emissions Trading Scheme (EU ETS), and also the recognition that many technical details must be worked out.

National and State Voluntary Emission Reduction Registries. There is increasing interest in many states, the U.S. generally, and internationally in quantifying air emission reductions associated with energy efficiency and renewable energy projects/programs and registering these reductions on emission reduction registries. Most voluntary emission reductions are eligible to be registered. However, there are some typical limitations on eligible reductions. It is important to be aware of specific eligibility criteria for the registry that you would like to have recognize your emission reductions (e.g., California Climate Action Registry, or Wisconsin's Voluntary Emission Reduction Registry). Each voluntary registry will provide guidelines and examples of how to calculate the pounds of pollutants avoided based on the grid-connected electricity saved or the site-specific emissions that are avoided.

Energy Efficiency and Emission Protocols for M&V, Documentation, and Reporting

The task of linking EE protocols and emission protocols is complicated by the number of protocols available. Practitioners seeking to link, or map, EE protocols to emission protocols must understand both the emission protocol(s) that will be accepted by the emission market/program, and the EE protocol that is best suited to that market/program's qualifying sources of emission mitigation projects.

The next section of this paper will select two candidate approaches and attempt to identify the critical linkages. Also, we include in the References section listings of EE and GHG protocols to give the reader a sense of the primary choices involved – and cite an important issue to be examined more closely in the next section: most of the EE protocols are *program-based*, and all of the GHG protocols are *project-based*.

An Example Illustrating Candidate Approaches to Convert Energy Savings into Emission Credits

A central purpose of this paper is to examine the California Energy Efficiency Evaluation Protocols (EE Protocol) and the GHG Protocol for Project Accounting (GHG Protocol) – example approaches for converting energy savings into emission credits. With respect to the EE Protocol, we will focus specifically on two of the protocols: the Impact Evaluation Protocol and the Measurement and Verification (M&V) Protocol. A critical distinction between them is that the Impact Protocol is *program*-oriented and the M&V Protocol is *project*-oriented (i.e., site-specific). This distinction is directly relevant to the relative ease with which linkages that can be made to the *project*-specific GHG Protocol, as discussed below.

This section will focus on the following aspects of the protocols: (1) objectives; (2) key concepts in common; (3) key concepts not in common; (4)outputs from the EE Protocols that can serve as reliable inputs to the GHG Protocol; and, (5) inputs needed for the GHG Protocol that are not addressed by the EE Protocol.

Objectives of the Protocols

Both the EE Protocol and the GHG Protocol seek to establish robust, uniform approaches for gathering data for quantifying and reporting project effects. Each stresses that this means clear, reliable, credible, and transparent approaches for monitoring, evaluation, verification, and reporting.

The EE Protocol was developed to support California's evaluation objectives for EE programs funded by the Public Goods Charge. However, the sponsors of the EE Protocol (CPUC and CEC) assume that the protocol will have value in other jurisdictions.

The GHG Protocol was designed to be more explicitly program-neutral. However, the Protocol developers are careful to state that though the Protocol "is intended to be compatible with all of these purposes, using it does not guarantee a particular result with respect to quantified GHG reductions, or acceptance or recognition by GHG programs that have not explicitly adopted its provisions" (page 5).

