BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Investigation into the cost-effectiveness of undergrounding electric utility lines.	) DOCKET NO. 890833-EU) ORDER NO. 23126) ISSUED: 6/28/90

The following Commissioners participated in the disposition of this matter:

MICHAEL McK. WILSON, Chairman
THOMAS M. BEARD
BETTY EASLEY
GERALD L. GUNTER

ORDER ON THE INVESTIGATION INTO UNDERGROUND WIRING

BY THE COMMISSION:

I. INTRODUCTION

The 1989 Florida Legislature, in Section 366.04(7), Florida Statutes (1989) 1/, directed that this Commission study the cost-effectiveness of converting overhead electric power lines (OH) to underground facilities (UG). This Legislation also required that the Commission examine the cost-effectiveness of requiring all new construction of power lines underground as well as the replacement of OH with UG in the normal course of retirements. Several non-exclusive factors were enumerated for Commission examination in making the cost-effectiveness decision. A report of the Commission's findings is due to the Legislature by July 1, 1990. A copy of the relevant statute appears as Attachment I.

The Legislature required that the Commission consider "total costs," including but not limited to costs associated with accidental electrocution, vehicular accidents, ascertainable and measurable adverse health effects, elimination of tree-trimming requirements, storm repair differentials for OH and UG, loss to the private sector from storm outages and related insurance and legal actions. See Subsection 366.04(7), Florida Statutes. The Legislature also required that the Commission survey other states' experience in this matter. This Legislative mandate represented a novel chal-

1/ This subsection was contained in Chapter 89-292, Laws of Florida, which became law on July 5, 1989.

lenge for the Commission and all parties to the process in that costs not traditionally evaluated in utility ratemaking were to be considered. Such costs included those associated with ascertainable adverse health effects, vehicular accidents and private sector losses.

A number of parties, including the four largest investor-owned electric utilities in Florida, the Florida Rural Electric Cooperative Association (FRECA) and the Florida Municipal Electric Association (FMEA) participated in this proceeding. The cities of Daytona Beach Shores, Fort Walton Beach, Golden Beach, Lakeland, and St. Petersburg Beach, as well as the Sierra Club, Southern Bell Telephone and Telegraph Company (Southern Bell) and individual ratepayers intervened in the process.

Staff conducted an initial workshop on September 11-12, 1989. On September 25, 1989, Staff issued a lengthy data request to the 57 electric utilities in Florida. Workshops were again conducted on December 22, 1989, and January 22, 1990. An additional meeting with the parties was held on March 26, 1990. A Prehearing Conference was held before Chairman Wilson on April 2, 1990. This process culminated in a hearing held April 9-10, 1990. Twenty-two witnesses testified and were subject to cross-examination in approximately seventeen hours of hearing time. In addition to the over 100 exhibits admitted into the record at this proceeding, 31 late-filed exhibits were filed. Post-hearing briefs were filed April 20, 1990.

II. EVIDENTIARY MATTERS

Because of the Legislative requirement that a report be issued, we allowed a broad range of evidence into this record, some of which would not typically be admitted into evidence in Section 120.57, Florida Statutes, proceedings. This fact, coupled with all parties' stipulation that implementation issues would be handled in a separate docket (Prehearing Order No. 22765, p. 95), lead us to conclude that undergrounding of facilities should not be ordered at this time. We will, however, instruct the Staff to open a rulemaking docket to further explore the underground wiring issue. Evidence that may not be sufficient to support a finding in an adjudicatory hearing could be used as support for rulemaking. General Telephone Co. of Florida v. Florida Public Service Commission,

444 So. 2d 1063, 1067 (Fla. 1984). Such evidence included undated newspaper and magazine articles discussing the effects of EMF, an unpublished article addressing value of unserved energy, and letters from the regulatory Commissions of other states addressing the impact of Hurricane Hugo.

This approach is not only supported, but is suggested, by the record in this proceeding. Many parties spoke of the uncertainty surrounding specific issues and many issues left unresolved by this process. (See Transcript of Hearing; hereinafter "R" at 192-93; 215; 386; 826; 833-34; 931.) Section III of this Order discusses the extent factual and legal issues were addressed in this record. Section IV of this Order resolves the preemption issue created by electric cooperatives and municipal utilities, and Section V is provided to assist all parties in the future rulemaking process. We are not precluding new information in that process nor attempting to propose rules here. Rather these discussions should provide a starting point for proposed rules.

III. MEASUREMENT OF COST-EFFECTIVENESS

The Staff of the Commission, through the testimony of Mr. Bernard Windham, offered a methodology by which to measure the cost-effectiveness of the conversion of OH to UG. This methodology involved the use of a uniform statewide model based both on cost data collected from utilities relating to ratepayer costs, and data compiled by Staff relating to non-ratepayer costs. It was Staff's position that cost-effectiveness should be evaluated based on cost comparisons between:

1. Annual Capital Cost for Construction
2. Operating and Maintenance Cost
3. Administrative and General Cost
4. Line Losses
5. Costs to Public (R-20)

Cost-effectiveness would then be determined by the net present value of 30-year life-cycle costs for each category. While most parties agreed that a uniform method should be used, disagreement ensued as to the level of uniformity. FPL, for instance, argued that the model should be developed as a weighted average composite of the four largest IOU's data

responses, modifiable to accommodate each utility's O&M or future capitalized storm damage. (R-335) Because of the widely varied construction and O&M costs in the utilities' initial data request responses (EXH-11), however, Staff advocated use of projected cost estimates for the FPL system in the statewide model, subject to justifiable adjustments, for two reasons. First, FPL's construction method resulted in the lowest O&M cost. Second, FPL has the largest utility area in the State. (Prehearing Order 22765, p.27; R-233)

