

# **Building and Remodeling a New Construction Program**

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## **ABSTRACT**

In 2006 the Wisconsin Focus on Energy program found itself faced with the best kind of problem to have – more funding. Along with this increased funding came significant increases in energy savings goals. Focus on Energy had been running many successful programs for both business and residential customers since 2001, eliminating most low hanging fruit. As a result the program undertook an intensive planning process to identify those opportunities that would help meet the increased goals.

In Wisconsin, roughly 1/3 of the annual electric and natural gas load growth is due to commercial new construction. Previous research suggested that savings associated with new construction from a mature program could represent annual savings of 15 MW, 68,957 MWh, and 1,076,000 therms (Grabner et al. 2006). The need to add a new construction program to address this large untapped market became clear.

The launch of the new construction program required extensive planning to effectively integrate an existing multifamily new construction program and existing market channel based lighting and HVAC programs with a new program focused on commercial new construction. Ultimately the program design that emerged was one that works with independent energy design professionals to provide technical assistance as subcontractors to Focus on Energy.

In this paper, the authors will present several program case studies and discuss lessons learned in developing and managing a new construction program, including: criteria for prescriptive/system and custom/whole building tracks, the value of industry input and how to get it, and the challenges of merging and managing of parallel programs.

## **Introduction**

Wisconsin's Focus on Energy program provides technical and financial assistance to residents and businesses of the State. The New Construction Program is one part of the successful program portfolio that Focus on Energy has run since 2001. The New Construction Program effectively integrates an existing multifamily new construction program and existing market channel-based lighting and HVAC programs with a new program focused on commercial new construction.

Research suggests that savings associated with new construction from a mature program for Wisconsin could represent annual savings of 15 MW, 68,957 MWh, and 1,076,000 therms (Grabner et al. 2006). After reviewing other program's design and literature, we set the following goals for the New Construction Program:

- Encourage incorporation of energy efficiency into new construction projects measures through a tiered incentive approach
- Assist in the market transformation toward energy efficiency design professionals
- Encourage early enrollment of projects during the design phase of construction
- Develop a clear and concise program for customers

The New Construction Program includes both a prescriptive/system track and a whole building/custom track. Providing both tracks in the program covers projects that are aimed at energy efficiency but not warranting energy modeling, projects that are in the construction phase with little opportunity for including major efficiency measures, and projects that are in the conceptual phase with considerable opportunities to make the project a high performance building. With the implementation of the New Construction Program, we learned many important lessons from the program's operation.

## **Focus on Energy Background**

Focus on Energy is Wisconsin's statewide energy efficiency and renewable energy program was created in 1999 and expanded in 2005. The program is ratepayer funded, with investor-owned utilities being required to participate and municipal utilities and electric cooperatives having the option to participate or offer their own programs. The aim of the program is to increase Wisconsin's energy independence by helping residents and businesses implement efficiency and renewable energy projects that would not otherwise occur.

The Focus on Energy program serves:

- Residential customers, including single and multifamily buildings and homeowners as well as renters
- Businesses, including farms, industrial, commercial, school, and government facilities
- Cities and community groups that want to improve their sustainability

Focus on Energy is a public benefits program with a Program Administrator and several subcontractors used for implementation. The Wisconsin Public Service Commission provides oversight of the Program Administrator. More than 54,000 businesses and 834,000 residents have participated in the program from 2001 to 2007.

Focus on Energy provides both technical and financial assistance. Technical assistance includes industry specific experience and access to unbiased experts that identify opportunities and help quantify the benefits. Incentives include cash-back rewards on specific purchases, custom incentives, and cost-sharing on assessments and feasibility studies.

## **New Construction Program Background**

### **History of the Multifamily Program**

Focus on Energy's program portfolio has always included multifamily buildings, first as a pilot program then as a statewide initiative. The Apartment and Condo Efficiency Services Program is offered through the Residential Programs along with the market channel ENERGY STAR Products Program for lighting, water heating and Heating Ventilation Air Conditioning (HVAC) products, the Targeted Income Program for residences of owners with a specific income level, the Home Performance with ENERGY STAR Program for existing 1 to 3 unit residences, and the Wisconsin ENERGY STAR Homes Program for new 1 to 3 unit residences.