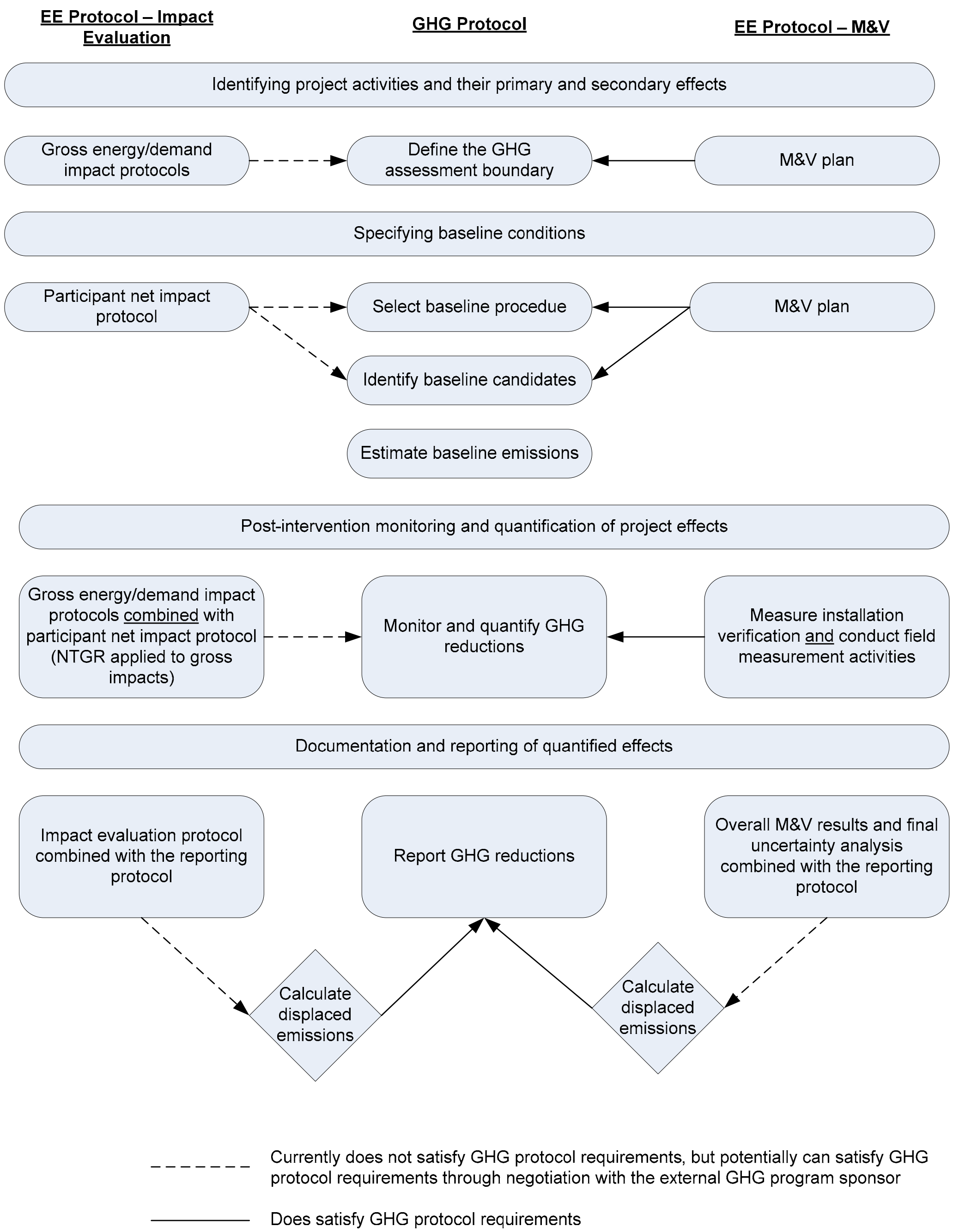
Key Protocol Concepts in Common

For purposes of identifying the common concepts across the two EE Protocols examined here (Impact and M&V) and the GHG Protocol, we simplified the protocols to the four steps proposed as essential to each (and some of the key questions that must be answered):

1. *Identifying intervention (project or program) activities and their primary and secondary effects*
   a. What is the intervention and its direct and indirect effects?
2. *Specifying baseline conditions*
   a. What is the alternative(s) to the project or program activities?
   b. Are the effects additional to the alternatives (i.e., free-ridership – the effects would have occurred even without the intervention and associated incentives; also seen as whether the intervention activity and its baseline scenario are effectively identical)?
   c. What are the pre-intervention energy consumption and emissions associated with the baseline?
3. *Post-intervention monitoring and quantification of project effects*
4. *Documentation and reporting of quantified effects*

Figure 1 displays the three protocols (columns), common protocol concepts (steps in the ovals), and the linkages between the EE Protocol requirements (in rectangles) and the corresponding GHG Protocol requirements. For ease of interpretation, and to facilitate discussion, we have diagrammed two types of linkage: (1) does not currently satisfy the GHG Protocol, but potentially could satisfy; and, (2) does satisfy the GHG Protocol (i.e., the output from the EE Protocol could be an input to the GHG Protocol with minor terminology changes – the respective protocol requirements are accomplishing a common concept). Finally, we added to the figure (the diamonds) an input needed for the GHG Protocol that is not addressed by the EE Protocols: estimation of emission factors and calculation of displaced emissions (i.e., combining energy impacts with appropriate emission factors).

Fig. 1



The figure highlights a premise of this paper: the bridges that need to be built so that there is a "crosswalk" between the EE Protocols and the GHG Protocol relate primarily to the Impact Protocol being *program-based* and emissions protocol being *site-based*. This is why the linkages are favorable between the *project-based* M&V Protocol and the GHG Protocol.

Thus, what is needed to create a linkage between the Impact Protocol and the GHG Protocol is an acceptable set of methods for *aggregating projects with sample-based monitoring and quantification of effects.* This aggregation of projects is likely also necessary for commercially viable emission credit transactions.

