



-M-E-M-O-R-A-N-D-U-M- COMMISSION  
CLERK

DATE: JANUARY 22, 2004

TO: DIRECTOR, DIVISION OF THE COMMISSION CLERK &  
ADMINISTRATIVE SERVICES (BAYÓ)

FROM: DIVISION OF ECONOMIC REGULATION (HAFF, BALLINGER, BAXTER, MUNROE)  
OFFICE OF THE GENERAL COUNSEL (M. BROWN) *MCB* *Wet*

RE: DOCKET NO. 030999-EG - PETITION FOR APPROVAL OF  
MODIFICATIONS TO RESIDENTIAL NEW CONSTRUCTION AND  
RESIDENTIAL ENERGY MANAGEMENT DSM PROGRAMS BY PROGRESS  
ENERGY FLORIDA, INC.

AGENDA: 02/03/2004 - REGULAR AGENDA - TARIFF FILING - INTERESTED  
PERSONS MAY PARTICIPATE

CRITICAL DATES: NONE

SPECIAL INSTRUCTIONS: NONE

FILE NAME AND LOCATION: S:\PSC\ECR\WP\030999.RCM

CASE BACKGROUND

As part of its Commission-approved Demand-Side Management (DSM) Plan, Progress Energy Florida (PEF) offers a Residential New Construction program, an umbrella program that promotes energy-efficient construction exceeding the Florida Energy Code. The program provides information, education, and advice to home builders and contractors on energy-related issues and efficiency measures. The program promotes duct sealing measures, insulation, energy-efficient electric heat pumps, and alternative electric water heating equipment through combined incentives of up to \$350.

PEF also offers a Residential Energy Management program, a winter-only program which provides for direct load control of electric water heating and central electric heating appliances between November and March. In each of these months, PEF pays a

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credit of \$11.50 to program participants with a monthly energy consumption of at least 600 kWh.

On October 22, 2003, in the instant docket, PEF petitioned the Commission for approval of modifications to the Residential New Construction and Residential Energy Management programs. For the Residential New Construction program, PEF requested approval to add two additional energy efficiency options, radiant barrier systems and high-performance windows, as well as to increase the minimum Seasonal Energy Efficiency Rating (SEER) of heat pumps from 11.5 to 13.0 in order to qualify for builder incentives. For the Residential Energy Management Program, offered under Rate Schedule RSL-2, PEF requested approval for the option to interrupt a heat pump's secondary resistive heating elements while allowing the main heat pump to operate without interruption. The proposed changes to the Residential Energy Management program do not preclude PEF from interrupting a customer's entire heat pump system if necessary.

By letter dated December 10, 2003, PEF voluntarily waived its right, pursuant to Section 366.06(3), Florida Statutes, to place the proposed rates filed in Rate Schedule RSL-2 into effect within 60 days of PEF's petition.

This recommendation addresses PEF's petition to modify the Residential New Construction and Residential Energy Management programs. The Commission has jurisdiction over this matter pursuant to Sections 366.81 and 366.82, Florida Statutes.

DISCUSSION OF ISSUES

**ISSUE 1:** Should the Commission approve PEF's petition to modify its Residential New Construction program?

**RECOMMENDATION:** Yes. Incorporating the changes proposed by PEF, the Residential New Construction program is expected to continue to meet the policy objectives of the Florida Energy Efficiency and Conservation Act, to continue to be monitor able, and continue to be cost-effective. (Haff)

**STAFF ANALYSIS:** PEF proposed three modifications to its existing Residential New Construction program: an increase in the minimum Seasonal Energy Efficiency Ration (SEER) of heat pumps from 11.5 to 13.0 in order to qualify for a builder incentive, an option for the installation of attic radiant barrier systems; and, an option for the installation of high-performance windows.

PEF cites several factors contributing to the proposed increase in the minimum SEER for heat pumps. First, recent changes to the Florida Energy Code imposed higher energy efficiency requirements on the total structure but allowed for more options to meet these requirements. Home builders typically choose the lowest-cost combination of options to meet these requirements. Second, the cost of higher-efficiency heat pumps has declined since the Residential New Construction program was approved in 2000. At that time, the incremental cost of an 11.5 SEER heat pump over a 10.0 SEER heat pump, the minimum required by the Florida Energy Code, was approximately the same as the current incremental cost of a 13.0 SEER heat pump over an 11.5 SEER heat pump. Because of the decreased cost of an 11.5 SEER heat pump, builders have chosen to install the heat pump measure, in lieu of more costly measures, more than twice as often in 2003 as in 2002. The result is a "free rider" effect, in which builders would likely have chosen the 11.5 SEER heat pump regardless of whether an incentive was offered. PEF expects that increasing the minimum heat pump SEER rating from 11.5 to 13.0 will minimize free riders.