While all parties agreed to the inclusion, if not the amount, of the first four costs, internal costs to the utilities, dissension arose concerning the inclusion of the fifth cost, cost to the public, or external costs, in the cost-effectiveness analysis. Examples of these costs are those incurred by customers due to hurricane-related outages, lightning damage to electronic equipment, and damage or loss resulting from vehicular accidents involving utility poles. We find that costs to the public, extra-utility costs, resulting from OH or avoided by UG must be included in the cost-effectiveness analysis. Exclusion of these costs from the analysis would not only be unresponsive to, but clearly contravene, the plain language of the statute which directs the Commission to consider, at least, the expressly enumerated costs to the public. Due to time constraints, however, Staff itself was able to develop cost data only for costs relating to hurricane-related outages and damage, vehicular pole accidents, and lightning damage. (R-139)

Staff created seven study cases by which to examine the cost-effectiveness of placing electric lines underground:

1. Transmission line segment in a urban area

2. Transmission line segment in a rural area

3. Distribution 3-phase feeder in an urban area

4. Distribution 3-phase feeder in a residential area

5. Distribution 3-phase feeder in a rural area

6. 226 lot residential subdivision - low density

7. 176 lot residential subdivision - high density

For each of the seven cases, Staff studied the four activities required by the Legislature:

1. New Construction
2. Line Relocation
3. Line Replacement
4. Line Conversion

Because subdivisions are not relocated, Staff studied 7 cases x 4 activities - 2, or 26 activities for cost-effectiveness.

QUALITY OF EVIDENCE

The evidence presented at hearing is uncontroverted that none of the 7 study cases is cost-effective when compared in terms of construction costs; UG facilities are more costly than OH facilities. (R-153, 375) The issue at hearing became, in essence, whether any of the "costs to the public", or external costs, could offset the UG differential sufficiently to render UG cost-effective. Of critical importance, then, is whether the methodologies used to valuate those costs resulted in competent substantial evidence of costs to the public.

HURRICANE RELATED COSTS

Staff, in developing a methodology to determine both hurricane-related outage costs to the public and hurricane damage costs to utilities, estimated a hurricane probability distribution based on 100 years of Florida hurricane data affecting the FPL service area. Staff found that 62 hurricanes struck Florida during the last 100 years, 37 of which struck the FPL service area. The 37 FPL area hurricanes were categorized into 5 windspeed classes and divided by 100 to render the annual probability of a hurricane of each class striking the FPL system. (R-36-39) Hurricane costs and

outages were based on utility-reported data from Hurricanes Kate, a low level storm that struck northern Florida in 1985, and Hugo, a Class 4 hurricane that struck the Carolinas in 1989. FPL witness Howell countered that a larger sample size, such as all hurricanes affecting, not the FPL service area, but the continental United States, should be used to allocate hurricane classes to Florida, and loss should be allocated not only to the FPL system, but all Florida utilities. (R-327, 332, EXH-68)

OUTAGES

To determine the cost of hurricane-related outages to the public, Staff multiplied its hurricane probability by estimates of unserved energy (kwh), or outages, extrapolated from utility-reported outages relating to Hurricanes Kate and Hugo (EXH 12). Staff, assigning to unserved energy a composite rate for all customers of $4.12 per kwh, argued that the Commission had previously approved this value for unserved energy in FPC's Lake Tarpon to Kathleen 500 kv transmission line need determination proceeding. The composite was based on estimated unserved energy costs of $1.58 per kwh for residential customers, $7.92 per kwh for commercial customers, and $5.74 per kwh for industrial customers.

Howell and FPC witness Roark countered that the composite $4.12 per kwh was a weighted average based on FPC's total customer mix valid only for estimating short-term, unannounced outages in FPC's bulk transmission system which would affect all customers. (R-322, 377-378) They argued that not only should none of cases 3 through 7 include the $5.74 per kwh cost to industrial customers served from transmission systems, but that the residential feeder and two residential subdivision studies should include only the $1.58 per kwh value specifically derived for the residential class. Use of a $4.12 per kwh value, Roark argued, resulted in an overstatement of OH hurricane outage costs in those three cases by 2 1/2 times. (R-378, 382) Upon review, Staff adopted FPC's proposed adjustment to Staff's methodology and calculated outage costs by class in its report to the Legislature.

FPL provided evidence that when a hurricane warning is given, the associated outage costs are reduced by between 30 and 60 percent (R-323). Windham replied that that downward adjustment is unnecessary in that while Staff's $4.12 value

($4.92 based on FPL's customer mix) was developed for short-term unannounced outages of eight hours or less and is conservative, most hurricane-related outages result in long-term outages which are more costly due to consequential damages. (R-128, 118-19) Howell refused to similarly extrapolate costs per kwh from shorter unannounced outages to longer announced outages. (R-324) No useful evidence was offered as to the cost of extended, as opposed to short-term, outages. (R-707) We are, therefore, reluctant to disregard uncontroverted evidence supporting a significant appropriate downward adjustment to allow use of cost data developed for short-term outages to be applied to significantly longer outages.

The utilities also argued that Staff's methodology itself results in an overstatement of hurricane-related outage costs for two reasons. First, FPL argued, Staff did not make clear the source of its estimates of kwh not served due to Hugo for Carolina utilities. (R-319, EXH-12) These estimates, FPL maintained, are typically derived from the number of customers without electricity and average customer use. FPL argued that because Staff used the difference between actual and estimated sales under normal conditions, Staff overstated the effect of hurricane outages on the OH distribution system; it estimated the total amount of unserved energy attributable to hurricanes instead of the portion of it attributable to OH facilities. Energy that would have been unserved for a variety of reasons, evacuations, the closing or curtailing of private and governmental businesses, failure of transportation sources, and damage to structures, FPL argued, was not netted out. (R-319-20, 376-77, 616) Staff countered that it did, in fact, use a fraction of total projected sales, 30 to 50 percent of daily loads, to obtain a conservative estimate of outage costs. (R-210-11)

Second, Howell argued that Staff's assignment of estimates of unserved energy reported by several Carolina utilities with approximately 62,000 square miles of service area to the FPL system involving only 25,700 square miles of service area resulted in a gross overstatement of costs. (R-316-17) Howell suggested that Staff's methodology should be adjusted to allocate Hugo related outage costs among all utilities in the State, and not only FPL. (R-332) Staff countered that such argument was correct only as to Class 5 hurricanes and that that allocation was accorded little weight in the overall

cost-effectiveness analysis. (R-105-06) Staff maintained that as to the balance, FPL's service area has more area and greater customer density than areas used as a basis for Class 1 through 4 hurricane costs. (R-39-40)