The Apartment and Condo Efficiency Services Program works with multifamily buildings 4 units and greater. Started in 2001, the program initially worked with existing multifamily buildings, expanding in 2003 to include multifamily new construction.

The existing buildings component of the program offers a full range of energy efficiency measures to owners and property managers, from lighting to large central HVAC systems. A team of contracted consultants (Energy Advisors) are located throughout Wisconsin. The Energy Advisors provide no cost building assessments to determine a building's energy usage, potential savings, and potential program cash incentives for implementation. Additionally, the program offers an In-unit Direct Install component for the installation of Compact Fluorescent Lamps (CFLs) and low flow showerheads and aerators.

From its inception in 2001 through the end of December 2007, the Apartment and Condo Efficiency Services program produced cumulative savings of over 50.8 GWh of electricity and 4.2 million therms of natural gas. The program's New Construction component contributed over 6.9 GWh and 600,000 therms to those savings amounts. In addition, the New Construction Program has provided assistance to over 150 buildings representing over 3,000 residential units.

### **History of Business Programs**

At the inception of the Focus on Energy program, one of the programs offered was a new construction program for businesses that emphasized technical assistance and market transformation, rather than incentives and resource acquisition. Due to reduced funding, this program was discontinued in 2003. Even without an official program, building owners were still allowed new construction projects to participate in Focus on Energy's Business Programs. However, there was no pro-active outreach to the new construction market (i.e. architects, engineers, design-build firms, contractors, and developers) or any specific program offers for new construction.

When there was not an official new construction program, new construction projects were identified through a network of contracted Energy Advisors working directly with building owners, primarily on existing building projects. Projects also were identified through the Business Program's market channel staff who promoted prescriptive incentive offers to manufacturer's reps, distributors, and equipment installers. When a new construction project was identified by an Energy Advisor or market channel staff, the project was handled as a series of individual equipment change-outs, and rarely used energy modeling to analyze complex changes at the system level or total energy use of the building.

### **Wisconsin Potential Study**

In the fall of 2005, in anticipation of restored funding, Focus on Energy began research on non-residential new construction activity in Wisconsin to determine the magnitude of energy savings available and document the need for developing a new and comprehensive new construction program. As a key component in the planning process, the research provided information about the feasibility and need for a new construction component of Focus on Energy's Business Programs (Grabner et al. 2006). Specifically, the research sought to:

- Estimate the level of non-residential new construction activity in Wisconsin.
- Characterize the baseline practices for building construction and market actors.
- Estimate the cost-effective energy savings potential for intervention options.
- Estimate the program cost and potential participation.

This research was completed in June 2006. The key findings were:

- New construction and major renovation activity totaled \$8.5 billion per year and included 47.5 million square feet of new facilities per year.
- Based on the percent of floor area, roughly one-third were small facilities (< 20,000 ft<sup>2</sup>), one-third were medium sized facilities (20,000 to 80,000 ft<sup>2</sup>), and one-third was large facilities (>80,000 ft<sup>2</sup>).
- Standard practice was determined to be more energy efficient than Wisconsin Commercial Building Code at the time, which was based on IECC-2000 (which in turn relied on ASHRAE 90.1-1989) with significant modifications for lighting power density and building envelope. Follow-up research (Grabner et al. 2007) determined the New Construction Program baseline was state code, with the following exceptions: the equipment/component efficiency requirements from IECC-2006 used for building shell and HVAC were used as the baseline, and some specific technology limitations (size of VFD's, use of lighting controls, etc.) were added.
- Cost effective potential savings from new construction was estimated at 65 MW, 130,145 MWh, and 3.3 million therms annually.
- First year committed (implemented projects and projects waiting for completion) savings was estimated at 2.3 MW, 7,000 MWh, and 165,000 therms, with a program budget of \$1.5 to 1.8 million.

## **Program Design**

### **Review of Other Programs and Current Practice**

New Construction Program staff reviewed several national reports on energy efficiency programs to identify key components to include in the design of the program. A key requirement for a new construction program is to offer both a systems track, which looks at the efficiency of a specific system or piece of equipment, and a whole-building track, which takes a comprehensive look at the total building and uses energy modeling (Morgan, 2001). While the goal may be to move projects towards the whole-building track to achieve comprehensive savings, smaller projects and projects where the owner or design team becomes aware of the program late in the design process can still achieve energy savings by using a systems track. A systems track also allows skeptical participants to explore the resources and benefits of new construction program (Quantum, 2004).