A radiant barrier is a layer of aluminum foil placed in an airspace to block radiant heat transfer between a heat-radiating surface (such as a hot roof) and a heat-absorbing surface (such as attic insulation). PEF added the attic radiant barrier system option to the Residential New Construction program based on research conducted with the Florida Solar Energy Center. This

research demonstrated the value of a radiant barrier system in new home construction.

A high performance window improves the thermal performance of a home by minimizing heat loss in cold climates while minimizing solar heat gain in warm climates. PEF added high-performance windows as an option to the Residential New Construction program due to recent advances in energy efficiency. At the same time, the cost of these windows has decreased.

When the Commission reviews conservation programs, it typically considers three criteria:

- Whether the program advances the policy objectives of Rule 25-17.001, Florida Administrative Code, and Sections 366.80-.85, Florida Statutes, also known as the "Florida Energy Efficiency and Conservation Act" (FEECA);
- Whether the program is directly monitor able and yields measurable results; and
- Whether the program is cost-effective.

PEF's Residential New Construction program, as modified, will allow PEF to continue to achieve the goals of FEECA. As shown in Exhibit C to the petition, the proposed modifications increase per-customer savings by 2.16 KW winter peak demand, 2.00 KW summer peak demand, and 3826 kWh of annual energy consumption over the existing program. Combined with forecasted increases in customer participation, the program is expected to increase peak demand and annual energy savings on PEF's system.

PEF's Residential New Construction program, as modified, is directly monitor able and will continue to yield measurable results. The proposed changes resulted from PEF's monitoring of activities in the current program, and these activities will remain unchanged in the revised program.

PEF's Residential New Construction program, as modified, is cost-effective. The increase in the minimum SEER rating for heat pumps is expected to minimize free riders and, as a result, increase the program's cost-effectiveness. PEF forecasts a benefit-cost ratio under the RIM test of 1.68. This means that, for participants and non-participants alike, the Residential New

Construction program is expected to be less costly than PEF's next identified power plants, starting with two 185 MW combustion turbines scheduled for 2005.

PEF's modified Residential New Construction program is expected to continue to meet the policy objectives of FEECA, to continue to be monitor able, and continue to be cost-effective. Staff recommends that the Commission approve PEF's petition to modify its Residential New Construction program.

**ISSUE 2:** Should the Commission approve PEF's petition to modify its Residential Energy Management program?

**PRIMARY RECOMMENDATION:** No. By controlling only the secondary strip heat portion of a heat pump, PEF would essentially place customers on a "no load-control" program with no reduction in credit payment. The existing program continues to be cost-effective, so there is no urgency to correct a problem. It appears that PEF is proposing the changes to the program to increase participating customer satisfaction with little or no incremental benefit to the remaining body of ratepayers. (Ballinger)

**ALTERNATE RECOMMENDATION:** Yes. Incorporating the changes proposed by PEF, the Residential Energy Management program is expected to continue to meet the policy objectives of the Florida Energy Efficiency and Conservation Act, continue to be monitor able, and continue to be cost-effective. (Haff)

**PRIMARY STAFF ANALYSIS:** PEF's Residential Energy Management program provides for direct load control of electric water heating and central electric heating appliances. For electric heat pumps, the program currently allows for the simultaneous interruption of the entire heat pump, consisting of the main heat pump and secondary strip heating elements. Heat pump interruptions currently do not exceed 16.5 minutes per 30-minute period. The proposed modification will allow PEF to interrupt service to the secondary strip heating elements continuously while allowing the main heat pump to operate normally.

In its petition, PEF claims that the supplemental strip heat portion of a heat pump can be driven into operation more frequently after the initial interruption schedule on a customer's heat pump. This occurs because the house can cool down during the interruption period, a maximum of 16.5 minutes every 30 minutes, and the heating system tries to make up the lost heat in rapid order. When this happens, subsequent interruption periods would contribute less and less demand savings. In addition, the initial interruption could have the unintended consequence of actually raising peak demand.

The problem of rebound due to supplemental strip heat has been known to PEF since at least 1990 and is a situation that could diminish the effectiveness of PEF's Residential Energy Management program. PEF claims that the proposed modifications "will provide greater demand reductions while improving the level of customer comfort during load control periods." Staff informally asked for these values and received a narrative explanation of the results and selected pages from a study performed by the Florida Solar Energy Center (FSEC).

If not interrupted, a heat pump's supplemental strip heat could be called upon to maintain the temperature of the house only under very cold temperatures. PEF has proposed a trigger temperature of 45 degrees before they would exercise the strip heat only option. However, the balance point for a typical heat pump is well below 45 degrees. In other words, a heat pump can efficiently provide heat to a dwelling when outside temperatures are below 45 degrees. Therefore, PEF's proposed modification would eliminate the demand savings currently available under the program at milder temperatures. If the customer's heat pump were not cycled at all, then the supplemental strip heat would not be activated, and the customer's demand profile would remain essentially flat. This is exactly what would happen under PEF's proposed modifications where the supplemental strip heat would be controlled, but the primary heat pump system would be allowed to run uninterrupted during the entire peak period. In other words, both participating and non-participating customers would provide no demand reduction associated with their heating system, but the participating customer would receive a credit of \$11.50 on their bill.