Windham offered evidence of an opinion from hurricane experts at the Florida Department of Community Affairs Emergency Management Center that indicated that utility damage costs from the Carolinas would apply to FPL's service area. (EXH-12) While Staff conceded that differences in wind speed design standards among utilities may result in an overestimation of costs (R-179-80), it maintained such overestimation is offset by several other factors. In addition to the two previously discussed Staff assumptions relating to daily usage and impacted areas, Staff testified that assumptions regarding the value of the composite cost per kwh used and the allocation to transmission lines were both conservative. (R-210-11) Staff also offered evidence of use of a higher outage cost per kwh in California. (EXH-37)

The four IOU's argued that estimates of hurricane outage costs to the public would be, if not impossible to develop, too speculative to be probative. (Prehearing Order No. 22765, p.53-55) While the record is clear that Staff's methodology needs refinement, FPC itself indicated that the cost to the public from hurricane-related outages could more accurately be determined by a variation of Staff's methodology by allocating unserved energy (kwh's) to each of the study cases and multiplying that amount by the value ($ per kwh), if determinable, for each study case based on the customer mix applicable to that case. (FPC's Posthearing Brief, p.11) TECO's witness Rowe premised his estimate on historical data relating to Hurricane Donna in 1960. (R-617) We find that while such estimate can be developed, conflicting evidence exists on the record as to how it should be developed. We, therefore, defer the issue to rulemaking.

FACILITY DAMAGE

A parallel issue arose regarding the determination of expected future cost of damage to overhead and underground facilities due to hurricanes. The purpose of determining hurricane damage costs to utilities is to allow a comparison to be made between resulting life cycle costs to OH and UG facilities. Staff's methodology involved assigning most of the

damage costs reported by several South and North Carolina utilities resulting from Hurricane Hugo to the FPL system, based on the previously described hurricane probability distribution. (EXH-12, p. 1) Howell argued that Staff's premise that Hugo damage can function as a proxy for damage which would occur in a Florida utility given a Hugo class hurricane failed to account for different transmission and distribution ratios (R-316), design standards, (R-317-18), and geographical characteristics (R-317) between systems in the Carolinas and Florida. Staff countered that it considered such factors. (R-179-80, EXH-12)

Howell proposed a counter-methodology involving a determination of the probability of hurricane data for any mile of proposed facilities multiplied by a determination of the cost per mile of replacement should such damage occur, for each of the 7 cases. (R-327) FPL maintained such methodology not only uses replacement costs in each utility's response to Staff's data request, but better addresses the uncertainties attendant to predicting forces of nature and resulting damage. (R-329).

In the alternative, FPL argued that Staff's methodology be adjusted in two ways. First, the methodology should be adjusted to assess damage for each hurricane class against all facilities within the State rather than only the FPL system. Such adjustment, FPL argued, would allow a determination of the proportionate share of damage for each utility based on each utility's portion of total facilities for the State. (R-326) TECO, for one, disagreed with this proposed adjustment. (R-144) Second, FPL argued that the probability distribution of hurricanes in Florida would be more accurate if based upon an allocation of the various hurricane classes affecting the continental United States. (R-327) Staff responded as it did to proposed adjustments to its outage cost methodology; expert opinion indicated that use of Carolina damage for Florida is appropriate and that several identified factors offset any resulting overestimation.

We find that the many grievances expressed in proposed adjustments only nominally balance each other; no evidence exists of a co-relation between the countervailing interests which each offered adjustment is intended to counter-weigh. We find, therefore, that costs associated with hurricane outage and facility damage costs require further refinement.

VEHICULAR ACCIDENTS

Section 366.04(7)(a), Florida Statutes, expressly requires the Commission, in making its determination, to consider the costs of vehicular accidents involving distribution and transmission facilities. In response, Windham relied on cost data obtained from both the National Safety Council (NCS), $354,680,000, and the National Highway Traffic Safety Administration (NHTSA), $453,900,000. (EXH-23) These were offered as alternative annual values of avoided deaths, injuries, and property damage chargable to OH construction. Staff allocated the lesser, more conservative, NSC amount of $354,680,000 among the seven cases. According to the NSC, the cost per urban death is $2,430,000 and $900,000 per rural deaths. (EXH-21) Windham offered evidence of 184 fatal vehicular accidents involving utility poles in 1988 in Florida as a basis for allocating cost estimates. (R-47) Staff estimated 7% of these were misclassified and 20% would have been "highly unlikely to be less severe given no pole." This resulted in costs associated with 134 fatal accidents to be allocated to OH. (EXH-23) Of the original 184 fatal sites, field engineers of the Bureau of Electric Safety located 115. A survey of the 115 sites resulted in an assignment of the 115 accidents into 1 of 7 of the study cases and a corresponding allocation of the associated costs. The number of accidents assigned to each of the 7 cases was multiplied by cost data obtained from the NSC.

Howell took issue with Staff's failure to eliminate accidents involving "Poles with Street Light Only," and "Traffic Signal Poles," in that such poles would not be eliminated through the undergrounding of lines. (R-337) Staff maintained such adjustment is unnecessary because currently available UG lines with frangible fiberglass poles are more cost-effective than OH lines for street lights. (R-51, 135) Staff itself, however, in determining the likely result of the remaining accidents had there been no pole, conceded that "[s]uch judgment is admittedly subjective and another person compiling the data might make different conclusions." We find that while we are comfortable with Staff's reliance on the NSC for cost data, we are uncomfortable with both Staff's assignment of the 115 accidents sites into the 7 case studies and its unilateral determination of whether accidents would have occurred but for the pole and with what severity. We find, therefore, that costs associated with vehicular pole accidents should be further explored at rulemaking.