Relationship building and having an early and active role in the project is another key requirement for a new construction program (Quantum, 2004). Outreach efforts for the new construction program have emphasized identifying projects early, such as following up on announcements of upcoming new construction projects from construction trade publications. New construction staff have also worked closely with architects, engineers, and contractors who we have previous relationships with, and regularly follow up with them to inquire about upcoming projects.

## Program Planning

In an effort to avoid offering duplicate large building new construction programs under Focus on Energy (one for multi-family, one for businesses), it was decided to offer one New Construction Program. Focus on Energy's program planning began in 2006 for the current contract period beginning July 1, 2007. The planning process for the Apartment and Condo Efficiency Services program involved an increase in funding along with an increase in energy savings goals. At the same time, the planning process started in the Business Programs portfolio to provide a New Construction Program for commercial buildings.

Developing one New Construction Program allows both the Apartment and Condo Efficiency Services and Business Programs to target different building sectors using the same internal and external infrastructure. Also, running programs with a different emphasis in parallel under the New Construction Program avoids confusion in the market place. Many of the participants such as architects, contractors, and engineers are involved in both large multifamily and commercial construction.

The following program goals were set early in the planning process after discussions with the Program's new construction advisory group and managers of other programs across the United States:

- *Encourage owners/developers and design professionals to consider and incorporate energy efficient measures early in the design process.* In an effort to encourage projects to incorporate multiple energy efficient measures, the New Construction Program developed a tiered system for measure incentives, Table 1. If a project implements measures from different end use categories, for example lighting and HVAC, or increased the percent of energy cost saved to a specific level, the incentive levels for kWh, kW, and therms increase. The program also increased its presence through dedicated marketing campaigns and presentations to groups involved in new construction.

**Table 1. Program Incentive Levels**

Program	Apartment and Condo Efficiency Services	Business Programs
Tier 1 Incentive	Measures from 1 category: building shell, lighting, HVAC	Energy Cost Savings of 10-20%
	\$0.04/kWh, \$125/kW, and \$0.40/therm	\$0.04/kWh, \$125/kW, and \$0.40/therm
Tier 1.5 Incentive	N/A	Energy Cost Savings of 20-30%
		\$0.05/kWh, \$160/kW, and \$0.50/therm
Tier 2 Incentive	Measures from 2+ categories: building shell, lighting, HVAC	Energy Cost Savings of 30+%
	\$0.06/kWh, \$200/kW, and \$0.60/therm	\$0.06/kWh, \$200/kW, and \$0.60/therm

- *Assist in the transformation of the market from a utility provider model to a market provider model where design assistance is provided by independent energy design firms.* We realized during the design of the program that in order to have a lasting impact of including energy efficiency measures in the building design process, a market transformation model from a utility provider model to a market provider model was needed. The utility provider model involves the utility providing design assistance and incentives to targeted customers. The New Construction Program's goal is to assist independent firms currently offering energy modeling in developing a market for providing design assistance for energy efficiency in new buildings. Five independent

Technical Assistance Firms around the state of Wisconsin are subcontracted by Focus on Energy to provide design assistance. This goal is now being achieved with the Technical Assistance Firms bringing projects to the program.

- *Encourage early enrollment of projects during their design phase.* In order for the program to influence the energy efficiency of a building, we need involvement early in the design process. The earlier in the design that modeling or suggested measures are discussed the more likely they will be incorporated in the project. If the program gets involved after construction begins, prescriptive measures are usually all that can be included in the project.
- *Develop a program that is clear and concise for the customer and efficient for the program staff to administer.* The New Construction Program staff recognized early in the planning process that if the program was confusing and difficult to administer it would not succeed. A dedicated staff position was created to work solely with owners/developers, design teams, and Technical Assistance Firms across the state. Also, the program delivery process was streamlined to allow efficient delivery and future refinement. Examples of the streamlining are determining early the correct track a project should take and minimizing the number of face to face meetings to only those that are essential.