To accomplish the sample-based aggregation of projects and impact measurements, the California EE Protocol is also able to work in tandem with an additional protocol – the Sampling and Uncertainty Protocol – as well as specified levels of rigor for measurement and documentation of net energy impacts. The Impact Protocol can also be used in combination with the M&V Protocol to provide measured quantitative data from the field (where this is cost-effective for evaluation). An advantage with this combination is that M&V can be used to reduce uncertainty in baselines, engineering calculations, equipment performance and operational parameters.

As discussed in the final section of this paper, "outreach" is needed – from the EE community to environmental authorities – to make them aware of the best EE evaluation protocols and methods for quantifying energy impacts (and associated displaced emissions). The California EE Protocol provides a strong basis for advocacy of EE programs as a qualifying activity for GHG markets and regulatory compliance. It is now a matter of the EE community providing input to the environmental authorities.

Inputs Needed for the GHG Protocol Not Addressed by the EE Protocol: Calculating Displaced Emissions

As shown in Figure 1, evaluators of EE programs (or projects) need to calculate the emissions displaced by a program. There are two considerations that now appear to be key to a rigorous approach to improve emission estimates associated with grid-connected EE program impacts: (1) accounting for hourly changes in marginal emission factors, and (2) expressing energy impacts also in hourly (8760) terms and at the end-use technology level. These approaches can be combined to promote acceptance and certification of EE program emission effects. It should be noted, however, that less rigorous approaches may be acceptable for many applications. For example, a marginal emissions factor can be used by anyone in a particular state or region, as discussed below.

Emission rates estimated from marginal hourly supply-side emissions. Whether the energy saved is obtained through the use of a project-specific M&V protocol, or by a program-level impact evaluation protocol, emission factors are needed to calculate the pounds of pollutant displaced. The EPA has produced emission factors for each state[6]. These factors are calculated as an average of all emitting generators in the state (excluding, for example, hydro and nuclear). However, these annual average emission rates do not take into account one important aspect – the impact of EE programs on generators is likely to be felt at the *margin*, rather than having an effect on base-load plants and assuming only one generating fuel.

[6] See EPA's *E-Grid 2005 database.*

One method for estimating marginal hourly emission rates has been used in the evaluation of Wisconsin's Focus on Energy public benefits programs[7]. The model selects plants that were actually operating in specified hours, predicts which were the marginal producers for each hour, and then calculates emission rates (for NOx, SO_2, CO_2, and mercury). Further, the model can be customized to examine any subset of generators in the U.S. A key point is that the more accurately you can model the marginal emissions rate, the more accurately you can estimate the emissions profile of energy efficiency measures[8]. The importance of this point is addressed next – expressing EE energy impacts in hourly (8760) terms to facilitate more accurate calculation of displaced emissions.

A dispatch estimation approach to expressing EE program impacts. The strongest case for maximizing the value of emissions credits from energy efficiency programs depends upon the ability of EE program evaluators to demonstrate via detailed analysis of electricity dispatch the specific impact of the EE measures on the grid system. In the following paragraphs, we suggest why this may be the case, and how evaluators can address this challenge. [Note: we emphasize that the following describes the "strongest case." There are, however, voluntary carbon credit programs where this does not apply – with carbon offset programs perhaps the best alternative example to cap and trade regimes.]

As noted above, in 2004 the U.S. Environmental Protection Agency (EPA) issued *Guidance on State Implementation Plan (SIP) Credits for Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures.* This document focuses primarily on NOx emission reductions, via a cap and trade program, as a means of achieving compliance with the Clean Air Act for ozone. However, an April 2007 Supreme Court decision signaled that the Clean Air Act could also regulate CO_2. However, in the guidance document cited above, EPA states that, "By limiting total mass emissions (for source categories including electric generating units), cap and trade programs automatically account for any action that reduces emissions, including energy efficiency and renewable energy." Their logic is as follows:

> *"If an energy efficiency program causes several EGUs that are part of a cap and trade program to scale back the amount of electricity they generate and therefore reduce overall emissions, it may be difficult to show that these reductions meet the 'surplus' criteria for crediting the measure. This is because the units are still allowed to emit up to the same number of allowances in the program even though the amount of electricity they need to generate has been reduced. The energy efficiency or renewable energy measure, in effect, allow the EGUs to comply with the cap and trade program with a slightly higher average emission rate and a theoretically lower allowance price. Therefore, the estimated emission reductions from the energy efficiency or renewable energy measure would typically not be surplus, and would essentially be double counted if we permitted the allowances that were freed up by the measure to be used and also provided additional SIP credit for the energy efficiency action"*(page 10).