LIGHTNING

Staff advocated including in the life-cycle cost analysis costs resulting from customer electronic equipment damaged by lightning and assigning part of such cost to OH and UG distribution systems. Staff's position assumed that the undergrounding of lines would reduce lightning and voltage transient damage to customer equipment 3 to 2, OH to UG. (R-61). Gulf Power, however, offered evidence that undergrounding would increase customer lightning damage by three times while reducing utility damage due to the loss of "cones of protection" provided by the poles associated with OH distribution. (R-969)

In developing costs to be charged to OH as a result of lightning surges, Staff collected residential claims data from State Farm Insurance Company relating to lightning damage to home electronic equipment and electrical appliances, and commercial and industrial claim data from the State Department of Insurance, IBM, and Safeway Insurance Company. From this data, Staff estimated $89,000,000 in total losses per year in Florida to residential electrical equipment (EXH-28) and extrapolated from that approximately $89,000,000 in losses to non-residential commercial and industrial electrical equipment. (Prehearing Order No. 22765, p. 68; R-61). Using the statewide number of 128,000 OH pole miles and 29,000 UG trench miles and the 3 to 2 damage ratio, Staff determined lightning related losses resulted in a $1154 cost per mile for OH and $770 for UG. (R-64)

The evidence also indicated that failures occur on OH lines at a ratio of between 2 to 1 and 4 to 1 more than on UG lines and that UG lines appear to experience less wind and tree related voltage fluctuations. (R-263)

Several witnesses challenged Staff's premise that undergrounding is the most cost-effective approach to reducing lightning induced power surges. (R-339, 969) Gulf witness Parrish, for instance, testified that it is more reasonable for each customer to assess his own need for lightning protection and weigh that against the cost of an individual protective system. (R-969) Lakeland witness Lesnett specifically suggested end-use surge protective devices as the most cost-effective protection from lightning damage. (R-917)

We find that the evidence in the record is contradictory even as to the fundamental issue of the effect of undergrounding on voltage surges and fluctuations. We further find that Staff's calculation of loss due to surges was concededly tenuous (R-61), and that while alternative lightning protection strategies were suggested, their cost was neither discussed nor compared with the UG differential. We find, therefore, that costs associated with electronic equipment damage due to lightning and voltage surges should be further refined at rulemaking.

CABLE TV AND TELEPHONE

Although Section 366.04(7)(a) does not specifically direct that the economic impact of undergrounding on telephone or cable TV companies be included in the cost-effectiveness analysis, Southern Bell intervened in this docket to offer evidence regarding the costs that Southern Bell could incur if existing electric poles were removed as a result of undergrounding lines. Southern Bell witness Tubaugh testified that if the Commission were to order all new electric facilities underground, Southern Bell would "likely" place its new facilities underground (R-875), at an annual increased cost of $11,595,000. (R-878, 900-01) This figure is based on a $15,945 differential between aerial and buried facilities per sheath mile and on an "assumed" 750 additional sheath miles per year. (R-878) Tubaugh further testified that if all existing electric OH were required to be buried, Southern Bell would "likely" place all or most of its existing facilities underground (R-875-76) at a cost of $974,000,000. This figure is based upon 20,197 sheath miles of aerial lines in place in Florida. (R-879) One intervenor, however, suggested that Centel is presently placing wire underground because such placement results in lower cost than overhead. (R-250)

Southern Bell argued that the consequential cost to all telephone companies in Florida, and not only to Southern Bell, be included in the cost-effectiveness analysis. While Staff agreed to the extent that the impact on all telephone companies should be included, it had reservations with the assumptions Southern Bell required to develop its over 1 billion dollars in resulting costs. The record also indicates that Staff sought to develop adjustment issues such as pole rental contracts and joint trenching among cable, telephone, and electric companies (R-472). Tubaugh, for instance, testified that pole-rental

contracts in the state result not only in an annual $4.1 million net payment by Southern Bell to electric companies, but in payments to both Southern Bell and electric companies by cable TV companies. (R-882-83)

Upon reviewing the evidence in the record relating to this issue, we find that a valuation of undergrounding costs to telephone and cable utilities should be refined to include consideration of: the cost to telephone companies to install new metallic telephone on non-electric poles; the cost of joint use payments to electric companies; the cost of telephone metallic wire on joint use or individual poles; electricity utility O&M costs incurred to maintain safety code clearance; the cost to install new underground telephone metallic wire and new underground fiber-optic wire; the value of other benefits to consumers resulting from use of expanded fiber optic capability such as data link/cable TV; and the cost differential resulting from taller poles necessary to provide vertical clearance between electric lines and cable TV/ telephone lines. Such data would allow consideration of cost-alternatives to, as well as the cost-effectiveness of, underground wiring. We find that the economic impact of undergrounding on all regulated telephone and cable TV companies in the state, and not simply on Southern Bell, should be included in such valuation. We also find that revenue, as well as costs, resulting to telephone, cable TV, and electric companies as a result of the undergrounding of electric lines should be netted in the cost-effectiveness analysis. Gulf Power, for instance, offered evidence that the sale of Gulf's poles to its attachees would result in $18 million in revenue. (Prehearing Order No. 22765, p. 70)

HEALTH EFFECTS AND AESTHETICS

Section 366.04(7)(a) expressly directs the Commission to consider for inclusion in its cost-effectiveness calculation the "ascertainable and measurable costs of adverse health effects." Several utility-related practices were identified as resulting in adverse health effects, including the siting of transmission facilities generating electromagnetic fielus (EMF), the treating of utility poles with toxic wood preservatives such as creosote, the disposal of such poles, and the clearing and maintaining of OH rights-of-way with phenoxy herbicides such as 2, 4-D.

Both because of its remoteness from typical utility-maintained data and the public's only recent awareness of it, EMF was the most ethereal of the factors considered. Staff argued that although there is a consensus in the record that a nexus exists between EMF and biological effects, no consensus exists as to whether EMF results in serious health effects and, if any, their magnitude. (R-188, 192).