## **Program Operation**

Interest in pursuing energy efficiency for a project by an owner/developer, architect, or contractor is the starting point for the New Construction Program. A project's initial contact with the program occurs by: recruiting by Focus on Energy staff, referral by a Technical Assistant Firm, referral by a participating utility, information from marketing campaigns, or past program participation by the owner/developer, architect, or contractor.

After the project passes the screening criteria, for example the building's location is within the service area of a participating utility, the appropriate track for the project is determined. The possible paths are prescriptive/systems track (per unit incentives or custom calculations based on dollars per energy unit saved), whole building track (tiered incentives based on percent energy cost saved), or a combination of the two tracks. Making the decision on the appropriate track is done by the program staff with input from the owner, design team, and Technical Assistance Firm. This decision is based on several factors:

- Stage in the design or construction process
- Type and size of building
- Type of measures
- Owner/Developer's dedication to energy efficiency.

For a project that follows a prescriptive/systems track, the next step is for the owner to fill out an application to participate. This application records general information about the owner/developer, the project, and the project team. In certain circumstances, the prescriptive/systems track may require limited design assistance from the New Construction Program staff. The design assistance is limited to 2 to 4 hours of calculations outside of the typical prescriptive applications. The New Construction Program places a cap of \$50,000 on cumulative prescriptive/system track measures per project. After the measures are implemented,

the owner/developer provides verification that the measures are in place by completing a self administered form. For implementation verification, there are monetary thresholds that the program requires for pre approval with no site verification, pre approval subject to possible site verification, and pre approval with site verification.

For a project meeting the requirements of the whole building custom track, a Technical Assistance Firm is assigned by the program staff. The selection of the Technical Assistance Firm is based on location, specialty, and work load. The New Construction staff collaborates with the Technical Assistance Firm to collect as much project information to become familiar with the project prior to the first meeting with the owner/developer and their design team.

During the Initial Meeting, New Construction staff and the Technical Assistance Firm present the Focus on Energy program and project's initial potential to the owner/developer, their design team, and contractors. This meeting is also the chance to determine the commitment the project owner/developer has to energy efficiency, and to present to the project team the realistic energy efficient measures and its monetary implications on the project's construction budget.

After the Initial Meeting, the Technical Assistance Firm develops a list of feasible measures that the owner/developer might implement for the project. Along with the measures, there is an estimate of energy savings and return on investment for the project. At this stage of the process, the measures are only a list of feasible items and estimates of savings are rough.

The Measures Meeting is the next stage in the process. At this meeting, the Technical Assistance Firm presents the feasible measures and rough savings calculations. The owner/developer has the opportunity to ask the Technical Assistant Firm questions about the different energy efficient measures. Either at this meeting or during subsequent internal discussions, the owner/developer makes their decision on which measures to proceed with for energy modeling.

The Technical Assistance Firm models the building using energy modeling software that they are familiar with and is appropriate for the project. The New Construction Program's baseline requirements for a specific building type are used for the modeling. The savings are developed from the difference between the model and the baseline. From those savings, an incentive is calculated.

At the Proposal Meeting the modeling results, savings, and incentives are presented to the owner/developer and their design team. This step may take several iterations involving changes in the measures as the owner/developer determines the appropriateness for their project. After a model is accepted by the owner/developer, a signed agreement between the owner/developer and Focus on Energy is completed committing funds to the project for implementing the energy efficiency measures.

As a project is constructed, verification of implemented measures is required by the New Construction Program. This verification occurs at several points in the construction process dependent on the measures, for example prior to close in for insulation levels. After measure verification is complete, the owner/developer receives their incentive check from Focus on Energy. The whole building track incentives are capped at \$200,000 per project.

A project may follow a combination of the two tracks. Situations where prescriptive/system measures are not part of the modeling process are common. In these projects, both tracks are followed and the project cap is a combined amount of \$250,000 (\$200,000 for whole building track, \$50,000 for prescriptive/systems track).

## Savings Goals & Results to Date

The current contract year for Focus on Energy is an 18 month period from July 1, 2007 to December 31, 2008. The following sections detail the projects, savings, and measures to date for the New Construction Program.

