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**BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION**

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| In Re: Petition for authority to implement Good Cents Conversion Program by Gulf Power Company. | Docket No. 981591-EG<br><br>Submitted for Filing: 8-5-99 |

**DIRECT TESTIMONY AND EXHIBIT**

**of**

**JOSEPH W. McCORMICK**

**on behalf of**

**PEOPLES GAS SYSTEM**

Q. Please state your name and business address.

A. My name is Joseph W. McCormick. My business address is 702 North Franklin Street, Tampa, Florida 33602.

Q. By whom are you employed, and in what capacity?

A. I am employed by Tampa Electric Company as Manager of Regulatory Coordination. My responsibilities include supervision of the Regulatory Affairs administrative staff as well as advising Peoples Gas System (Peoples) in matters of regulatory policy and programs.

Q. Please summarize your educational background and experience.

A. I hold a Bachelor of Science in Psychology from Viterbo College and a Master of Business Administration from the University of Wisconsin-LaCrosse. I served in the United States Army for five years, attaining the rank of Captain before being retired for service-related disability. After completing my degrees, I taught business and management at the University of Wisconsin-LaCrosse for two years. From 1981 to 1995, I served on the staff of the Florida Public Service Commission (Commission).

From 1982 to 1986, I held various positions in the Commission's System Planning and Conservation group, including Planning and Research Economist, Economic Analyst and various supervisory roles in which I supervised energy analysts, economists and engineers. In those positions, I was involved in initial rulemaking to establish the Commission's Conservation Cost Recovery Cost Effectiveness Test. I also analyzed and supervised the analyses of electric and gas utility filings of proposed conservation plans and programs and made recommendations to the Commission regarding program approval. I participated in numerous rulemaking and other dockets regarding electric and gas utility energy conservation and demand side management activities, including establishment of conservation goals, review of electric utility ten-year site plans and Energy Conservation Cost Recovery Hearings. On behalf of the Commission, I testified on Florida energy conservation actions before the United States Congress House of Representatives Committee on Energy and served as technical advisor to the Florida Legislature on issues related to energy and energy code when requested to do so by the chairs of various legislative committees.

In 1986, I was appointed as Bureau Chief of the newly formed Bureau of Gas Regulation, and remained in that position until leaving the Commission in March 1995. As bureau chief, I was the staff person primarily responsible for all aspects of regulation of Florida's natural gas industry, including managing rate case proceedings, recommending regulatory policy to the Commission and overseeing energy conservation activities of the investor-owned natural gas utility industry. In that capacity, I supervised accountants, engineers and economists.

In March 1995, I was employed by Peoples Gas System, Inc. as Director of Regulatory Affairs. Since the acquisition of Peoples by TECO Energy, Inc., I have continued to be involved in regulatory matters in various capacities throughout the corporation.

Q. Do you have any exhibits to which you will refer in your testimony?

A. Yes. I have one composite exhibit, Exhibit No. ____ (JWM-1). The exhibit includes pertinent pages from several reference documents: 1. Air Conditioning and Refrigeration Institute (ARI) consumer information brochure: "Keep Your Cool and Save Cold Cash: Here are answers to 42 questions that consumers often ask the Air-Conditioning & Refrigeration Institute"; 2. 1999 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Handbook: Heating, Ventilating and Air-Conditioning Applications; 3. State of Florida Energy Efficiency Code for Building Construction, 1997 Edition; 4. Copy of Gulf's Water Heating Conversion materials for free water heater or $140 incentive; 5. Gulf's response to Staff Interrogatory No 18, and; 6. Gulf's response to Staff Interrogatory No. 7.

Q. Have you reviewed the Commission's Proposed Agency Action Order No. PSC-99-0684-FOF-EG, issued on April 7, 1999, and Gulf Power Company's (Gulf's) Petition for Formal Proceeding on Proposed Agency Action filed in this docket on April 28, 1999?

A. Yes, I have.

Q. Have you reviewed the direct testimony and Exhibit ____ (TSS-1) submitted by Mr. Ted S. Spangenberg on July 22, 1999 in support of Gulf's petition?

A. Yes. I am familiar with Mr. Spangenberg's direct testimony and the exhibit he has sponsored on behalf of Gulf.

Q. Do you agree with the assumptions used by Gulf in analyzing the cost effectiveness of its proposed Good Cents Conversion Program?

A. No. There are several assumptions used by Gulf with which I disagree, and which – if corrected – would result in the program's failure to meet the Commission's tests for approval of the program for cost recovery through the energy conservation cost recovery ("ECCR") clause.

Q. Please identify the assumptions used by Gulf which you believe are incorrect.

A. First, the benefits of the proposed conversion program are overstated due to Gulf's assumed reductions in summer peak demand and annual kWh consumption resulting from replacing an electric air conditioning unit with an effective Seasonal Energy Efficiency Ratio ("SEER") of 7.0 with a heat pump with a SEER of 11.0.

Second, the benefits of the proposed conversion program are overstated due to the apparent lack of recognition in Gulf's analysis that the replacement heat pump's average life is only 15 years.

Third, Gulf's inclusion of the monthly customer charge in the average gas price used in its cost effectiveness analysis overstates the cost of gas used in that analysis.

Finally, Gulf's analysis assumes a decrease in summer peak demand. For reasons I will address later in my testimony, I believe approval of this program, when viewed in conjunction with other Gulf programs, will result in the replacement of additional gas appliances with electric appliances. This will diminish and perhaps entirely eliminate Gulf's calculated reduction in summer peak demand and further increase winter peak demand and annual energy consumption.

Q. Please explain why you disagree with Gulf's calculation of benefits under the proposed program based on reductions in summer peak demand and energy consumption attributable to the change in the SEERs of the involved equipment from an assumed 7.0 to an assumed 11.0.

A. As recognized by the Commission in its Order No. 99-0684-FOF-EG, whether or not Gulf implements its proposed conversion program, the heat pump installed by any customer in Gulf's service area as a replacement for an existing air conditioning unit must, under Florida's Energy Efficiency Code for Building Construction (Building Code), have a SEER of not less than 10.0. The Building Code adopts those standards to be consistent with the National Appliance Energy Conservation Act of 1987 (NAECA), which establishes the national minimum standard efficiency as 10.0 for heat pumps. (See Exhibit JWM-1, p. 10-12.)

Thus, any savings in summer peak demand (or in annual electric energy consumption) derived from a customer's conversion of these appliances is attributable not to Gulf's program, but to the Building Code. Gulf's analysis incorrectly includes all of the savings attributable to the change from an assumed 7.0 SEER air conditioning unit to an 11.0 SEER heat pump. The analysis should use in its assumptions only those savings associated with a change from a 10.0 SEER heat pump to a heat pump with a SEER of 11.0.

We believe Gulf's program will not so much cause the early replacement of old, inefficient heating and air conditioning equipment as it will cause replacement of non-electric heating systems with heat pumps at the end of the air conditioning system's normal useful life.

In its Petition for Formal Proceeding on Proposed Agency Action, Gulf says it "seeks a formal proceeding to show that residential customers are likely to replace functioning, though inefficient, existing equipment and not just equipment that fails." Gulf's own filings in this docket, however, indicate this program is designed only to replace systems near the end of their useful lives. In response to Staff's Interrogatory No. 18 (see Exhibit JWM-1, p. 16), Gulf stated: "The targeted program participants have existing equipment installations that are 10 to 15 years old." The ARI consumer brochure: How to Keep Your Cool and Save Cold Cash, (see Exhibit JWM-1, p. 1-7) gives the average useful life of a central air conditioning unit as 15 years and of a heat pump as 14 years. The 1999 ASHRAE Handbook Heating, Ventilating and Air-Conditioning Applications estimates the service of a residential central air-conditioning unit or heat pump as 15 years. (See Exhibit JWM-1, p. 8-9.) Gulf's proposed program is, therefore, targeted to replace existing electric air conditioners very nearly at the end of their normal useful lives. ARI states that "By 1994, the average SEER for all units shipped by manufacturers in the U. S. improved to 10.61 for central air conditioners and 10.94 for central heat pumps." For cooling load, which affects summer peak kW demand and kWh consumption, the analysis should then be limited to, at most, the difference between the SEER 10.0 and 11.0 cooling unit. Even that difference is conservative, based on the ARI data indicating that the average efficiency of all heat pumps shipped by manufacturers five years ago was a SEER of approximately 11.0.