Windham testified that while electric fields are eliminated by undergrounding, magnetic fields, which are of more concern, are not. (R-65) Windham also discussed many stategies and properties that affect electric magnetic fields: the closer 3-phase power lines are balanced, for instance, the lower their magnetic field; because wires in UG cables tend to be closer than those in OH, UG cables result in lower magnetic fields than OH lines; UG cables lines in soil with poor heat dissipation properties result in higher magnetic fields than cables closer together; and grounding practices affect magnetic fields of distribution lines to the extent that unbalanced currents generate greater magnetic fields than balanced currents. Windham testified that ferrous pipe used in undergrounding can shield magnetic fields.

Windham also testified that EMF field epidemiological studies indicated a 2.5 mG magnetic field is the lowest boundary for EMF exposure in the home. (R-66) A Department of Environmental Regulations report was admitted which included not only levels of electric and magnetic fields generated by Florida transmission and distribution lines, but a summary of electric and magnetic fields typically present in the home. (R-656-60) While several studies were admitted into evidence which indicated that statistically significant links exist between EMF and childhood cancer, leukemia, brain cancer, neurological function and hormonal changes (R-665, EXH 29-31), other studies were admitted and discussed which either challenged the validity of those studies or found no significant effect. (R-828, 831-33, 835, 837). We find, therefore, that while much evidence was offered relating to EMF and its properties, a lack of consensus existed as to the "ascertainable and measurable" EMF-related health effects and costs. While several parties proposed methodologies to develop EMF-related costs, none were implemented. (R-782, 817-18)

As to wood pole treatment and disposal costs, witness Brian Moore testified to the toxic chemicals necessary to convert

southern pine logs to rot and insect resistant utility poles (R-854), and to pole treatment and disposal in Florida. (EXH-111). Moore concluded, however, that he did not know the costs of these practices (R-855), and that the 18 wood preserving operations in Florida will "probably cost in excess of $100,000,000 to clean up, and possibly much more." (R-856) We find that to be included in a cost-effectiveness analysis and chargable to OH distribution, future costs associated with toxic wood pole treatment must not only be specifically demonstrated, and not generally asserted, but must be netted against any similar costs, if any, that may be associated with UG facilities. We find, therefore, that while such costs are contemplated by the legislative mandate if properly demonstrated, such demonstration was not made in this record.

We find that record evidence of the costs associated with herbicides used to clear and maintain transmission line rights-of-way would be similarly includable but is similarly undemonstrated. (R-414) Conversely, we find that costs to the public associated with aesthetics are not analogous to enumerated factors to be considered, and are not includable regardless of the level of demonstration. (Prehearing Order No. 22765, p. 86-87).

IV. PREEMPTION

At hearing, we heard testimony from both the electric cooperatives and the municipal electric utilities that while they did not oppose undergrounding, they did believe that determinations regarding undergrounding are better left to them than to the Commission. Dew testified that FRECA, in conjunction with its member cooperatives, recommended that each cooperative be allowed to continue to determine and implement its own undergrounding policy based on policies developed by the Rural Electric Association, cooperative members, member-selected boards of directors, staff, and management. (R-724, 728) FRECA witness Glenn Wrightson testified that because the prohibitive costs associated with undergrounding would require frequent and large rate increases rejected by members, the Commission should allow the cooperatives to continue to offer undergrounding as found in their existing tariffs. (R-751)

Both Florida Municipal Electric Association witness Sheldon Ferdman and Lakeland witness Larry Lesnett similarly argued

that the decision to place OH lines underground should be made, not by the Commission, but by municipal ratepayers. Ferdman's argument was premised solely on economics; those financing the decision to go underground should be allowed to make that decision. (R-682-83) Lesnett's argument was premised largely on responsesiveness; local government is best able to determine at the local level, on a case-by-case basis, when the unique characteristics of the area and the objectives of city and utility management require undergrounding. (R-908-09) While we agree, section 366.04(7)(a), Florida Statutes, clearly addresses all electric utilities, including electric cooperatives and municipal electric utilities. There is no expressed or implied exemption or preemption for utilities with existing undergrounding policy or criteria arguably more responsive to the needs of its membership or ratepayers. We find, therefore, that unless or until the statutory language states otherwise, the Legislature contemplated exclusive, not supplemental or complementary, jurisdiction to the Commission concerning the determination of the cost-effectiveness of undergrounding.

V. RULEMAKING

Although the hearing in this docket was a section 120.57 hearing, we allowed a wide range of evidence not typically admitted in such hearing because of the investigative nature of this docket. Notwithstanding the wide range of evidence admitted, many issues remain undeveloped or unresolved in this record, and no issue resulted in competent substantial evidence upon which a pivotal decision regarding underground wiring can be made. Costs expressly directed for consideration by the Legislature, such as those associated with electrocutions (R-168-69) and tree-trimming (R-918-19), need further development. Issues created by Staff as part of its model, such as discount and depreciation rates, remain unresolved. (R-867-68) Issues created by the parties, such as possible cost-effective alternatives, also remain unresolved. (R-682, 908-13) Issues created by the Commissioners at hearing, such as multiple agencies with jurisdiction, went unresolved. (R-838-39) While Staff devised methodologies to develop costs associated with hurricane damage and outages, vehicular pole accidents, and customer electronic equipment damage, the many adjustments proposed by various parties convince us that such methodologies require further refinement before they can be described as bases for competent substantial evidence factorable into a cost-effectiveness analysis.

We find, therefore, that a rulemaking docket should be opened as to the new subdivision study cases, cases 6 and 7, only. A section 120.54 rulemaking hearing is a quasi-legislative proceeding intended to facilitate the exchange of information between parties. It allows the Commission to inform itself to the fullest extent possible prior to rulemaking. General Telephone Co. of Florida v. Florida Public Service Commission, supra, at 1067. As such, where an order could not properly be issued, a rule may be properly made.

To determine the appropriate tests for cost-effectiveness, we have requested further policy direction from the Legislature in the following areas:

1. A determination of legislative intent as to preemption by this Commission of state or local code and zoning requirements and the resulting effect on costs to government or ratepayers;

2. Weight to be given to future or present societal benefits, i.e., those health, aesthetic, or public convenience considerations to which dollar amounts cannot be directly ascribed by this Commission; and

3. Affirmation of, or objection to, current Commission policy which provides for direct costs being borne by cost causers rather than the full body of ratepayers.

