DIRECT TESTIMONY OF

DR. J. D. GUY

ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY

RE ENERGY ALTERNATIVES

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Q. Please state your name and position.

A. My name is J. D. Guy and I am employed as Manager of Corporate Planning at Houston Lighting & Power Company (HL&P).

Q. Please describe your educational background.

A. I have B.S. and Ph.D. degrees from Texas A & M University and an M.S. degree from the University of New Mexico in Electrical Engineering. Additionally, I have taken a number of undergraduate and graduate level courses in economics, finance, and accounting at the University of Houston.

Q. Please describe your work experience following graduation from college.

A. Following graduation from Texas A & M, I worked for four years at HL&P in the Engineering Department; leaving HL&P in 1974, I worked at the Atomic Energy Commission as a Power Systems Engineer until 1976. For the past four years, I have been employed by Houston Lighting & Power Company in the Corporate Planning Department and was promoted to Manager of Corporate Planning in February, 1980. In this capacity, I am responsible for developing HL&P's long range corporate plans.

Q. What is the purpose of your testimony?

A. First, I will update the Allens Creek Environmental Report Supplement with respect to HL&P's demand forecast and the planned capacity additions necessary to meet the projected load. I will explain how the Allens Creek project fits into the Company's plans for future generation additions. I will explain that we are precluded from constructing new gas or oil fired generating facilities and that, therefore, our only alternatives are to construct new nuclear, coal, and lignite plants. In addressing the contentions on conservation and alternative energy sources, I will be joined by a panel of witnesses who have addressed various parts of the contentions. Dr. Anderson will provide an independent analysis of future demand for electricity on HL&P's system. Dr. Perl will explain that the various conservation measures recommended by the intervenors cannot eliminate the need for the Allens Creek project. In the process of that analysis, he considers the energy conservation measures suggested by TexPirg and demonstrates that rather than reducing the need for Allens Creek, these conservation measures would increase the need for the project because they would increase the need for base load capacity on HL&P's system. Dr. Perl also compares the costs of the coal, lignite, gas, and nuclear alternatives and establishes that among these alternatives, nuclear power is the least expensive source of electricity. Dr. Hamilton will address the comparative health effects of coal, lignite, and nuclear plants. Dr. Woodson will testify that it is not feasible to replace the capacity of Allens Creek with a plant that is fueled by the burning of solid waste. Mr. Simmons will testify that the construction of interconnections with neighboring utilities does not present a possibility of reducing reserve margins and thus obviating the need for the Allens Creek project.

Q. Please describe the Company's current demand and capacity forecast.

A. The Allens Creek Environmental Report Supplement filed in May, 1978, contains a thorough description of HL&P's method of forecasting demand. Figure S.1.1-3 in the Supplement shows the actual capability and peak demand data from 1963 through 1976 and forecasted data for 1977 through 1987. I have attached hereto as Applicant Exhibit No. _____ (JDG-1), a table showing the actual peak demand for 1977 through 1980 and the forecasted peak demand for 1981 through 1991, and the reserve margins in each year.

Q. Has the Company changed its scheduled generation additions shown at page SH-100 of the ER Supplement?

A. Our planned generation additions are developed on a continuing basis. The schedule shown at page SH-100 has changed several times since publication of the ER Supplement. The most current schedule is shown on Applicant Exhibit No. _____ (JDG-2) which lists the new plants presently being planned or under construction, the estimated unit capability, the fuel type and the scheduled in-service date of each plant.

Q. Does this construction program provide HL&P with sufficient capability to maintain adequate reserves through 1988?

A. No. HL&P has had to enter into contracts to purchase capacity from neighboring utilities in order to meet its reserve requirements. These agreements include: (1) a contract between HL&P and the City of Austin to purchase 500 megawatts of capacity in 1980 and 800 megawatts from 1981 through 1987; and (2) a contract between HL&P and the City Public Service Board of San Antonio to purchase from 200 megawatts to 500 megawatts between 1982 and 1987. Exhibit JDG-1 shows the effect of these purchases on HL&P's reserves. A summary of the purchased power presently under contract is shown in Applicant Exhibit No. ___ (JDG-3).

Q. What is the current schedule for Allens Creek?

A. Allens Creek is now scheduled to be in commercial operation in 1988, but after the peak of that year. That is why I have shown it coming on line in 1989 in Applicant Exhibit No. __ (JDG-2).

Q. What is the impact on reserve margins if Allens Creek is delayed?

A. If we are unable to bring the Allens Creek project on line in 1989, our reserve margin would drop to 9.3 percent. The reserve margin would be 10.7 percent in 1990 if Allens Creek is not in operation by then.