According to the FSEC study, the best strategy would be to control the strip heat 100% of the time and reduce the duty cycle of the heat pump compressor from 50% to 33%, roughly 10 minutes of interruption for every 30 minutes of peak period. Such a strategy

would provide increased demand savings while maintaining similar customer comfort compared to the current interruption schedule.

Since the existing program is cost-effective, there does not appear to be an urgent need to modify the program to maintain cost-effectiveness to non-participating customers. Instead of the proposed changes offered by PEF, primary staff would rather see the program left alone, a lower trigger temperature closer to 32 degrees, or, perhaps, a modification of the duty cycle for the heat pump while continuously controlling the strip heat portion.

**ALTERNATE STAFF ANALYSIS:** The proposed modification will allow PEF to interrupt service to the secondary strip heating elements while allowing the main heat pump to continue normal operation. The proposed change results from an end-use studies on 204 PEF customers, performed by FSEC, which found that strip heating elements can be driven into operation more frequently when load control is exercised. The FSEC study found that continuous interruption of only the strip heating elements over a two-hour period improved the demand reduction on PEF's system compared to interrupting the entire heat pump under the normal interruption schedule. The FSEC study also found that customer acceptance improved as a result of allowing the heat pump compressor to operate without interruption during the full control period.

When the Commission reviews conservation programs, it typically considers three criteria:

- Whether the program advances the policy objectives of Rule 25-17.001, Florida Administrative Code, and Sections 366.80-.85, Florida Statutes, also known as the "Florida Energy Efficiency and Conservation Act" (FEECA);
- Whether the program is directly monitor able and yields measurable results; and
- Whether the program is cost-effective.

PEF's Residential Energy Management program, as modified, will allow PEF to continue to achieve the goals of FEECA. PEF evaluated the program over a range of duty cycles ranging from 33% (10 minutes of interruption per 30-minute period) to 55% (16.5 minutes of interruption per 30-minute period). As shown in Exhibit C to the petition, the proposed modifications result in minimal

increases in demand and energy savings over the existing program. With a duty cycle ranging from 33% to 55%, per-customer savings range from 0.1 to 0.133 KW of winter peak demand and 0.7 to 1.6 kWh of annual energy consumption. Given that the Residential Energy Management Program is a winter-only program, there are no forecasted summer peak demand savings. Combined with forecasted increases in customer participation, the program is expected to slightly increase winter peak demand and annual energy savings on PEF's system.

PEF's Residential Energy Management program, as modified, is directly monitor able and will continue to yield measurable results. The proposed changes resulted from PEF's monitoring of activities in the current program, and these activities will remain unchanged in the revised program.

PEF's Residential Energy Management program, as modified, is cost-effective. PEF forecasts a benefit-cost ratio under the RIM test of 1.54. This means that, for participants and non-participants alike, the Residential Energy Management program is expected to be less costly than PEF's next identified power plants, starting with two 185 MW combustion turbines scheduled for 2005.

The modification proposed by PEF to its Residential Energy Management program does not achieve the maximum demand and energy savings available to PEF. The FSEC study indicated that PEF could gain greater demand and energy savings by the dual interruption of the supplemental strip heating elements for long periods and the cycling interruption of the heat pump compressor under normal duty cycles. PEF is concerned that implementation of such a program would cause existing participants to drop off the program entirely. PEF's proposed modification balances program cost, demand and energy savings, and customer acceptance.

PEF's modified Residential Energy Management program is expected to continue to meet the policy objectives of FEECA, to continue to be monitor able, and continue to be cost-effective. Further, the program balances program cost, demand and energy savings, and customer acceptance. Therefore, alternate staff recommends that the Commission approve PEF's petition to modify its Residential Energy Management program.



**ISSUE 3:** Should this docket be closed?

**RECOMMENDATION:** Yes. If the Commission approves the primary staff recommendation in Issue 2, and no timely protest is filed, this docket should be closed upon the issuance of a Consummating Order. If the Commission approves the alternate staff recommendation in Issue 2, and a protest is filed within 21 days of the issuance of an Order, the tariff should remain in effect pending resolution of the protest; however, if no timely protest is filed, this docket should be closed upon the issuance of a Consummating Order. (M. Brown)

**STAFF ANALYSIS:** If the Commission approves the primary staff recommendation in Issue 2, and no timely protest is filed, this docket should be closed upon the issuance of a Consummating Order. If the Commission approves the alternate staff recommendation in Issue 2, and a protest is filed within 21 days of the issuance of an Order, the tariff should remain in effect pending resolution of the protest; however, if no timely protest is filed, this docket should be closed upon the issuance of a Consummating Order.