A determination of cost-effectiveness will be affected by the policy considerations raised above.

In consideration of the above, it is

ORDERED by the Florida Public Service Commission that a rulemaking docket be opened to determine the cost-effectiveness of underground wiring in new subdivisions. It is further

ORDERED that the Staff Report to the Florida Legislature is hereby approved. It is further

ORDERED that this docket be closed if no timely motion for reconsideration or notice of appeal is filed.

By ORDER of the Florida Public Service Commission, this 28th day of JUNE, 1990.

STEVE TRIBBLE, Director
Division of Records and Reporting

(S E A L)

BAB

NOTICE OF FURTHER PROCEEDINGS OR JUDICIAL REVIEW

The Florida Public Service Commission is required by Section 120.59(4), Florida Statutes, to notify parties of any administrative hearing or judicial review of Commission orders that is available under Sections 120.57 or 120.68, Florida Statutes, as well as the procedures and time limits that apply. This notice should not be construed to mean all requests for an administrative hearing or judicial review will be granted or result in the relief sought.

Any party adversely affected by the Commission's final action in this matter may request: 1) reconsideration of the decision by filing a motion for reconsideration with the Director, Division of Records and Reporting within fifteen (15) days of the issuance of this order in the form prescribed by Rule 25-22.060, Florida Administrative Code; or 2) judicial review by the Florida Supreme Court in the case of an electric, gas or telephone utility or the First District Court of Appeal in the case of a water or sewer utility by filing a notice of appeal with the Director, Division of Records and Reporting and filing a copy of the notice of appeal and the filing fee with the appropriate court. This filing must be completed within thirty (30) days after the issuance of this order, pursuant to Rule 9.110, Florida Rules of Appellate Procedure. The notice of appeal must be in the form specified in Rule 9.900(a), Florida Rules of Appellate Procedure.

(7)(a) By July 1, 1990, the commission shall make a determination as to the cost-effectiveness of requiring the installation of underground electric utility distribution and transmission facilities for all new construction, and for the conversion of overhead distribution and transmission facilities to underground distribution and transmission facilities when such facilities are replaced or relocated. In making such determination the commission shall consider the total cost involved including, but not limited to, the overall cost of accidental electrocutions and temporary and permanent disabilities to both the utility employees and others; vehicular accidents involving distribution and transmission facilities; ascertainable and measurable costs of adverse health effects; the differential between the rights-of-way required for underground versus overhead utilities; the cost differential due to the elimination of tree-trimming requirements; the cost differentials between underground and overhead utilities to be expected from repairing storm damage, as well as the incurred loss to the private sector as a result of outages due to storm damage; and costs of associated insurance, attorney's fees, and legal settlements and costs. Further, in making its determination, the commission shall survey the experiences of other states and utilities operating outside of Florida with respect to the cost-effectiveness of underground utilities. Upon a finding by the commission that the installation of underground distribution and transmission facilities is cost-effective, the commission shall require electric utilities, where feasible, to install such facilities.

(b) The commission shall, by July 1, 1990, make a determination as to the cost-effectiveness of converting existing overhead electric distribution and transmission facilities to underground facilities. In making this determination, the commission shall consider the factors specified in paragraph (a) and the original cost, depreciated, of the existing facilities, plus their salvage value, if any. The commission shall report its findings to the Legislature by July 1, 1990.

STATE OF FLORIDA

Public Service Commission

Michael M. Wilson
CHAIRMAN

101 EAST GAINES STREET
TALLAHASSEE, FL 32399-0855
(904) 488-7001

July 1, 1990

The Honorable Bob Crawford, President of the Senate
The Honorable Tom Gustafson, Speaker of the House of Representatives
The Honorable William G. Myers, Senate Minority Leader
The Honorable Dale Patchett, House Minority Leader

Dear Sirs:

Pursuant to Chapter 89-292, Laws of Florida, enclosed is the Commission's report on our investigation into the cost-effectiveness of underground electric utility lines. While the Commission feels the record, as developed through this investigation, is not yet adequate to determine that it is "cost-effective" to order installation or replacement of overhead wiring with underground transmission lines, we are continuing in our efforts to attempt to respond properly to the statutory directives.

In order to determine the appropriate tests for cost-effectiveness, we respectfully request further policy direction from the Legislature in the following areas:

1. Determination of legislative intent as to preemption by this Commission of state or local code and zoning requirements and the resulting effect on costs to government or ratepayers.
2. Weight to be given to future or present societal benefits, i.e., those health, esthetic, or public convenience considerations to which dollar amounts cannot be directly ascribed by this Commission.
3. Affirmation of, or objection to, current Commission policy which provides for direct costs being borne by cost causers rather than the full body of ratepayers.

We welcome your comments on methodologies used and any clarification as to specific legislative intent that might assist us and current or future parties involved in evaluating the information presently received and to be elicited.

Since the statute specifically directs a finding of cost-effectiveness before implementation, we must report that, while there is a great deal of cost information available, a determination of cost-effectiveness will be affected by the policy considerations raised above.

Respectfully,

Michael M. Wilson
Chairman

MMW/ms
Enclosure

A Report To The Florida Legislature

Cost-Effectiveness Of Underground Electric Utility Wiring

Florida Public Service Commission
Tallahassee, Florida
July 1, 1990

I. Florida Overhead and Underground Electric Utility Wiring History

In 1971, the Commission adopted rules requiring customers who desire underground wiring to pay its higher cost. The belief was that underground wiring provided only aesthetic value. Prior to 1971 relatively little underground wiring existed, the technology was rapidly evolving, and there was little operating or maintenance history. Therefore, current policy bases underground wiring charges on initial costs only.

Underground Wiring Tariffs

Commission Rules 25-6.074 through 25-6.083 require a charge for underground subdivisions based on the difference between the construction cost for overhead lines and the construction cost for underground lines. The only consideration of savings or higher cost for annual expenses is that differences in operating and maintenance expenses, if any, may be considered in the overall cost differential. The regulatory theory behind requiring a differential charge is that those benefitting from underground should pay for it.