On the heating side, Gulf's proposed program provides an incentive to discard non-electric heating systems coincident with the end of the electric air conditioning systems' normal useful lives. The proposed program would replace them with heat pumps that have back up resistance heating coils, adding significant winter peak demand and significant electric energy consumption for heating .

The Commission was correct in its order in stating:

> "... [I]n reality, Gulf's Program will capture only the demand and energy savings associated with upgrading from 10.0 SEER to 11.0 SEER. Based on this realistic assumption, Gulf estimates that the Program will decrease total summer peak demand by 1.5MW (0.3 kW per participant). Total annual energy consumption under this scenario, however is estimated to increase by 6950 MWh (1,390 kWh per participant). There would be no change in the forecasted winter peak demand increase under this scenario because it, like Gulf's base case assumption, requires the replacement of

a natural gas heating system with an electric heat pump." (Order PSC-99-0684-FOF-EG, page 3)

Q. Please explain why you disagree with Gulf's assumed 30-year life for the replacement heat pump envisioned by its conversion program.

A. I disagree with that assumption because ARI and ASHRAE data indicate the average life of a heat pump to be only 14 to15 years. Gulf has calculated the cost effectiveness of its proposed program using an average life of twice that indicated by ARI as useful life. If ARI's average life of the replacement heat pump is to be used, the cost effectiveness analysis must include a benefit stream of only 15 years. Correcting the cost effectiveness analysis in this way would significantly reduce the savings assumed by Gulf in its analysis.

Q. What is the impact on the cost effectiveness results calculated by Gulf for this program if the correct assumptions are used?

A. Gulf has provided these calculations. As shown on page 9 of Exhibit ___ (TSS-1), if the program life is reduced to 15 years, and the assumed change in the efficiency of the cooling equipment is correctly stated as increasing only from a 10.0 SEER to a SEER of 11.0, the proposed program fails both the Participant Test and the Total Resource Cost (TRC) Test with results of 0.80 and 0.75, respectively, both of which are well below the desired result of 1.0 or greater. This proposed program fails two of the three cost effectiveness tests. The RIM test result drops to 1.19. (Spangenberg Exhibit TSS-1, Page 9 of 9.) The positive RIM test result could be diminished or reversed if this program leads to the addition of electric load through replacement of additional gas appliances. It should, therefore, not be approved.

Q. Please explain how Gulf's inclusion of the monthly customer charge in the average gas price used in its cost effectiveness analysis overstates the cost of gas used in that analysis.

A. A natural gas utility's service rates include a monthly customer charge, which is a flat rate the customer pays regardless of the level of gas consumption during a given month, and a delivered rate per therm for gas actually consumed. We believe Gulf's analysis inappropriately includes the customer charge in its calculation of the average gas price of $0.95 per therm. The customer charge should not be included in the average gas price if the customer – after replacing its gas furnace with a heat pump as envisioned by Gulf – continues to use gas for any other appliances. If the customer charge is not included in the average cost of gas, the appropriate per-therm charge on Peoples' system would be $0.742 per therm as shown in Gulf's response to Staff's Interrogatory No. 7. (See Exhibit JWM-1, p. 17-18). Thus, at least as to customers on Peoples' system, Gulf's assumed average cost of gas overstates the cost of gas by about $0.21 per therm, or approximately 28 percent.

Q. Please explain how Gulf's proposed program could bring about conversion of other gas appliances from gas to electric and how that would diminish or eliminate Gulf's calculated reduction in summer peak demand and could, in fact, increase summer peak demand.

A. If Gulf's proposed program causes the removal of the existing gas furnace, the effective per-therm cost of gas for remaining appliances increases. This results from the fixed monthly customer charge ($7 per month in Peoples' service territory) being spread over a smaller number of therms. The resulting higher unit cost of gas creates a significant likelihood that the customer will replace additional gas appliances with electric ones.

Adding to the likelihood of conversion of other appliances, Gulf currently has a program which gives a customer a free electric resistance water heater (including a timer) if it will replace an existing gas water heater (or provides a $140 rebate). (See Exhibit JWM-1, p. 13-15). Addition of the demand requirements of the electric resistance water heater (and ultimately the additional electricity required if any other gas appliances are replaced with electric ones) will offset the slim 0.3 kW per participant reduction in summer peak demand which Gulf has calculated as savings associated with conversion of 10.0 SEER cooling equipment to equipment with an 11.0 SEER. Replacement of gas water heaters with electric ones will also further increase Gulf's calculated 4.4 kW increase in its winter peak demand and kWh consumption attributable to this proposed program.

Q. Do you believe the Commission should approve Gulf's proposed program for recovery of the program costs through the ECCR clause?

A. No. Peoples believes that if input assumptions are changed to reflect the average life of heating and cooling equipment and the Building Code equipment efficiency requirements (SEER 10.0) are used to calculate demand and energy changes, Gulf's proposed program fails both the Participant Test and the TRC Test.

The proposed program increases weather sensitive peak demand in the winter, increases annual kWh consumption, and, at best, minimally decreases summer peak demand. When viewed in conjunction with Gulf's water heater program, this proposed program may, in fact, increase summer demand. The proposed program, therefore, appears to violate all Florida Energy Efficiency and Conservation Act (FEECA) requirements.

Regardless of whether summer peak demand increases with further increases in kWh consumption in the event all gas appliances are replaced, this proposed program would undeniably increase winter peak demand and annual kWh consumption. The Commission must consider that, absent this proposed program, the additional of 4.4 kW of winter peak demand per participating customer (22 MW total system) would not exist. Stated conversely, if the Commission approves this program, it will result in a 22 MW increase in winter peak demand and significantly increased electricity consumption that would not otherwise occur absent the program. Approval of the proposed program would be inconsistent with the plain language contained in the FEECA. The Commission, therefore, should not approve Gulf's proposed program.

Q. Does this conclude your testimony?

A. Yes.

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# Here Are Answers to 42 Questions That Consumers Often Ask the Air-Conditioning & Refrigeration Institute

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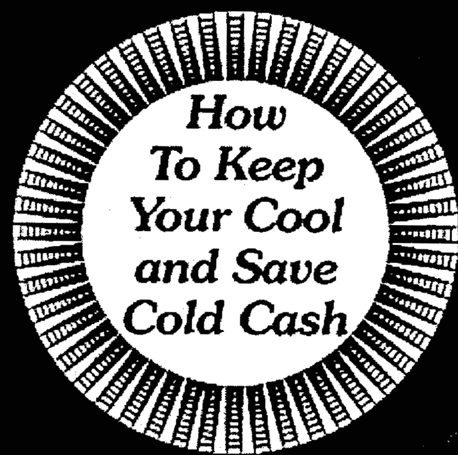
*Here are answers to 42 questions that consumers often ask the Air-Conditioning & Refrigeration Institute*

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*1. Here are some basic rules to follow for keeping cool at minimum cost.*

- Caulk, weatherstrip, and insulate (especially the attic) to close air gaps.
- Plan hot work (washing and drying clothes, baking, cooking) for cooler morning and evening hours.
- Pull drapes and shades over windows facing the sun.
- Keep windows and doors closed when the air conditioning is on.
- Use a thermostat control to automatically increase or decrease home temperatures for daytime/nighttime differences to save money.
- Set thermostat control at highest comfortable level—each degree raised reduces energy consumption by 3 to 4 percent.
- Clean or replace air filters regularly.
- With a new system, consider a service contract which includes periodic maintenance and repairs for a specified period of time.
- Keep the outside unit free of leaves or other airflow obstructions.
- Have the air conditioning unit cleaned each spring.