Q. Is it possible to cover this shortfall in reserves through additional capacity purchases?

A. While we have been able to cover some of our short fall in reserves through purchases from other companies, the reserve margins shown in Exhibit JDG-1 are dependent upon Allens Creek coming on line before the peak season in 1989. It is possible that we can continue to make up for some of the shortage in reserves through capacity purchases if Allens Creek is delayed to 1990 or beyond. However, 1990 may be an extremely critical year, because most of the excess capacity which we have been able to purchase is either oil or gas-fired capacity that is being displaced by cheaper base load coal units. Much of this excess capacity may not be available for sale due to either the unavailability of fuel and/or the legal prohibitions on its use. Secondly, by 1990, projected load growth in the systems supplying the capacity will have eroded the excess capacity to the extent that these systems are no longer willing to make commitments of firm capacity sales. For instance, as shown in the July, 1980, National Electric Reliability Council report, the installed reserve margin of ERCOT is expected to fall from 46 percent in 1979 to 19 percent in 1990.

Q. Is there a cost penalty associated with delaying Allens Creek in reliance upon capacity purchases from other electric utilities?

A. Yes. There is a tremendous penalty both in terms of escalation and replacement fuel costs. The plant costs will escalate by about $100,000,000 each year that it is delayed and the differential fuel costs would average at least $500,000,000 each year, based on present cost estimates of replacement fuels. So, if Allens Creek were delayed only one year to 1990, there would be a cost penalty of about $600,000,000. I reiterate that by 1990, the excess gas and oil capacity previously available for purchase will largely disappear so we cannot continue to defer Allens Creek in reliance upon such excess capacity.

Q. Would you please explain why HL&P cannot construct new generating capacity to be fueled by natural gas or fuel oil?

A. In 1978, Congress passed the Powerplant and Industrial Fuel Use Act, 42 U.S.C. §8301 et seq. This Act prohibits HL&P from constructing new power plants that use either petroleum or natural gas as a primary energy source. The Act also provides that natural gas will not be used as a primary energy source in any existing power plant after January 1, 1990.

Q. Are you familiar with the exemptions permitted under the Act?

A. Yes, I am very familiar with them. In fact, I first became involved with this legislation when it was proposed in the Spring of 1977. At that time HL&P began an intensive effort to review and comment on the proposed legislation. Subsequent to the passage of the Act I was involved in our review of and commenting on the DOE regulations implementing the Act. Most importantly, it has been my continuing responsibility to evaluate the Act as it affects HL&P's corporate planning.

Q. Would you please explain the exemptions available under the Fuel Use Act and what their impact is on HL&P?

A. There are a number of exemptions available under the Act which may allow, under certain showings on the part of HL&P, either construction of new oil or gas-fired facilities or continued use of natural gas in existing facilities past January 1, 1990. I have reviewed those exemptions for construction of <u>new</u> facilities and have concluded that there is no certainty that HL&P could meet the requirements for any exemption except the peak load exemption. However, this exemption would allow only 1500 hours of use of the exempted facilities and would hardly provide sufficient energy to replace that expected to be available from Allens Creek.

Of the exemptions available under the Act for extended use of natural gas in existing facilities, the only two for which HL&P may be able to qualify are the retirement and synthetic fuel exemptions. The retirement exemption may allow an additional five years of natural gas use provided that HL&P pledges to retire the exempted capacity at the end of the five year period. The synthetic fuel exemption may allow up to ten years of natural gas use if HL&P can make the necessary showing that synthetic gas will be available and used at the end of the exemption period. HL&P's current plans anticipate the use of both these exemptions in order to realize the maximum economic utilization of its existing gas-fired generating capability.

Q. Would the utilization of these exemptions affect the need for Allens Creek?

A. No, because the contemplated exemptions only provide for extended use of existing facilities, the expected growth in system demand must be supplied by additional new capacity. The new capacity will consist of coal, lignite, and nuclear units, including Allens Creek, which is an important and integral part of HL&P's planned generation mix.

Q. Please explain why there is no reasonable probability that HL&P could get a permanent exemption to construct a new base load, gas-fired plant.

A. In order to qualify for such an exemption, HL&P must show, in effect, that it cannot construct new coal, lignite, or nuclear plants. Since we are planning for and constructing all three of these types of plants it would seem impossible to make the showing required for the permanent exemption for a new base load, gas-fired plant.