Electric Safety History

Chapter 86-173, Laws of Florida (366.04 F.S.), required the Commission to adopt, inspect and enforce electric transmission and distribution safety standards for Florida's electric utilities using the standards contained in the National Electrical Safety Code. Accordingly, Commission Rule 25-6.0345, effective on August 3, 1987, adopted the Code.

Underground Study Statute

Sections 366.04(4) (a) and (b), Florida Statutes, enacted by the 1989 Legislature, directed the Commission to study the cost-effectiveness of installing underground electric lines in place of overhead lines for the following four cases: new construction, replacement, relocation, and conversion.

The Commission was directed to report its findings to the Legislature by July 1, 1990, and upon a finding by the Commission that the installation of underground distribution and transmission facilities is cost-effective, the Commission should require electric utilities to install such facilities where feasible.

Since the Commission can only make findings and "require" implementation pursuant to a hearing, it was necessary to conduct the study as a formal docket (Docket No. 890833-EU).

II. Study Methodology and Data

Studies of alternatives entail a comparison between what is being done, called the base case, and a proposed alternative case. In the underground wiring study the base case is an overhead wiring system which is compared to an alternative underground wiring system.

COST-EFFECTIVENESS OF UNDERGROUND ELECTRIC UTILITY WIRING

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Internal Costs - Operation & Maintenance (O&M)
O&M costs are defined as costs for materials, supplies, and labor that will be consumed in one year or less, or are below a certain dollar value. Practically, O&M expenses are those expenses that do not extend the life or enhance the capability of a piece of equipment or building. These expenses are costs internal to an electric utility and upon which utility electric rates are, in part, based.

Reduced O&M costs for many utilities in the State result from improved cables and their installation methods. Controversy remains as to quantifying the reduction. For example, one utility's 1988 commingled average O&M expense is $1747 per mile; (Exhibit-24) its O&M expense for the new technology cable is $1265 per mile. (Prehearing Order P-38).

This estimate of $1265 per mile of O&M expense for improved cable and installation methods appears reasonable. The expense is about $600 per mile less than the commingled cost reported for 1988. The real value is somewhere in between the $600 and $1900 per mile. (R-233). Other utilities disagreed, presenting their actual O&M expenses. Intervenors generally agreed with staff's initially advocated O&M expense of $1200 per mile for underground cable. (Prehearing Order P-38).

Internal Costs - Tree Trimming
Although tree trimming expenses are small in comparison to some other utility costs, such as power plant and fuel costs, tree trimming is a significant overhead line O&M expense. (Exhibit-24). Tree trimming expenses are higher in relation to the distribution system than transmission, because the distribution lines are lower to ground and nearer tree level. In the statewide model, staff used large utility tree trimming expenses of $544 per pole mile in 1988 and assumed a 5% per year inflation rate. (Exhibit-24).

Internal Costs - Storm Damage Repair
Most utilities do not maintain separate storm damage repair records since such damage can result from anything ranging from a small thunderstorm to a hurricane. Utility repair costs due to non-hurricane weather conditions (storms, thunderstorms, and tornadoes) are recurring costs routinely incurred each year requiring no annualization of the data, as for less frequent hurricanes. Repair costs due to storms, however, are recorded with repair costs due to all other causes. Utility storm damage repair costs appear to be included in the internal cost data upon which the statewide model and study are based in part.

Internal Costs - Fixed
There are three types of electric utilities: investor-owned utilities whose rate levels are set by the Commission; municipal electric utilities, whose rate levels are set by a city commission; and rural electric cooperatives (co-ops), whose rate levels are set by managers

underground served customers benefit. Given that this payment could result in higher electric rates, staff advises that it may be unfair for overhead served customers to pay, in part, to serve other customers underground. There are other benefits of underground wiring that inure soley to underground served customers that staff would exclude from the study. This is a major issue in the study which was not fully addressed at hearing, leaving open a decision of what costs should or should not be included in the study.

Costs To The Public - Costs Per KWH Not Served Due to Hurricane Caused Outages

Utilities testified that advanced warning is given for hurricanes and the economy usually slows down due to evacuation irrespective of whether electricity is available. (R-319-320, R-331). This suggests that the cost per KWH not served should be less for hurricane outages than for more sudden outages. Also, the number of KWH's not served due to an outage caused by a hurricane is less than average normal daily usage.

However, hurricane caused outages are of much longer duration than unanticipated outages. Staff believes the cost of an extended outage appears to have more cost per KWH not served than a shorter outage. (R-119 and R-707). No studies have been made of the cost per KWH not served for extended, though anticipated, outages caused by hurricanes.

Staff advocated the same cost per KWH not served as for unanticipated shorter duration outages. The evidence on outage costs in the record is conflicting and the Commission will investigate this issue.

As with non-hurricane outages, an issue arises as to whether costs that do not benefit the general body of customers should be included in an underground cost-effectiveness study with results that may impact all customers.

Costs to the Public - Average Annual Hurricane Costs

Staff and intervenors advocated the use of 100 years of hurricane data. Staff testified that meteorologists give three main reasons for not only using the last few years to predict the next 20 to 30 years. First, a short period of time does not give a good basis for predicting occurrences of relatively rare events that tend to be random and/or cyclic in pattern. Second, several atmospheric researchers studying hurricane patterns believe that the relative scarcity of large hurricanes in this area for the period 1970 to 1987 was due to a persistent drought in African areas where large Atlantic hurricanes are often spawned. Third, some meteorologists expect more and larger hurricanes in the future due to ocean warming caused by the "Greenhouse Effect." (R-35-36).

Staff obtained a detailed list of storm tracks and wind speeds of all hurricanes striking Florida in the last 100 years from the Florida Department of Natural Resources. Staff used this data to calculate the hurricane damage and outage costs.

Staff, by necessity, used many assumptions to develop its electric contact costs to the public. The utilities countered that only the costs associated with contact fatalities and injuries paid by and recorded on utility books should be included in the study. The Commission will investigate the matter more thoroughly in rulemaking.