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### 2. How does an air conditioner work?

An air conditioner transfers heat—from the inside of a building, where it is not wanted, to the outside. Refrigerant in the system absorbs the excess heat and is pumped through a closed system of piping to an outside coil. A fan blows outside air over the hot coil, transferring heat from the refrigerant to the outdoor air. Because the heat is removed from the indoor air, the indoor area is cooled.

### 3. Is central air conditioning better than window units?

This depends largely on individual circumstances—for example, how large is the area to be air conditioned, how large is the family, what temperatures are required, how well the house is insulated, where the house is located, etc. Central systems require internal ducting; window units take up valuable window space. In many cases, if more than three large rooms need air conditioning, it is best to consider central air conditioning. Your contractor can advise you.

### 4. Should I augment my central air conditioning system with other air conditioners or ceiling fans?

If you need to use other air conditioners with a central air conditioning system, your central system probably is undersized or the air distribution system is imbalanced. Window air conditioners or split ductless systems may be used in rooms that lack air ducts.

Ceiling fans can be a good idea with some indoor comfort systems because they circulate air that tends to stagnate at the top of rooms with high ceilings.

### 5. What is the average life of a central air conditioning system?

It can vary, depending on how much the system is used and how regularly it is checked or serviced. Generally, the average life of cooling units built in the 1970s and 1980s is about 15 years, but individual units may vary and last much longer, depending on use and how well they are maintained. Heat pumps have about the same life-span—an ARI survey showed average heat pump life to be about 14 years when recommended maintenance procedures were followed. Newer units are expected to last even longer.

INDOOR AIR

### 6. What should I do in advance to make sure that my air conditioning system will work efficiently this summer?

The main thing is to have the system checked each year before the peak cooling season—by a qualified contractor or service technician. Then, remember to keep the air filter clean and the outdoor unit free of leaves and debris.

### 7. If my air conditioner is no longer cooling properly, what is the most likely problem?

It could be as simple as replacing a fuse, resetting a circuit breaker or checking to see if the thermostat is set properly. If an electrical problem isn't the cause, the refrigerant may be low if the system still runs but does not cool properly. This can be corrected by having an EPA-certified technician add necessary refrigerant. Most likely, if the problem involves any major part, such as the compressor, you would hear strange noises similar to those of any mechanical equipment not running correctly, or the unit might not run at all.

### 8. Can homeowners repair their own air conditioners?

In most cases, definitely not. Cooling systems today are more complicated to service and usually require expert attention in order to comply with federal regulations, such as the Clean Air Act which prohibits releasing refrigerants into the atmosphere. An EPA-certified air conditioning contractor or service technician should be called at the first sign of trouble.

### 9. When do I know it's time to replace my system?

When the system starts giving you more problems than seem cost-effective to fix, particularly when major components such as the compressor start making unusual noises or otherwise indicating need for a service call. When faced with major repairs, consult several contractors for their recommendations. Replacing a compressor is somewhat less expensive than replacing the entire unit, but new units may give you greater efficiency and lower operating costs in the long run.

### 10. Which is better—letting a central cooling system wear out before replacing it, or replacing it at some point before it wears out?

Because newer equipment usually is more energy efficient than older central air conditioning or heat pump systems, you might actually save money by replacing your old system before it completely wears out. Contact local contractors and ask for their estimates. In some cases, the money you save in reduced utility costs might pay back your purchase price of a new system years earlier than you might think.

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### *11. When is the best time to buy an air conditioner?*

Like most items, in the off-season. That's when contractors have more time to spend with you determining exactly the best options you would want to consider for your individual needs.

### *12. How do I go about shopping for a new system?*

Ask friends and neighbors about the types of systems they have, how much they cost, how long they've had them, and how satisfied they are with them. Then ask for recommendations as to brands and local contractors, or ask several different contractors to take a thorough look at your home, evaluate your overall comfort needs, and recommend the best system for you. Look at all indoor climate control options—the entire spectrum of heating, cooling, air filtration, and humidification equipment.

### *13. Should I replace both my outdoor condensing unit (which includes the compressor) and the indoor coil on my central air conditioning system at the same time?*

In most instances, yes. Matching a new condensing unit with a new coil is the only reliable way to be certain you are going to get the rated efficiency of the new equipment. Matching a new, high SEER (seasonal energy efficiency ratio) condensing unit with an old indoor coil probably would not result in optimum efficiency.

### *14. What is the best type of system to meet all indoor comfort needs?*

The best system depends on many variables, including family size, house location and design, and utility cost and availability. The optimum indoor comfort system might include high efficiency central air conditioning and heating, a high-efficiency air cleaner, and a central humidifier.

### *15. If I buy a new system, what is the best kind of control unit?*

If you want flexibility to program your temperature changes, a computerized thermostat will probably be best. Manually-operated control systems allow you to select a temperature setting which your unit will maintain.

INDOOR AIR

### *16. How can I get a high efficiency system that will have minimum operational costs?*

Manufacturers publish equipment efficiency ratings which are available to your contractor. ARI also publishes directories indicating various energy efficiency ratings of specific equipment. It is important that a contractor install a unit that has just the right capacity to cool your home. Units with excess capacity will cycle on and off and work less efficiently, thus increasing your operating costs.

### *17. How can a homeowner tell if a contractor's price is fair?*

Mostly by comparing bids from several contractors, and possibly checking the local Better Business Bureau to be sure the contractor has a good reputation.

### *18. How easy is it to install central air conditioning in an older home?*

Often it is fairly simple, particularly if the older home has existing duct work or plenty of room for adding duct work. Homes without air conditioning ducts can consider non-ducted systems which also provide the advantage of cooling only selected areas very effectively. An important consideration is how well the older home is sealed and insulated.

### *19. If I'm buying a house, how can I make sure that the air conditioning system is in good working order?*

Just turn on the system and listen for unusual sounds while feeling how cool the air is and how strong the air flow is from the vents. Don't just listen inside the house—go outside and listen to the condensing unit, too. This personal inspection is a good indicator, but like buying a car, the best way is to then hire an expert—a contractor—to come out and inspect the system. It won't cost much, and it could save you lots of money in unanticipated repairs.

### *20. What is a heat pump?*

A heat pump is like a conventional air conditioner except it also can provide heat in winter. In the summer, the heat pump collects heat from the house and expels it outside. In the winter, the heat pump extracts heat from outside air and circulates it inside the house. The heat pump works best when the outdoor temperature is above freezing. Below that, supplementary heat often is needed. A heat pump can save 30 to 60 percent less energy to supply the same heat when compared to an electric furnace with a resistance heating element.

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### *21. Are air conditioners and heat pumps efficiency rated?*

Yes. Central systems are rated by the seasonal energy efficiency ratio (SEER). Many older systems now in use have SEERs of 6 or below.

By 1994, the average SEER for all units shipped by manufacturers in the U.S. improved to 10.61 for central air conditioners and 10.94 for central heat pumps. The higher the rating, the more efficient the system.

### *22. What are the advantages of buying a system with a high SEER (seasonal energy efficiency ratio?*

You will use less energy to cool your house, resulting in lower electric bills. Sometimes the savings are enough to partially or fully offset the cost of the new equipment within a few years. In all cases, it's an individual calculation which the homeowner should figure out with the contractor of choice.

### *23. Is there any law or rule covering air conditioning efficiency ratings?*

Yes. The National Appliance Energy Conservation Act of 1987 (Public Law 100-12) sets national standards for residential air-cooled central air conditioners and air-source central heat pumps.

The NAECA provides for a federal minimum standard of 10.0 seasonal energy efficiency ratio (SEER) for split-system air conditioners and heat pumps, effective Jan. 1, 1992, and 9.7 SEER for single-package air conditioners and heat pumps, effective Jan. 1, 1993.