The guidance from EPA goes on to state that a way to clearly demonstrate that emissions decreased "despite the cap and trade program and the ability for plants to sell more electricity to other areas" will likely require "a detailed analysis of electricity dispatch and allowance markets to determine the specific impact of the measures on the system" (page 10).

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[7] See *Estimating Seasonal and Peak Environmental Emission Factors*, 2004 (Jeff Erickson, with Carmen Best, David Sumi, Bryan Ward, Bryan Zent, and Karl Hausker. Report for the Division of Energy, Focus on Energy Statewide Evaluation.

[8] See *Measuring Emission Benefits with Integrated Resource Models,* 2004 (Paul Meier, with Jeff Erickson and Jim Mapp). ACEEE Summer Study.

So how might evaluators meet this challenge? The task for evaluation professionals is to convert the program impacts that are produced from the evaluation effort to load impact shapes across the 8,760 hours of the year, and then combine this with the marginal hourly emission rates (as described above). Fortunately this is not a difficult task; however, it does involve more effort than what is needed from the typical energy program impact evaluation effort[9].

First, the evaluation approach must be structured to deliver kW impacts over the 8,760 hours of the year. This can be established during the evaluation design stage, in which a study might employ hourly metering approaches, or when hourly impacts can be estimated via a building simulation model, or when program impacts can be distributed across 8,760 hours using technology-level, sector-specific, and climate-specific end-use load shapes that match the technologies covered by the program and the participants locations (climate zones). In these cases, it is possible to distribute the program's impacts across the hours using distributions that match the appropriate load shapes. The process of converting to an 8,760 load shape for a program is not an evaluation *revolution*, but rather a small *evolution* of what we already do most of the time. The evaluation revolution comes at the next step: converting the 8,760 program load impacts to a reduction in greenhouse gas emissions. Fortunately, as cited above, we also have these tools.

As a result of these developments, the evaluation field can now use dispatch information, or build dispatch models that reflect any given territory[10]. These dispatch models can then be periodically updated to match changes in the dispatch profiles as they occur over time. Thus, both today and in the future, most evaluation professionals will be able to determine the fuel source and generation mix that is not being used to match the demand reduction profile provided by the EE program. We suggest that this is a promising approach to satisfying both the displaced emissions calculations for the GHG Protocol – and the "additionality," or "surplus," requirements of both the GHG Protocol and cap and trade program sponsors (e.g., EPA).

Conclusion: A Need for EE Outreach To Environmental Policy- and Rule-making

Finally, we turn to environmental policy- and rule-making and what needs to be done by the EE community. First, the EE community must make sure that policy makers are aware of the value of EE sources in reducing combustion emissions from generating grid-connected electricity – and that failure to provide access to EE sources will significantly hamper overall GHG mitigation policy objectives.

Next, there are numerous rules that are being (and will be) designed and administered. Some will be related to protocol development and, hopefully, the recognition and acceptance by environmental program sponsors of EE protocols that will satisfy emissions protocols. Other rules will relate less to protocol requirements but still should elicit input from the EE community. Across different types of external programs, examples of these rules include rights of ownership to credits, fungibility of credits, liability, persistence and "delivery risk" for credited displaced emissions, double counting across

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[9] While evaluation approaches that determine energy impacts across the 8,760 hours in a typical year are permitted within the California Evaluation Protocols, they are not required and are seldom used. Most evaluations report annual kWh, peak kW, and the number of therms saved. Evaluations conducted under the California Evaluation Protocols must [?] provide kW savings over four time periods, including noon-1PM, 1PM-2PM, 2PM-3PM and 3PM to 4PM during the months of June, July, August, and September, for each weather zone in which the program operates.

[10] Or more easily, dispatch models can be built for any area of the United States and use software, such as DSMore, for a specific geographical area corresponding to the boundaries of the EE program.

programs, and other coordination issues potentially involving different trading philosophies in the U.S., Europe, and globally.

Also, the rules of trading, or compliance with pollutant regulatory requirements, will obviously not be set by the EE community alone. Instead, the rules will be formulated by the environmental authorities – with input from the EE community if we aggressively pursue outreach advocacy with them. The EE community, in particular evaluators and policymakers, need to acquire more knowledge of the environmental rule-making. Whether EE program evaluators are the best choice for adopting an advocacy role with environmental authorities on behalf of the EE community is a separate question.