Costs To the Public - Appliance and Electronic Equipment Damage Due to Voltage Surges and Sags Caused By Lightning and Other Sources

Staff maintained burned out electronic equipment, water heaters, meters, air-conditioners and other appliances and equipment due to voltage surges and sags caused by any reason result in costs to the public. (Prehearing Order No. 22765 P. 27).

Usually, it is undeterminable whether a customer's appliance or electronic equipment was damaged by a lightning induced surge or a switching induced surge. Insurance adjusters therefore do not typically separate causes.

Staff Exhibit-28 shows that, according to an insurance company, the statewide cost of burned out equipment in the residential sector is $89,000,000 due to voltage surges and sags. (R-60). Staff also testified that it believes damage due to voltage surges and sags in the non-residential sector is as high as that of the residential sector. For study purposes, staff assumed that the cost to the public in the non-residential sector caused by voltage surges and sags is also $89,000,000. (R-61). Hence, staff used a total cost to the public of $178,000,000. Staff advises us they used this number because no other number exists.

Staff is also concerned that damage costs should be excluded from the study for the same reason that costs per KWH not served should be excluded and questions the equity of overhead served customers paying for undergrounding to reduce equipment damage costs for underground served customers. (R-72). The Commission will investigate this conceptual argument and the costs associated with customer appliance and electronic equipment damage in rulemaking.

Costs To the Public - Electric Undergrounding Impact On Telephone and Cable TV Companies

Overhead telephone and cable TV metallic wiring is typically attached to electric utility poles and placed underground whenever the electric lines are placed underground. (R-68). Lightning induced voltage spikes can enter a building by metallic cable TV and telephone wiring as well as by electric lines. (R-63).

The issue of how to treat the cost to telephone and cable TV companies is complex. To give the issue serious consideration in future rule hearings, we will need to consider the following on a per pole or trench mile basis as appropriate:

169,000,000 pounds. (R-855). Although the impact of wood pole preservatives on human health and the environment is difficult to quantify, it exists and is directly attributable to any overhead electrical equipment. Further research, however, may be in the jurisdiction of other agencies.

Gulf Power Company points out that, if the treated pole problem is of sufficient magnitude, there are alternatives such as concrete and steel poles which could be used to eliminate the treated pole problem. (Prehearing Order R-79). Gulf Power takes the position that only those direct costs which can be eliminated as a result of placing power lines underground should be included.

To account for all these considerations, staff attempted to capture the cost of wood pole treatment and disposal by computing the cost of using a wood pole alternative, such as concrete poles. Staff used FPL's concrete pole cost as a reasonable cost for capturing all of the costs to the public due to groundwater contamination and wood pole exposure that would be avoided by underground wiring. In forthcoming rulemaking hearings, parties will have an opportunity to address whether concrete poles are the lowest cost alternative or too high an imputation for avoiding compounds such as arsenic in wood poles and groundwater.

Utilities all disagreed that wood pole treatment or disposal is a hazard which results in a cost to the public.

Survey of Other States

At least eight states require underground lines for most new subdivisions: Arizona, California, Delaware, Illinois, Maryland, Michigan, New Jersey, and New York. (R-27-28). Maryland also requires most residential, and commercial feeders and taps to be underground. Several states or utilities allow a choice between overhead or underground lines with no cost differential. Some local governments in other states also have requirements for putting power lines underground.

The primary reasons given by states having undergrounding requirements were aesthetic, environmental, or safety concerns. Virtually no information was provided relevant to the questions on other costs to the public. Some Commissions indicate their policies take such factors into account subjectively, however, no objective study results seem to be available. (R-29). Where there is no state policy requiring undergrounding of power lines, utilities usually charge an underground differential to developers or the local government.

Several states or utilities charge no differential if the developer does all on-site trenching. (R-29). The requirement for the developer to do all on-site trenching results in a charge that may be more or less than present underground wiring charges in Florida where the utility does the trenching.

III. Cost Effectiveness

Notwithstanding the plain language of the Statute, the utilities argued that only normal utility construction and operating costs should be included in a cost-effectiveness analysis. Staff and intervenors argued for the inclusion of costs to the public. Some benefits of underground wiring resulting from the legislatively mandated criteria enure only to customers with underground wiring, others do not.

Should customers with overhead wiring subsidize, in part, underground served customers? While defining cost-effectiveness is a proper role for the Commission, we are concerned that no definition was included in the statute requiring this study. The key question concerning cost-effectiveness is to to whom? From what viewpoint? In our investigation we have considered the total costs as statutorily required, but are without guidance as to whom underground wiring is to be cost-effective. These questions need to be answered before a determination can be made as to whether underground wiring is cost-effective and should therefore be implemented.

IV. Conclusion

The evidence is uncontroverted that none of the cases developed by staff is cost-effective when only utility construction and O&M costs are compared; underground facilities are presently more costly than overhead facilities. However when the costs to the public, as enumerated by the Legislature, which can be supported at this time, are included in the cost-effectiveness analysis, the evidence suggests that underground wiring may be cost-effective in new subdivisions. While no issue resulted in competent substantial evidence upon which a pivotal decision regarding underground wiring can be made, the evidence addressed compels us to continue our investigation.

In order to determine the appropriate tests for cost effectiveness, we respectfully request further policy direction from the Legislature in the following areas:

1. Determination of legislative intent as to preemption by this Commission of state or local code and zoning requirements and the resulting effect on costs to government or ratepayers.
2. Weight to be given to future or present societal benefits, i.e., those health, esthetic, or public convenience considerations to which dollar amounts cannot be directly ascribed by this Commission.
3. Affirmation of, or objection to, current Commission policy which provides for direct costs being borne by cost causers rather than the full body of ratepayers.

We welcome your comments on methodologies used and any clarification as to specific legislative intent that might assist us and current or future parties involved in evaluating the information presently received and to be elicited.

Since the statute specifically directs a finding of cost effectiveness before implementation, we must report that, while there is a great deal of cost information available, a determination of cost <u>effectiveness</u> will be affected by the policy consideration raised above.