Heat pumps also are subject to federal standards of 6.8 heating seasonal performance factor (HSPF) for split systems, effective Jan. 1, 1992, and 6.6 HSPF for single packages, effective Jan. 1, 1993.

### *24. What is the difference between a split-system and a single-package central air conditioner or heat pump?*

A split system has one of its heat exchangers (which includes the compressor) located outdoors and the other (the indoor coil) located indoors. A single package has both heat exchangers located in the same unit, usually indoors. Most residential central air conditioners and heat pumps are split systems.

INDOOR AIR

### *25. How can I determine the SEER of my present equipment?*

There are three main ways to determine the SEER of equipment: (1) find the model numbers of your present equipment (the outdoor condenser/compressor unit and the indoor evaporator coil unit) and check them with local contractors who handle your brand; (2) estimate the SEER based on the average SEER units produced approximately when your system was installed; or (3) check the energy efficiency label on your outdoor condenser/compressor unit if you have equipment produced after late 1988.

In the first method, contractors can then consult manufacturer data or the ARI unitary equipment certification directory which lists all models of equipment by manufacturers that certify their equipment SEER ratings.

In the second method, for air conditioners and heat pumps produced in 1981, the first year SEER criteria was used, the average ratings were 7.78 and 7.51 respectively. By 1987, SEERs reached 8.97 and 8.93 respectively. By 1994, ratings increased to 10.61 for air conditioners and 10.94 for heat pumps.

In the third method, residential central air conditioners and heat pumps covered under Department of Energy (DOE) test procedures and manufactured on and after June 7, 1988, are required to have labels containing energy efficiency information. For each system, the label will be on the outdoor condenser/compressor unit, and will reflect the SEER achieved by matching the outdoor unit and the indoor evaporator coil unit.

### *26. How can I find the savings of higher SEER equipment compared to lower SEER equipment?*

You'll need to talk with a local contractor to verify what size cooling equipment you now have and what you actually need, then determine the normal cooling load hours for your area, and find your electric rate cost.

When cooling, heat pump performance is measured in seasonal energy efficiency ratio (SEER). When heating, it is measured in coefficient of performance (COP) or heating seasonal performance factor (HSPF). In all measurements, the higher the rating the more efficient the system.

The formula is as follows:

$$\frac{\text{Capacity (Btuh)}}{\text{SEER}} \times \frac{\text{Cooling Load Hours}}{1000} \times \text{Electric Rate} = \text{Annual Operating Cost}$$

For example, if a home requires a unit with a capacity of 36,000 British thermal units per hour (Btuh), is located where the cooling load is 1500 hours and the electric rate is 8 cents per kilowatt hour, here is the calculation for a system with a SEER of 10:

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$$\frac{36{,}000}{10} \times \frac{1500}{1000} \times .08 = \$432 \text{ per year}$$

The same calculation with a SEER of 12 reveals an annual operating cost of $360 or $72 less per season—a 17 percent savings.

### *27. What are typical savings to expect from higher SEERs in various parts of the country?*

Here are *representative* operational costs of three SEER levels for a 2,000-square foot split level house in six regions of the United States (actual costs may vary greatly depending on individual circumstances):

| *Region* | *SEER 7* | *SEER 9* | *SEER 11* |
|---|---|---|---|
| Southeast | $ 757 | 569 | 482 |
| Southwest | 469 | 365 | 298 |
| South Central | 964 | 749 | 613 |
| Northeast | 301 | 234 | 192 |
| Northwest | 100 | 77 | 63 |
| North Central | 364 | 262 | 231 |

### *28. What percentage of my utility bill is caused by air conditioning?*

It can be surprisingly small on an annual basis, but it depends on how much you use your air conditioning, how efficient your equipment is, and how much you conserve energy by actions ranging from insulating your home to keeping doors and windows closed when the system is operating. Your local electric company is the best source for specifics in your area.

### *29. Is there any difference in the quality and quantity of cooling and heating from a heat pump and that from other cooling and heating systems?*

No. In its cooling mode, a heat pump supplies exactly the same kind of cooling as all electric air conditioners. In its heating mode, the temperature of the air supplied by a heat pump is not as hot as the air supplied by a fossil fuel furnace, but the end result is the same: a warm, comfortable home. Air temperature from a heat pump at room outlets normally is about 100 degrees Fahrenheit compared to about 120 to 130 degrees from a fossil fuel furnace.

The heat pump warming effect thus is something like warming your bath water more gradually and uniformly by turning the hot water faucet to a moderately warm setting rather than turning the faucet all the way to maximum hot water.

INDOOR AIR

### *30. Do all heat pumps come with supplemental heat?*

Virtually all heat pumps are available with supplemental electrical heat. Some heat pumps are used in conjunction with a fossil fuel heating system such as gas or oil. Whether supplemental heating is necessary depends on your climate and home location. Your local contractors can advise you as to whether supplemental heat is necessary, and what type of heat pump might be best for your needs.

### *31. Should I install a heat pump instead of a regular air conditioner if I have a gas or oil heating system?*

A heat pump can be a worthwhile consideration no matter what heating system is used in a home. In many areas, a heat pump with gas or oil supplementary heat is the most economical system and offers excellent performance and comfort. However, check with local contractors who can determine the best systems for use in your area that meet your comfort needs.

### *32. How often should I change the air filter in my system?*

Check it at least every month during peak use, and replace it when it looks dirty enough to significantly impair the air flow through it. Some filters, such as media filters or electronic air cleaners, are washable; others are disposable and must be replaced.

### *33. Will I get cleaner air by shutting up my house and running my central air conditioner or heating system, or by opening up my house as much as possible to let in fresh air?*

As you might suspect, this depends primarily on the quality of air outside your home, the quality of air inside your home, and your home's indoor comfort equipment. Indoor air quality varies greatly from building to building. Factors may include everything from emissions by the materials used in your home's construction to the kind of cleaning products you use for personal and household needs, to possibly even radon from the ground or water in some areas.

Optimum air quality is a matter of personal preference, as is deciding when it is best to air out the home, and when it is best to rely primarily on the cooling/heating equipment. Research on indoor air quality is gaining momentum, but it may be years before comprehensive analysis of the spectrum of variables affecting indoor air quality is widely available to households nationwide.

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# Here Are Answers to 42 Questions That Consumers Often Ask the Air-Conditioning & Refrigeration Institute

[ 1-2 | 3-4 | 5-6 | 7-8 | 7-8 | 11-12 | 13-14 ]



Using a high efficiency air cleaner on the central cooling/heating system remains one of the best ways to help maintain a clean indoor environment. High efficiency air cleaners can remove particles smaller than the eye can see.

### *34. How, and how often, should I clean my air conditioning registers and ducts?*

Duct outlets and registers should be cleaned as part of your regular home cleaning routine. It's the filters in the system—and to a lesser degree the grilles and registers at the duct outlets—that collect most of the dust, and therefore need changing or cleaning.

Ducts usually don't require cleaning, especially if filters are kept clean. You can occasionally check ducts by removing a few registers and inspecting the ducts from the inside with a flashlight (be sure to look at return air ducts). If the insides of ducts need cleaning, some contractors provide this service.

### *35. Should my home be humidified?*

That depends largely on your climate and personal needs. Humidification is definitely helpful in many homes and businesses. Particularly during cold weather, insufficient moisture in the air often is responsible for such assorted problems as stuffy noses, sore throats, even more dust than usual, cracks and dried-out joints in wood furniture, wilted plants, and static electricity which jolts hair, clothes, and computer disks. Indoor relative humidity may fall to around 7 percent, much drier than even the 25 percent relative humidity of the Sahara Desert! Ideal indoor relative humidity is between 30 to 50 percent.

### *36. Is there any advantage to letting the air conditioner or heat pump fan run all the time (the "on" setting on the thermostat) instead of periodically (the "auto" or "automatic" setting on the thermostat)?*

If you live in a very humid climate you may not want to run the fan continuously because this reduces dehumidification. Otherwise, there are some potential advantages.