### Apartment and Condo Efficiency Services

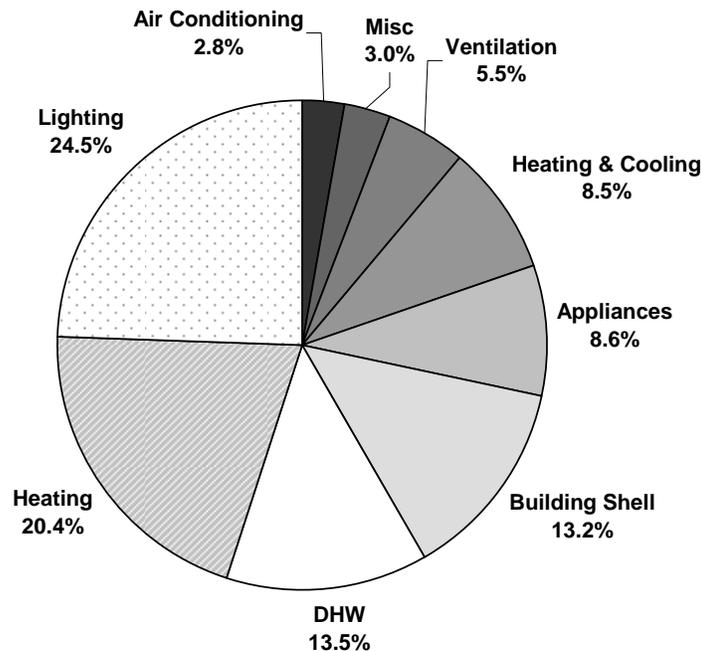
In the first 9 months of the contract year, 23 multi-family projects were completed. There are approximately 70 additional multifamily projects involved with the New Construction Program, which are at varying stages in the process from initial interest to pending verification.

With 50% of the contract period complete, implemented savings (estimated net) and percentage of total contract period savings for 23 completed projects in the Apartment and Condo Efficiency Services Program are:

- 290 kW (55% of goal)
- 1,824,000 kWh (35% of goal)
- 106,000 therms (25% of goal)

Figure 1 shows the Apartment and Condo Efficiency Services Program savings by technology type for the first nine months of the contract period.

**Figure 1. Apartment and Condo Efficiency Services Implemented Savings through 3/31/2008, % Savings by Technology**



## Business Programs

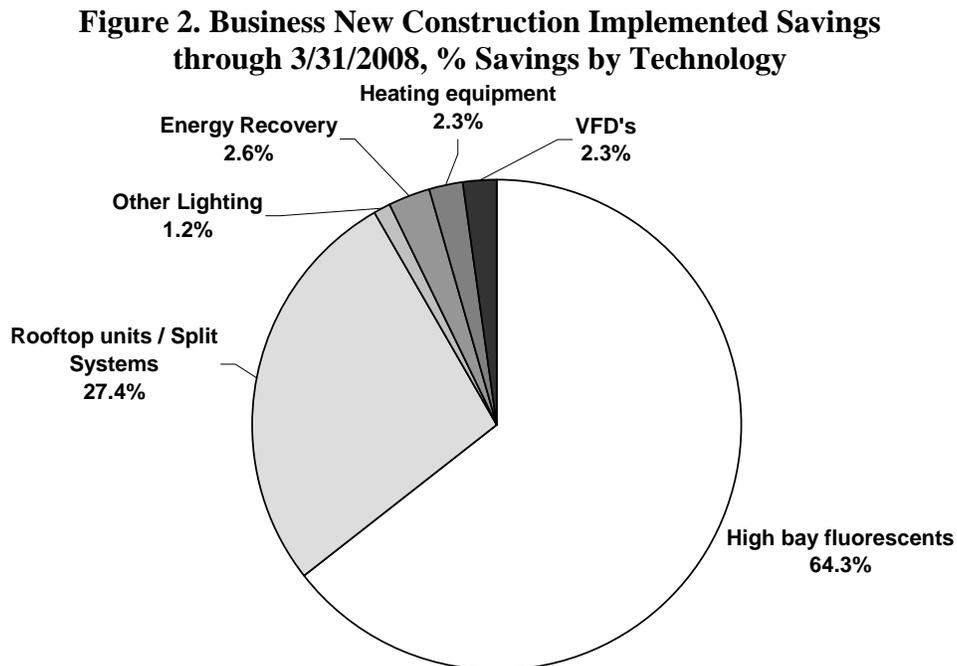
To date, the business new construction program has begun work on over 65 projects, many of which fall into the whole building track and will include energy modeling. These have included a variety of size projects, from a 14,000 ft<sup>2</sup> fire station to a 300,000 ft<sup>2</sup> manufacturing facility. The majority of these projects have included both lighting and HVAC measures in the energy model, and are awaiting completion of construction to verify which measures were installed. Additionally, Energy Advisors working directly with customers have offered systems track incentives to dozens of projects.