Q. What about the provision that indicates that there may be an exemption to avoid violation of environmental requirements such as the Clean Air Act?

A. Obviously, we are planning and constructing new coal and lignite plants both inside and outside our service area. As long as we have the capability to find sites where we can construct new coal or lignite plants in compliance with the Clean Air Act, we simply cannot qualify for this exemption.

Q. In the FES Supplement the NRC Staff cites a study by the Federal Power Commission which indicates that the rate of development of natural gas supplies will be inadequate to meet current projections of demand. In its order of November 13, 1980, the Board asked whether there was more recent information than that provided in the FES Supplement on cost and availability of natural gas. Can you address the Board's question?

A. With respect to the question of costs, I defer to Dr. Perl. On the question of availability, I am not aware of any studies which would serve as a basis to reverse the conclusion drawn by the NRC Staff in Section S.9.1.2.1 of the Final Supplement to the Final Environment Statement (FSFES).

Q. Are you aware of any studies which provide more recent support for the conclusions in the FSFES?

A. In May, 1979, the Department of Energy published a study known as National Energy Plan II, which is a comprehensive study of U.S. energy problems. This study was prepared by DOE in accordance with Section 801 of the Department of Energy Organization Act. In NEP II, the DOE addresses the future supply and demand for natural gas and concludes that there is extreme uncertainty as to whether natural gas supply can satisfy U.S. demand through the year 2000. This prediction includes all sources of supply -

conventional and unconventional, domestic and imported. Another comprehensive study was published by the National Research Council in 1979. The title of this study is "Energy in Transition 1985-2010." This study was prepared for the Department of Energy under a contract initially entered into by the Energy Research and Development Administration. The Council's report contains a number of scenarios for natural gas production through 2010. Under even the most optimistic scenario they expect continued declines in both oil and gas production through 2010. The report states that "the likelihood of reversing the slow decline in domestic oil and natural gas production is quite small, and the prospect of compensating for this decline by continued growth of oil imports is equally small, at least beyond a few years in the future." Finally, in a report prepared by the Department of Energy in November, 1980, titled "Reducing U.S. Oil Vulnerability, Energy Policy for the 1980's," the Department concluded that it is "highly unlikely that the production of [natural] gas can increase or even be held constant over the next 20 years."

Q. The November 13 order also raises a question as to the environmental comparison between natural gas plants and nuclear plants. Has HL&P done any such comparison?

A. We have not done a specific comparison; however, I am sure that natural gas plants would compare very favorably to nuclear plants. Gas fired plants are clearly preferable to coal and lignite because the sulfur and ash discharges are negligible. Likewise, there is a very minimal impact associated with the fuel cycle for gas plants. However, any environmental comparison is meaningless because we cannot build new gas fired plants. The gas fired plant is just not an option for us.

Q. Exhibit JDG-2 shows that HL&P is planning and constructing nuclear, coal, and lignite plants. As Manager of Corporate Planning, is it your view that the Company should construct all three types of plants?

A. Yes, it is.

Q. From your perspective as a corporate planner why is it desirable to have a diversity of generating plants on the HL&P system?

A. There are numerous reasons, but it basically comes down to the fact that it is highly desirable to have a diversity of fuel supply. The point is illustrated by our experience. Up until the 1970's, we were totally dependent upon natural gas for our fuel supply. As a result of shortages of natural gas that developed in the early 1970's and the resultant legislative and regulatory prohibitions on the had been planned. The only short term remedy was to install fuel oil capability in our generating plants. The price of fuel oil has, of course, skyrocketed in the past few years and the Federal government has passed laws and regulations designed to discourage further dependence on imported oil. For the longer range, we also undertook an ambitious nuclear program. Like all other companies in the United States, we began experiencing substantial delays in our nuclear plants, which caused us to focus on coal plants as an alternative. We found that we could undertake construction and operation of coal plants on a shorter schedule than nuclear plants. This was an important consideration because of the tremendous load growth on HL&P's system and because of our inability to construct new gas-fired generating facilities. We are now turning our attention to lignite plants because the fuel supply is relatively closer to HL&P's service area and the cost projections for lignite fuel supply are much more stable than the cost projections for coal.