Continuously circulating the air keeps the temperature more even throughout the house by alleviating temperature stratification. It keeps air circulating through the comfort system's air filter, which—depending on filter type and efficiency—can keep the home cleaner and the air fresher to breathe. When the fan is operating continuously, the compressor continues to periodically cycle on and off automatically to cool and dehumidify your home just as it does on the "auto" setting.

INDOOR AIR

Although running the fan alone takes much less energy than when the compressor is also operating, you may want to get a good idea of what it will cost. To estimate the cost, you can check with your comfort system contractor to determine approximately how much energy the fan uses, then multiply that times your local electric rate.

### *37. How do I know my equipment is ARI certified?*

Equipment certified by manufacturers to ARI as being accurately rated is subject to ARI verification testing. This equipment normally is identified by an ARI certification seal on the outdoor unit of the equipment or on its operating instructions. If no seal is evident, ask your contractor or contact ARI. Ask your contractor to show you the appropriate ARI product certification directory that lists the units you are considering. Then have your contractor go over the various ratings with you.

### *38. Can my cooling or heating system reduce or eliminate radon or other "sick building" problems?*

As a gas emanation primarily from soil or rocks, radon can be detected and measured by relatively inexpensive monitors that are becoming increasingly available to the general public. Considerable research is being done on measures to control radon and its health effects as typically found in indoor building environments—residential and commercial. At present, most conventional home central cooling and heating systems appear to have little, if any, effect on radon.

"Sick building" essentially refers to some buildings which have excessive concentrations of pollutants. Such pollutants may range from cigarette smoke to chemical emanations from materials used in furniture or building construction, to biological contaminants such as fungi (e.g., molds and mildew) and bacteria growing in areas where moisture may collect and stagnate. This may occur in such diverse locations as improperly maintained or damaged ceiling tiles, dishwashers, carpeting and air conditioning drain pans.

Most problems allegedly have occurred in commercial buildings. Cleanliness and adequate ventilation are major considerations. If you believe you may have a problem, you should seek the advice of a qualified contractor.

For more information about radon and sick building problems, contact your local American Lung Association, state radiation protection office, or Environmental Protection Agency regional office.

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# Here Are Answers to 42 Questions That Consumers Often Ask the Air-Conditioning & Refrigeration Institute

[ 1-2 | 3-4 | 5-6 | 7-8 | 7-8 | 11-12 | 13-14 ]

INDOOR AIR

### *39. Is there any relationship between my home air-conditioning system and chlorofluorocarbon (CFC) refrigerants and the ozone layer?*

An international protocol limits future worldwide production and consumption of the fully halogenated CFCs 11, 12, 113, 114, and 115.

Virtually all of the refrigerant used in residential central air-conditioning systems is called HCFC-22, which has some ozone-depletion potential, but only one-twentieth that of CFCs. This is because HCFC-22 breaks down fairly rapidly when released into the lower atmosphere, and most of it never reaches the ozone layer at high altitudes.

HCFC-22 will be phased out of production for use in new equipment by the year 2010 and for servicing existing equipment in 2020. After its phaseout, there will still be some of this refrigerant available for servicing existing equipment. Manufacturers are beginning to produce units that use alternative refrigerants. Consumers can thus enjoy their air conditioning and help protect the environment at the same time by following a few simple guidelines:

- A central air conditioner is a closed system and will not release refrigerant into the atmosphere as long as it is maintained properly. Have your system checked by a service person once a year before the cooling season. Make sure the technician checks for refrigerant leaks.
- After July 1, 1992, intentional venting of refrigerant is against the law. *All refrigerant from units must be recovered.* Only patronize service companies that practice refrigerant recovery and recycling and have the proper equipment to do so.

### *40. Is there anything dangerous about the refrigerant in my central air conditioning or heat pump system?*

The refrigerant (HCFC-22) in residential central air conditioning and heat pump systems is nontoxic, nonflammable, odorless, and sealed within the system. Nonetheless, like any substance, it can be abused.

You should be aware that some people have died from deliberately inhaling or "sniffing" pure gas (e.g., after buying and "sniffing" cans of refrigerant like those used to recharge automobile air conditioners). Inhaling such concentrated refrigerant vapor can cause cardiac irregularities and cardiac arrest—a fatal heart attack.

Although a large release of refrigerant vapor could displace oxygen available for breathing and cause suffocation, this is virtually impossible with residential systems because of the relatively small amount of refrigerant used in the 24,000 to 36,000 Btuh (2-ton to 3-ton) units of most residential central air conditioning systems.

INDOOR AIR

### *41. In hot weather, should I turn my thermostat up when I leave for work in the morning?*

If your house is going to be empty for more than about four hours, it's a good idea to turn your thermostat up to about 82 degrees or so instead of the 78 usually recommended. Keep the house closed to minimize heat build-up. When you come home, don't set the thermostat any lower than the temperature you actually want—your air conditioning system wouldn't cool any faster and might easily waste money by cooling your home more than needed.

### *42. Where can I get information about making the temperature in my home as comfortable and economical as possible?*

This pamphlet and the following free ARI consumer information brochures, provide additional information about central air conditioning, heat pumps, air filters, humidifiers and air conditioning technician careers.

To order, write to the Air-Conditioning and Refrigeration Institute and enclose a self-addressed, stamped envelope for each single pamphlet ordered. Additional postage may be required if requesting several pamphlets.

- **Consumer Guide to Efficient Central Climate Control Systems.** Shows homeowners how to keep comfortable while holding down utility bills and how to compute cost savings (32 pages—please include two first class stamps).
- **Heat, Cool, Save Energy with a Heat Pump.** Highlights energy-saving and functional features of heat pumps (14 panels).
- **Breathing Clean—How Air Filters Provide Cleaner Living.** Discusses various types of air filters and explains how air filters provide cleaner living (8 panels).
- **How to Humidify Your Home or Business.** Highlights advantages and relatively low costs of humidifying dry air (8 panels).
- **Life, Liberty and the Pursuit of Comfort.** Explains the operations and advantages of a ductless split air-conditioning system (8 panels).
- **Career Opportunities in Heating, Air Conditioning and Refrigeration.** Outlines opportunities available for people interested in becoming technicians in the heating, ventilation, air-conditioning and refrigeration industry (8 panels).

# 1999 ASHRAE® HANDBOOK

# Heating, Ventilating, and Air-Conditioning APPLICATIONS

## Inch-Pound Edition

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
1791 Tullie Circle, N.E., Atlanta, GA 30329
(404) 636-8400 http://www.ashrae.org

Table 3 Estimates of Service Lives of Various System Components[a]

| Equipment Item | Median Years | Equipment Item | Median Years | Equipment Item | Median Years |
|---|---|---|---|---|---|
| Air conditioners | | Air terminals | | Air-cooled condensers | 20 |
| Window unit | 10 | Diffusers, grilles, and registers | 27 | Evaporative condensers | 20 |
| Residential single or split package | 15 | Induction and fan-coil units | 20 | Insulation | |
| Commercial through-the-wall | 15 | VAV and double-duct boxes | 20 | Molded | 20 |
| Water-cooled package | 15 | Air washers | 17 | Blanket | 24 |
| Heat pumps | | Ductwork | 30 | Pumps | |
| Residential air-to-air | 15[b] | Dampers | 20 | Base-mounted | 20 |
| Commercial air-to-air | 15 | Fans | | Pipe-mounted | 10 |
| Commercial water-to-air | 19 | Centrifugal | 25 | Sump and well | 10 |
| Roof-top air conditioners | | Axial | 20 | Condensate | 15 |
| Single-zone | 15 | Propeller | 15 | Reciprocating engines | 20 |
| Multizone | 15 | Ventilating roof-mounted | 20 | Steam turbines | 30 |
| Boilers, hot water (steam) | | Coils | | Electric motors | 18 |
| Steel water-tube | 24 (30) | DX, water, or steam | 20 | Motor starters | 17 |
| Steel fire-tube | 25 (25) | Electric | 15 | Electric transformers | 30 |
| Cast iron | 35 (30) | Heat exchangers | | Controls | |
| Electric | 15 | Shell-and-tube | 24 | Pneumatic | 20 |
| Burners | 21 | Reciprocating compressors | 20 | Electric | 16 |
| Furnaces | | Package chillers | | Electronic | 15 |
| Gas- or oil-fired | 18 | Reciprocating | 20 | Valve actuators | |
| Unit heaters | | Centrifugal | 23 | Hydraulic | 15 |
| Gas or electric | 13 | Absorption | 23 | Pneumatic | 20 |
| Hot water or steam | 20 | Cooling towers | | Self-contained | 10 |
| Radiant heaters | | Galvanized metal | 20 | | |
| Electric | 10 | Wood | 20 | | |
| Hot water or steam | 25 | Ceramic | 34 | | |

*Source*: Data obtained from a survey of the United States by ASHRAE Technical Committee TC 1.8 (Akalin 1978).
[a] See Lovvorn and Hiller (1985) and Easton Consultants (1986) for further information.
[b] Data updated by TC 1.8 in 1986.