This advocacy outreach from the EE community to environmental authorities will need to take several forms to ensure that they make the best use of the current, best EE evaluation protocols and methods for quantifying energy impacts (and associated displaced emissions). This clearly will not be easy since there are cultural differences between the EE community and the air quality community (Vine 2003). We clearly want to avoid the unnecessary creation of rules that are unfair or particularly burdensome to EE as a qualifying activity. Some of these best forms are:

1. Joint memberships in EE and emissions protocol advisory committees addressing linkages and further development
2. Reading the published works to comment, support, lobby, etc.
3. Being aware of the issues environmental authorities are facing so that the EE community can be current and as helpful as possible with input.

In summary, a number of technical and market conditions make assessing the emission reduction impacts of EE programs something that can be immediately developed, adopted and used to assess the emission impacts of energy efficiency programs. These conditions include the following:

1. The environmental community and the public as a whole are supportive of EE programs as one of the most effective ways to reduce GHG emissions;
2. A plethora of supportive public and private stakeholders across the country moving in the direction of focusing significant support and resources on GHG reduction efforts, with our without federal support or direction;
3. The Supreme Court re-emphasizing that it is part of the US-EPA's responsibility to regulate GHG emissions and setting an expectation that these issues are addressed;
4. The appearance of voluntary, regulatory and market-based local and regional structures for crediting value to emissions reductions efforts through a number of plausible approaches, such as EE;
5. The ability of the EE program evaluation community to rapidly and reliably estimate emission reduction impacts achieved through EE programs using net reduction dispatch analysis approaches; and,
6. The presence of established standardized evaluation protocols that can evolve to incorporate the documentation of emission reductions using approaches that can support emission credit allocation.

A significant barrier that remains to be resolved is *ownership* for the emissions credits from EE programs. However, if one assumes a financial perspective, with acceptance of the view that ownership credits should follow the funding source, this barrier may not be significant. If the programs are funded with investment dollars provided by stockholders of a utility or other company wanting to make an impact in the market, then the company providing the program funds should own the credits in proportion to the cost distribution of the project's costs.

For example, if the program covers 100% of the incremental costs, then the program gets the incremental reduction credits. If the program funds 10% of the incremental costs, the program get 10% of the reduction credits. If the funding comes from taxes, the citizens living in those jurisdictions should own the program's share of the credits and the credits should be kept or used in ways that benefit the people living in those jurisdictions consistent with public policy and budgeting approaches. If the funds are provided by pubic benefits charges and fees that are enacted to provide energy efficiency programs, then the ownership of the program's share of the credits should rest with the people who pay those fees. Public policy will need to be established to assure transparency in the handling and allocation of the credits and a distribution or spending approach that benefits owners of those credits.

On the other hand, if one takes a societal perspective, then ownership of credits will need to be examined in a broader context (Vine 2007): how will the allocation of credits, for example, further energy efficiency (or renewable energy) and the resulting reduction in GHG emissions? For example, in January 2007 the CPUC ruled in D. 07-01-018 that they would allow renewable DG system owners to retain 100% of their renewable energy credits, and that utilities would not be able to count the output of renewable distributed generation facilities that have received ratepayer incentives toward the utility's renewable portfolio standard obligations. One might expect a similar decision favoring consumers (rather than utilities) when deciding on the ownership of carbon credits when public benefit funds are involved.

References

EE Protocols

- 2006 California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals (prepared for the California Public Utilities Commission – CPUC)
- 2006 EERE Guide for Managing General Program Evaluation Studies – prepared for US DOE Office of Energy Efficiency and Renewable Energy
- 2007 IPMVP – for project M&V options and issues (current version is 2002, new version forthcoming) [Note: the 2006 California EE Protocol for M&V is derived from the IPMVP.]
- 2007 New England ISO M&V Handbook for Demand Side Resources (forthcoming)
- 2005 International Energy Agency Guide on Evaluating Energy Efficiency Policy Measures & DSM Programmes
- 2004 Protocols to Measure Resource Savings (New Jersey Clean Energy Program)

GHG Protocols

- 2006 GHG Protocol for Project Accounting (World Resources Institute and the World Business Council for Sustainable Development)
- 2004 GHG Protocol Corporate Accounting and Reporting Standard (World Resources Institute and the World Business Council for Sustainable Development)
- 2007 Electricity Sector Project GHG Protocol (forthcoming - World Resources Institute and the World Business Council for Sustainable Development)
- 2004 Guidance on State Implementation Plan (SIP) Credits for Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures, U.S. Environmental Protection Agency (EPA). [Note: applies primarily to NOx emissions currently – but an April 2007 Supreme Court decision ruled that the Clean Air Act can now include CO_2.]

- 2006 ISO 14064 Standards for Greenhouse Gas Accounting and Verification (International Standards Organization)
- Kyoto Protocol CDM (Clean Development Mechanism)

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