Q. What is the benefit of a nuclear plant in terms of adding diversity to HL&P's system?

A. First, the cost of power produced by a nuclear plant is competitive with power produced by a coal or lignite plant. Furthermore, a nuclear plant is not as vulnerable as a coal plant to escalations in fuel costs. The fuel costs associated with operation of a nuclear plant amount to about 27 percent of the total electricity cost whereas the fuel costs of a coal plant amount to about 65 percent of the total electricity costs. Thus, escalations in fuel cost have less effect on total cost of power from a nuclear plant. Furthermore, the cost of western coal at the mine is usually subject to considerable escalation and there is a considerable risk of escalation in the cost of transporting coal. Indeed, the cost of transporting coal from the West (Wyoming and Montana) is much greater than the purchase price of the coal itself. For example, for the first nine months of 1980, the average price paid by HL&P for coal was \$10.60/ton, while the rail tariff averaged \$18.83/ton. These transportation costs reflect rates as they were prior to deregulation. The transportation costs following deregulation are likely to be an even greater portion of the total. We hope to get some protection from these transportation costs by building mine-mouth lignite plants in Texas. However, there is a limited supply of economically recoverable lignite deposits for which leases have been sufficiently consolidated to support all of the new power plants which must be built in Texas in the next few years to supply the expected increases in electric demand.

Q. Does that complete your testimony?
A. Yes.

Planned Additions (1981-1990)

Generation Additions, System Capability, Load, Purchase Power, and Reserve

1977-1990

Year	Peak Demand (MW) (1)	Installed Capability (MW) (2)	Purchase Power (MW)	Reserves: Without Purchase Power (MW)	Reserves: Without Purchase Power (%)	Reserves: With Purchase Power (MW)	Reserves: With Purchase Power (%)
1977	8445*	10170	0	1725	20.4	1725	20.4
1978	9114*	10828	0	1714	18.8	1714	18.8
1979	9336*	11193	0	1857	19.9	1857	19.9
1980	10266*	11763	500	1497	14.6	1997	19.5
1981	10700	11763	800	1063	9.9	1997	19.5
1982	11375	11763	1300	388	3.4	1688	14.8
1983	11700	12303	1200	603	5.2	1803	15.4
1984	11975	12688	1000	713	6.0	1713	14.3
1985	12625	13160	1300	535	4.2	1835	14.5
1986	13050	14245	1000	1195	9.2	2195	16.8
1987	13575	14845	1200	1270	9.4	2470	18.2
1988	14150	15445	0	1295	9.2	1295	9.2
1989	14675	17175	0	2500	17.0	2500	17.0
1990	15050	17787	0	2737	18.2	2737	18.2
1991	15750	18387	0	2637	16.7	2637	16.7

(1) Does not include interruptible demand.
(2) Does not include purchase power.
* Actual peak demand.

Generation Additions, System Capability, Load, Purchase Power, and Reserve

1977-1990

Year	Peak Demand (MW) (1)	Installed Capability (MW) (2)	Purchase Power (MW)	Reserves Without Purchase Power (MW)	Reserves Without Purchase Power (%)	Reserves With Purchase Power (MW)	Reserves With Purchase Power (%)
1977	8445*	10170	0	1725	20.4	1725	20.4
1978	9114*	10828	0	1714	18.8	1714	18.8
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1986	13050	14245	1000	1195	9.2	2195	16.8
1987	13575	14845	1200	1270	9.4	2470	18.2
1988	14150	15445	0	1295	9.2	1295	9.2
1989	14675	17175	0	2500	17.0	2500	17.0
1990	15050	17787	0	2737	18.2	2737	18.2
1991	15750	18387	0	2637	16.7	2637	16.7

(1) Does not include interruptible demand.
(2) Does not include purchase power.
* Actual peak demand.

Applicant Exhibit No. ____ (JDG-1)

Planned Additions (1981-1990)

Unit Name	Estimated Capability (MW)	Fuel Type	Scheduled In-Service Date
W. A. Parish 8	540	Coal	1983
South Texas Project 1	385	Nuclear	1984
Limestone 1	700	Lignite	1985
South Texas Project 2	385	Nuclear	1986
Limestone 2	700	Lignite	1986
XLN 1	600	Lignite	1987
XLN 2	600	Lignite	1988
XLN 3	600	Lignite	1989
Allens Creek	1130	Nuclear	1989
Undefined 1	700	Lignite	1990
Undefined 2	600	Lignite	1991

Applicant Exhibit No. ____ (JDG-2)

Purchase Power Contracts, 1981-1990

(MW)

Year	City of Austin	CPSB of San Antonio	Total
1981	800	0	800
1982	800	500	1300
1983	800	400	1200
1984	800	200	1000
1985	800	500	1300
1986	800	200	1000
1987	800	400	1200
1988	0	0	0
1989	0	0	0
1990	0	0	0

Applicant Exhibit No. ____ (JDG-3)