## Electrical Energy

Fundamental changes in the purchase of electrical energy are occurring in the United States, which is opening access to and eventually deregulating the electric energy industry. Individual electric utility rates and regulations may vary widely during this period of deregulation. Consequently, electrical energy providers and brokers or marketers need to be contacted to determine the most competitive supplier. Contract conditions need to be reviewed carefully to be sure that the service will suit the purchaser's requirements.

The total cost of electrical energy is usually a combination of several components: energy consumption charges, fuel adjustment charges, special allowances or other adjustments, and demand charges.

**Energy Consumption Charges.** Most utility rates have step rate schedules for consumption, and the cost of the last unit of energy consumed may be substantially different from that of the first. The last unit may be cheaper than the first because the fixed costs to the utility may already have been recovered from earlier consumption costs. Alternatively, the last unit of energy may be sold at a higher rate to encourage conservation.

To reflect time-varying operating costs, some utilities charge different rates for consumption according to the time of use and season; typically, costs rise toward the peak period of use. This may justify the cost of shifting the load to off-peak periods.

**Fuel Adjustment Charge.** Due to substantial variations in fuel prices, electric utilities may apply a fuel adjustment charge to recover costs. This adjustment may not be reflected in the rate schedule. The fuel adjustment is usually a charge per unit of energy and may be positive or negative depending on how much of the actual fuel cost is recovered in the energy consumption rate.

Power plants with multiple generating units that use different fuels typically have the greatest effect on this charge (especially during peak periods, when more expensive units must be brought on-line). Although this fuel adjustment charge can vary monthly, the utility should be able to estimate an average annual or seasonal fuel adjustment for calculations.

**Allowances or Adjustments.** Special allowances may be available for customers who can receive power at higher voltages or for those who own transformers or similar equipment. Special rates may be available for specific interruptible loads such as domestic water heaters.

Certain facility electrical systems may produce a low power factor, which means that the utility must supply more current on an intermittent basis, thus increasing their costs. These costs may be passed on as an adjustment to the utility bill if the power factor is below a level established by the utility. The power factor is the ratio of active (real) kilowatt power to apparent (reactive) kVA power.

When calculating power bills, utilities should be asked to provide detailed cost estimates for various consumption levels. The final calculation should include any applicable special rates, allowances, taxes, and fuel adjustment charges.

**Demand Charges.** Electric rates may also have demand charges based on the customer's peak kilowatt demand. While consumption charges typically cover the utility's operating costs, demand charges typically cover the owning costs.

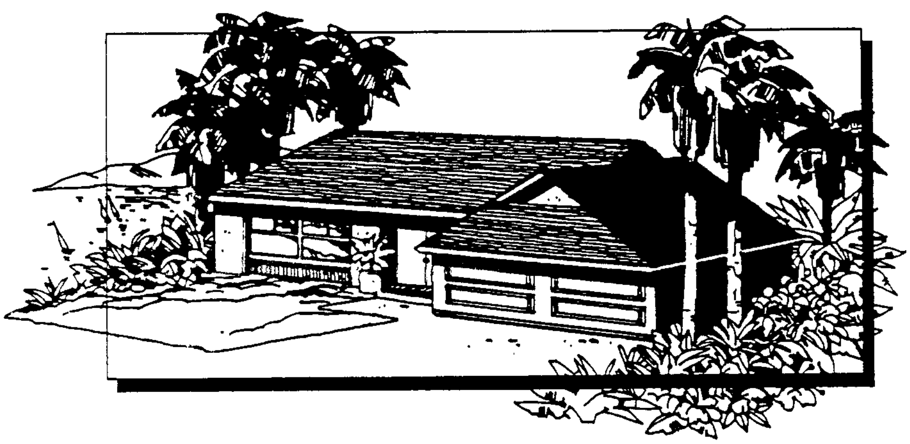
Demand charges may be formulated in a variety of ways:

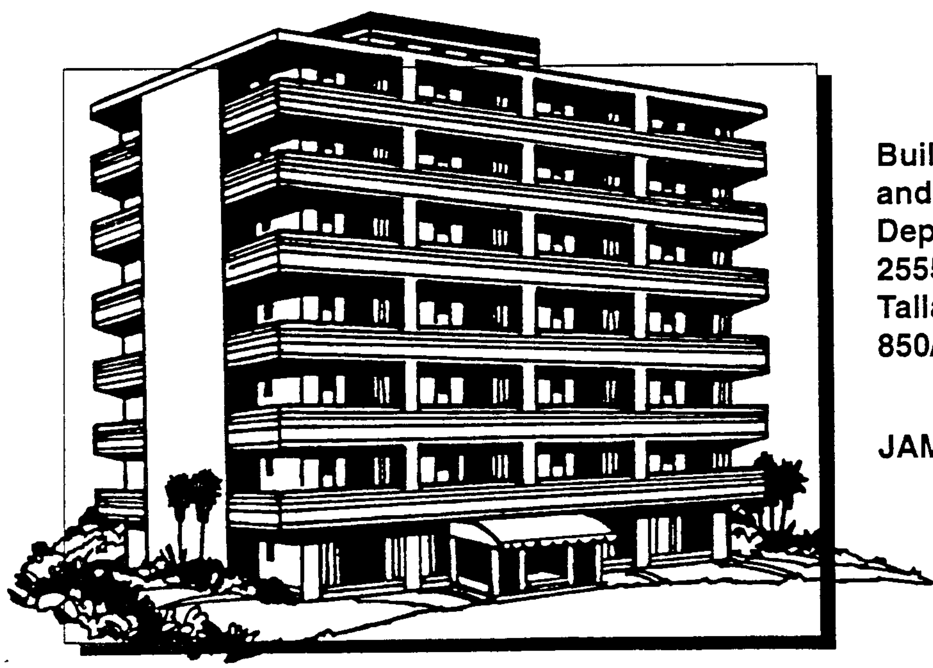
1. Straight charge—cost per kilowatt per month, charged for the peak demand of the month.
2. Excess charge—cost per kilowatt above a base demand (e.g., 50 kW), which may be established each month.

STATE OF FLORIDA

# ENERGY EFFICIENCY CODE FOR BUILDING CONSTRUCTION

1997 EDITION





Building Codes
and Standards Office
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100
850/487-1824

JAMES F. MURLEY, Secretary

model number, meets the minimum Code requirements. The certification shall attest to the accuracy of the input data, the validity of the calculation procedure utilized and that the results of the simulation are in accordance with the DOE approved methodology. Simulated equipment efficiency rating certifications shall identify any enhancement features included to attain claimed ratings. a full set of input data utilized to arrive at the rating shall be available as documentation on request.

When challenged, computer simulated ratings shall not exceed 105 percent of the SEER, EER, HSPF or COP rating, as appropriate, of the actual tested performance for that condensing unit evaporator coil configuration. Unsubstantiated claims for such equipment shall be dropped from publication.