Through March 31, 2008, or 50% through the current 18 month contract, the implemented savings (estimated net) for the business new construction program is:

- 399.1 kW (48.2% of goal)
- 1,318,032 kWh (58.1% of goal)
- 5,679 Therms (7.3% of goal)

Although the percent savings for therms is lower than the percent of contract period, this was expected due to the initial ramp up of the program. With the projects in the pipeline, we are confident that this goal will be met.

The following chart, Figure 2 shows the types of measures implemented to date for the business new construction program:



High bay fluorescents have also been a popular measure with the Focus on Energy lighting program, due to significant incentives compared to the installation cost of this technology. Focus on Energy staff anticipate that the percent of savings coming from high bay fluorescents will decrease in the near future as whole building track projects begun at the start of the program are completed.

## Lessons Learned

Through the initial operation of the new construction program, experience with the following has led to valuable lessons learned:

- Determining systems track vs. whole building track for projects
- Determining program boundaries
- Operating parallel programs
- Holding advisory committee meetings

During the planning process, setting a fixed minimum square foot required to have the project qualify for the whole building track was considered. Several other programs across the country have similar requirements. In the end, it was determined that program staff should use their judgment on the individual projects to determine if the systems track or whole building track should be used. This would allow for flexibility, as buildings under a square footage cap may be very energy intensive and have good savings opportunities (such as a small lab or manufacturing facility), while a building over a cap may not be very energy intensive or have much for savings opportunities (such as a heated only warehouse). The following guidelines, Table 2, have been developed based on our experience to date to evaluate whether a project should use the systems track or the whole building track:

**Table 2. Guidelines for Determining Program Track**

<b>Systems Track</b>	<b>Whole Building Track</b>
The project can be at any point, either early planning / design or already under construction	The project is early in the planning or design process (< 50% design complete)
There might not sufficient time remaining to incorporate recommendations from energy modeling into the project.	There is sufficient time remaining to incorporate recommendations from energy modeling into the project.
The energy efficiency measures that the customer is interested in could easily be covered by the prescriptive offers and a few custom incentives	The customer is interested in more complex measures that are easier to evaluate using energy modeling software (such as glazing or HVAC controls improvements)
The project can be any size or energy savings potential	The project is larger in size (about 10,000 ft <sup>2</sup> , but ideally 20,000 ft <sup>2</sup> or more), has significant energy savings potential, and/or has the potential of building numerous copies of the building (chain hotels, restaurants, etc.)
The project will not be performing energy modeling already	The project will be pursuing LEED or performing energy modeling already for other reasons, so that energy modeling for Focus's purposes can be completed for cost of the energy modeling design incentive

Another key lesson learned is that good communication and documentation of decisions are needed. The multi-family and business new construction programs each have separate budgets and track their goals separately, making it important to assign projects, or portions of projects, to the appropriate program. This is occasionally challenging on some building types, such as mixed use facilities and senior housing / assisted living facilities, especially when building systems are inter-connected. The typical process used for assigning savings in mixed use facilities is:

- For mixed use facilities in the whole building track, the energy model should be set up to report energy use by zone, so that the energy savings can be assigned to the multi-family and business portions of the building
- If this is not possible, or the project falls under the systems track, a division of savings by the ratio of square feet is used
- Costs for energy modeling of these facilities is then allocated approximately equal to the energy savings from each area of the building