**607.1.ABC.3.1.2 Field-Assembled Equipment and Components.** Air conditioning and heat pump systems with capacities of 65,000 Btu/h or greater where components such as indoor or outdoor coils are used from more than one manufacturer, shall be rated by a calculated total system Energy Efficiency Ratio (EER). Component efficiencies shall be specified based on data provided by the component manufacturers. Calculations documenting how the efficiency rating was derived shall be submitted with the appropriate Code compliance form and shall be signed and sealed by a registered professional engineer.

Total on-site energy input to the equipment shall be determined by combining inputs to all components, elements and accessories, such as compressor(s) internal circulating pump(s), condenser-air fan(s), evaporative-internal circulating pump(s), purge devices, viscosity control heaters, and controls.

**607.1.ABC.3.2 Minimum Efficiencies for Cooling Equipment**

**607.1.ABC.3.2.1 Electrically Operated, Cooling Mode**. These requirements apply to unitary (central) cooling equipment (air-cooled, water-cooled and evaporatively cooled); the cooling mode of unitary (central) and packaged terminal heat pumps (air source and water source); packaged terminal air conditioners; roof air conditioners; and room air conditioners.

**607.1.ABC.3.2.1.1** HVAC system equipment of less than 65,000 Btu/h, whose energy input in the cooling mode is entirely electric, shall have a Seasonal Energy Efficiency Ratio (SEER) or Energy Efficiency Ratio (EER), as specified for that piece of equipment in section 607.1.ABC.3.1, of not less than the values shown in Table 6-3.

**607.1.ABC.3.2.1.2** HVAC system equipment with capacities between 65,000 Btu/h and 135,000 Btu/h whose energy input in the cooling mode is entirely electric, shall show an Energy Efficiency Ratio (EER) and/or Integrated Part-Load Value (IPLV), as specified for that piece of equipment in section 607.1.ABC.3.1, of not less than values shown in Table 6-4.

# TABLE 6-3
# ELECTRICALLY DRIVEN COOLING EQUIPMENT, CAPACITIES <65,000 BTU/H: MINIMUM PERFORMANCE EFFICIENCIES[1] - SEER, EER, IPLV[2]

| TYPE OF EQUIPMENT, CAPACITIES, RATING CONDITIONS (°F) | EER | SEER | IPLV [2] |
|---|---|---|---|
| Central Units | | | |
| Air Cooled - Seasonal Rating [3] | | | |
| Split-system | | 10.0 | |
| Single-package | | 9.7 | |
| Evaporatively Cooled | | | |
| Standard Rating (80db/67wb indoor, 95db/75wb outdoors) | 9.3 | | |
| Int. Part Load Value (80db/67wb out.) | | | 8.5 |
| Water Cooled | | | |
| Water-Source Heat Pump (80db/67wb indoor) | | | |
| Standard Rating (85 entering water) | 9.3 | | |
| Low Temp. Rating (75 entering) | 10.2 | | |
| Ground-Water Heat Pump | | | |
| Standard Rating (70 entering) | 11.0 | | |
| Low Temp. Rating (50 entering) | 11.5 | | |
| Ground Source Heat Pump | | | |
| 77° Entering brine | 10.0 | | |
| 70° Entering brine | 10.4 | | |
| Unitary Air Conditioners (80db/67wb indoor) | | | |
| Standard Rating (85 entering) | 9.3 | | |
| Int. Part Load Value (75 entering) | | | 8.3 |
| Packaged Terminal Units (PTAC & PTHP) | | | |
| Standard Rating ( 95db outdoor) | | | |
| ≤7,000 | 8.9 | | |
| 7,001 - 8,000 Btu/h | 8.8 | | |
| 8,001 - 9,000 Btu/h | 8.6 | | |
| 9,001 - 10,000 Btu/h | 8.5 | | |
| 10,001 - 11,000 Btu/h | 8.3 | | |
| 11,001 - 12,000 Btu/h | 8.2 | | |
| 12,001 - 13,000 Btu/h | 8.0 | | |
| 13,001 - 14,000 Btu/h | 7.8 | | |
| 14,001 - 15,000 Btu/h | 7.7 | | |
| >15,000 Btu/h | 7.6 | | |
| Room Units [3] | | | |
| Without reverse cycle | | | |
| <6,000 Btu/h | 8.0 | | |
| 6,000-7,999 Btu/h | 8.5 | | |
| 8,000-13,999 Btu/h (with louvers) | 9.0 | | |
| 14,000-20,000 Btu/h (with louvers) | 8.8 | | |
| >20,000 Btu/h (with louvers) | 8.2 | | |
| 8,000-20,000 BTU/H (without louvers) | 8.5 | | |
| >20,000 Btu/h (without louvers) | 8.2 | | |
| With reverse cycle (with louvers) | 8.5 | | |
| With reverse cycle (without louvers) | 8.0 | | |

[1] Test procedures for equipment referenced shall be in accordance with the applicable standard listed in Chapter 3.
[2] Products covered by the 1992 Energy Policy Act have no efficiency requirements at other than standard rating conditions for products manufactured after 1/1/94.
[3] To be consistent with National Appliance Energy Conservation Act of 1987, P.L. 100-12.

GULF POWER
A SOUTHERN COMPANY

# WATER HEATING CONVERSION
# $140 REBATE
## Individual Participant

### Qualifying Unit

______________________________
Address

______________________________
City, State, Zip Code

______________________________
Account Number

______________________________
Water Heater Size (gallons)

______________________________
Date of Installation

### Rebate Payee

______________________________
Name

______________________________
Address

______________________________
City, State, Zip Code

______________________________
Social Security Number

### Approvals

______________________________
Residential Energy Consultant

______________________________
Residential Marketing Manager

______________________________
Date

# FREE HOT WATER HEATER
## Information

Customer Options for Water Heater Conversion Program
Must be Gas TO Electric

- Customer comes to Marketing Department and fills out voucher form (See Attachment) to get their Rheem 40-gallon water heater and timer.
- Customer takes voucher form to appliance warehouse in back to receive their water heater and timer. (Please make copy of voucher for Marketing rep)
- Customer has 30 days to install water heater and timer. A marketing rep will verify after installation is completed. (Marketing Rep's phone number is on voucher).
- Customer is responsible for their own installation. Some plumbers phone numbers are: Sasser's 243-8699 or Jim's 243-1651. (Others are available).

## 2nd Option

- Customer also may receive $140 Rebate check if they choose to purchase water heater and timer from somewhere else. (Example Lowe's, Home Depot Scotty's etc. (Customer may purchase any size or brand of water heater and timer).
- When installation is completed, customer calls Gulf Power Marketing Department at 244-4770 and Marketing rep will verify installation. (It takes approximately 7-10 days for customer to receive check).
- Customer must fill out $140 rebate form to receive check. (See attachment).

# Gulf Power Company
# Water Heating Voucher

This voucher is good for one (1) 40 gallon electric Rheem Water Heater. Model Number 81V40D, and one (1) Intermatic Timer. Model Number WH21.

______________________
Customer Name

______________________
Customer Account Number

______________________
Address

______________________
City, Zip Code

______________________
Telephone Number

______________________
Gulf Power Energy Consultant

______________________
Date

This free offer is contingent upon installation of this equipment in replacement of a gas water heater. Customer agrees to install this equipment within 30 days of the date of this voucher and to contact Gulf Power Energy Consultant for installation verification. **Failure to comply with these requirements will result in the customer being billed for the water heater and timer.**
Customer is responsible for equipment pickup and installation.

______________________
Customer Signature

Present this voucher to an Appliance Sales Clerk for product issuance.

Water Heater and Timer should be charged to Marketing account number 40233-908-01188

18. **Please explain why Gulf chose. as its baseline existing equipment, an AC Unit with a SEER rating of 7.0 If available, provide supporting documentation or data which justifies Gulf's choice of a 7.0 SEER AC unit as its baseline existing equipment.**

Answer: The targeted program participants have existing equipment installations that are 10 to 15 years old. The minimum efficiency standards in effect for installations during that time frame were 7.5 SEER to 8.5 SEER. Gulf has assumed the average installed efficiency to be approximately 8 SEER with a15% efficiency degradation due to age. This results in an average current efficiency rating of approximately 7 SEER.

7. **Please explain the cause of the decrease in "customer O&M cost" contained on page 4, section III. (6) of Gulf's filing. If available, provide supporting documentation or data for the "customer O&M cost" value.**

Answer: The "Customer O & M Cost" decrease of $287 is the customer operating cost savings resulting from the removal of the gas furnace. This figure was arrived at by using Gulf's Residential Building Energy Program (RBEP) and the average price of natural gas across Gulf's service area. Estimated cost savings ranged from $227 in DeFuniak Springs where Gulf's customers experience the lowest cost for natural gas to $359 in the portion of Santa Rosa County surrounding the City of Milton, which has the highest cost for natural gas. The homeowner will pay less to heat with a heat pump than with natural gas in Florida. Natural gas in Northwest Florida costs about $.95 per therm while the national average is $.604 per therm. Electricity average cost is $.0695 per kWh at Gulf Power versus $.0841 per kWh national Average (GAMA Consumers' Directory of Certified Efficiency Ratings, April, 1998). The rate schedules of area gas distributors are included as Attachment "B".

PEOPLES GAS - WFGAS (MAY CHANGE MONTHLY DUE TO FUEL COSTS)

| Cu FT | | $/1000CUFT | $/CUFT | $/THERM | ¢/THERM | | |
|---|---|---|---|---|---|---|---|
| ALL CU FT | ALL THERMS | $7.42 | $0.00742 | $0.7423 | 74.2 | $0.924 | 34.1% |

$7.00 CUSTOMER CHARGE EVERY MONTH

Normal weather rate. Does not include Weather Normalization Charge in winter.

CHIPLEY - CHPGASOT (OUTSIDE CITY)

| Cu FT | THERMS | $/1000CUFT | $/CUFT | $/THERM | ¢/THERM | | |
|---|---|---|---|---|---|---|---|
| UNDER 2,500 CU FT | 25 | $10.59 | $0.01059 | $1.0587 | 105.9 | | |
| OVER 2,500 CU FT | 25 | $10.45 | $0.01045 | $1.0450 | 104.5 | $1.052 | 52.6% |

$1.10 MINIMUM BILL

CHIPLEY - CHPGASIN (INSIDE CITY)

| Cu FT | THERMS | $/1000CUFT | $/CUFT | $/THERM | ¢/THERM | | |
|---|---|---|---|---|---|---|---|
| UNDER 2,500 CU FT | 25 | $7.70 | $0.00770 | $0.7700 | 77.0 | | |
| OVER 2,500 CU FT | 25 | $7.60 | $0.00760 | $0.7600 | 76.0 | $0.765 | 11.0% |

$1.00 MINIMUM BILL

DE FUNIAK SPRINGS - DFUNKOUT.RAT (OUTSIDE CITY)
(MAY CHANGE MONTHLY DUE TO FUEL COSTS)

| Cu FT | | $/1000CUFT | $/CUFT | $/THERM | ¢/THERM | | |
|---|---|---|---|---|---|---|---|
| ALL CU FT | ALL THERMS | $7.13 | $0.00713 | $0.7130 | 71.3 | $0.827 | 20.1% |

$4.40 CUSTOMER CHARGE EVERY MONTH

DE FUNIAK SPRINGS - DFUNKIN.RAT (INSIDE CITY)
(MAY CHANGE MONTHLY DUE TO FUEL COSTS)

| Cu FT | | $/1000CUFT | $/CUFT | $/THERM | ¢/THERM | | |
|---|---|---|---|---|---|---|---|
| ALL CU FT | ALL THERMS | $6.48 | $0.00648 | $0.6482 | 64.8 | $0.752 | 9.2% |

$4.00 CUSTOMER CHARGE EVERY MONTH

| | | |
|---|---|---|
| WEIGHTED AVERAGE PRICE CUSTOMERS PAY FOR NATURAL GAS IN NWF IN AN EFFICIENT HOME: | $0.950 | 37.9% |
| % CHANGE IN PRICE VS 6/1/94($.945/therm): | 0.6% | |
| NATIONAL AVERAGE NATURAL GAS PRICE PER THERM (DOE/EIA est. 1997: | $0.689 | |
| (1996 avg. = $0.634 ) *(Yellow Energy Guide = $.604)* | | |

| LP GAS PRICES - GALLONS AND THERMS | | PER/THERM |
|---|---|---|
| PENSACOLA | $0.99000 PER GALLON | $1.089 |
| PANAMA CITY | $1.25000 PER GALLON | $1.375 |
| FT WALTON BEACH | $0.99000 PER GALLON | $1.089 |
| NATIONAL AVERAGE (DOE/FTC/Gam | $0.98300 PER GALLON | $1.081 |

| | | | |
|---|---|---|---|
| NATIONAL AVERAGE ELECTRIC PRICE PER KWH (DOE/EIA) 1997: | price per KWH | $0.0846 | |
| GULF POWER AVERAGE ANNUAL ELECTRIC PRICE 1997: | price per KWH | $0.0674 | -25.5% |
| GULF POWER MARGINAL ELECTRIC PRICE April, 1998: | price per KWH | $0.0538 | |

NOTES: ELECTRICITY PRICE % LOWER THAN NATIONAL AVERAGE: 20.3%

THE EFFECTIVE OR ANNUALIZED COST PER THERM INCLUDES THE MONTHLY CUSTOMER CHARGE OR HIGH COST-LOW USAGE STEPS OF THE RATES WHERE APPLICABLE. THESE CHARGES CAUSE THE ACTUAL CUSTOMER CHARGE PER THERM TO BE HIGHER THAN THE PER THERM COST ON THE RATE SCHEDULE. ALL DOE COSTS INCLUDE CUSTOMER CHARGES.
THE RESIDENTIAL BUILDING ENERGY PROGRAM (RBEP2) WAS USED IN CALCULATING EFFECTIVE COST. THE CALCULATED USAGE IS 462 THERMS OF NATURAL GAS ANNUALLY AND BASED ON AN 1800 SQ. FT. ENERGY EFFICIENT HOUSE WITH AN 80% AFUE GAS FURNACE AND A 56% ENERGY FACTOR WATER HEATER.
THE HOUSE HAS R13 WALLS, R38 CEILING INSULATED DOORS AND WINDOWS, AND THE HOME MEETS ENERGY CODE.
RATES TAKEN FROM RATE SCHEDULES AND/OR VERIFIED BY PHONE FROM EACH GAS DISTRIBUTOR.
HOT WATER USAGE ( 19500 GALLONS, 194 THERMS) REFLECTS THE ENERGY CONSUMPTION FOR WATER HEATING OF THREE PEOPLE.
THE AVERAGE HOUSEHOLD SIZE IN NORTHWEST FLORIDA IS ABOUT 2.6 PEOPLE.
National avg. estimated naturial gas price is from DOE/EIA Natural Gas Monthly, April 1998. 1996 price is final.
National avg. estimated Electricity prices is from DOE?EIA Electric Power Monthly, April 1998. 1996 price final.
The FTC Yellow Energy Guide cost is from Oct. 1997, GAMMA's Consumers' Directory of Certified Efficiency Ratings
Natural gas total usage in therms: 462

FTC = FEDERAL TRADE COMMISSION

NATURAL GAS QUANTITY NOMENCLATURE:
CF=CU.FT.=CUBIC FEET= APPROX. 1,000 BTU'S
100 CU FT = 1 CCF = 1 THERM = 100,000 BTU'S
ONE GALLON OF LP = 91,500 BTU'S AND 1.1 GALLONS OF LP = 1 THERM