Across various market channel programs within Focus on Energy, advisory committees have served as a useful tool for obtaining industry input on the design and operation of programs. These meetings are held approximately every 6 months with a group of 15-20 key trade allies and market providers, and allow for Focus staff to solicit feedback on current program offers, obtain ideas for new program offers, and convey information on where the program is heading. Two and a half months prior to the launch of the new construction program, an advisory group meeting was held with staff from architecture, engineering, design-build, and contracting firms from around the state. Invitees were people that Focus staff had prior relationships with, and were selected in order to get representation from around the state and from a variety of firms that are involved with new construction. Response to the planned program was positive, and also helped to get the word out about the launch of the program. Specific recommendations were:

- Prescriptive incentives for existing buildings required a copy of an invoice. The advisory group recommended broadening this to a proof of purchase, which could include an invoice (if available), a proof of purchase, shipping bill, or a bill of lading.
- The advisory group was interested in the new construction program supporting commissioning, such as by offering a bonus for doing basic or advanced commissioning (similar to LEED™ pre-requisite or additional credit). The new construction program plans to start with a fact sheet explaining the benefits of commissioning, and evaluate adding a commissioning bonus in future program years.
- For technologies, the advisory group was interested in prescriptive building shell measures and for ground source heat pump systems. New Construction Program staff evaluated prescriptive building shell measures, but the incentives that could be offered only covered two to six percent of the project cost, which raised free-ridership concerns. A prescriptive offer for ground source heat pump systems is currently under development for new and existing buildings.

## **Case Studies**

### **Program Boundaries**

When the New Construction Program started, the program staff thought that we had planned for all major scenarios that would occur. We soon found out that there are always exceptions to our plans. In fact, exceptions have become the standard and are no longer considered out of the ordinary.

Our initial template for a project involved one developer. That developer could receive up to \$250,000 of incentives through a combination of prescriptive and whole building measures. Several months after the New Construction Program started, a project came to the program with three developers. The project is a large (1 million square feet) mixed used building with two separate developers for the commercial portion and another developer for the apartment component. An additional complication is that one of the commercial developers entered the equation after construction started. Under the original Program design, the building would only be eligible for \$250,000 proportioned between the three developers. The original two developers indicated that they felt they had claims to the \$250,000 based on their early participation with the New Construction Program.

We wanted to avoid first come, first served, situations for the program that set up adversarial relationships. We used a precedent already in place within Focus on Energy's Programs for the relationship that the Renewable Program has with Business Programs and Residential Programs. Any Renewable Program incentives are considered separate and additive to the above project caps for the new construction program (or other business / residential programs). With the approval from the Public Service Commission, we changed the program rules to allow for a \$250,000 cap per use when separate developers are involved. The new rule is not applicable if there is one developer using multiple tax identities for different uses.

### **Prescriptive Projects**

One of the most important aspects of the New Construction Program is to determine a project's needs as quickly as possible after enrollment. We want to be as cost effective for the customer and the program. As outlined in a previous section, in the first meeting with the owner/developer or design team we gather information as to the level of energy efficiency they are wishing to achieve, the budget they are working with, and the point in the planning process that the program is becoming involved. Many owners want the New Construction Program to model their building. For many projects, modeling is not cost effective. An example is the typical four to eight unit apartment buildings, replicated with a standardized layout. The program is involved with a project that involves 13 buildings completed over a two year period. The prescriptive measures included in the early buildings are ENERGY STAR appliances, common area lighting, and individual domestic hot water heaters. After the first several buildings were completed the program was able to influence the owners to include radiant heating and high efficiency boilers.

## Whole Building Project

An example of a project that used the whole building track of the new construction program is a new fire station for the City of Madison. This project wished to pursue LEED certification, and had a goal of reducing energy use by 20-30%. Focus on Energy staff had worked extensively with the City of Madison prior to the launch of the business new construction program, and Focus on Energy new construction staff had worked with the architect on a couple of different projects since the launch of the program.

The proposed building is a single story, 13,711 ft<sup>2</sup> and was needed to address continued growth in Madison. Design for the project started in August 2007, with an estimated occupancy date of December 2008. Energy modeling for the building included a program baseline model, along with two different proposed HVAC systems: a VAV with hot water reheat system and a geothermal heat pump system (recommended). Additionally, wall and roof insulation improvements, glazing improvements, and a reduction in lighting watts / square feet were recommended. The final recommendations resulted in an energy cost savings of 42% and projected incentive of \$12,681.

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