# KOMANOFF ENERGY ASSOCIATES

Testimony of Charles Komanoff

SHOREHAM COSTS, OPTIONS AND IMPACTS

presented to the
New York State Assembly Standing Committee on Energy

April 29, 1983

451 BROOME ST 11th FLOOR NYC 10013 212-334-9767

Summary of
Testimony of Charles Komanoff

"Shoreham Costs, Options and Impacts"

Presented to the New York State Assembly Standing Committee on Energy
April 29, 1983

1. Shoreham's annual costs (assuming it goes into service) will start at around $800 million per year and remain roughly constant over time. The savings in oil resulting from Shoreham's operation will start at around $240 million per year and will rise with rising oil prices.

2. Assuming 7% yearly increases in oil prices, the oil savings from Shoreham's operation will equal Shoreham's annual costs for the first time around the year 2001.

3. Oil savings after 2001 will not be sufficient to pay back Shoreham's "deficits" (excess of costs over savings) from the 1980s and 1990s unless oil prices grow by about 11 percent a year starting in 1985 and continuing indefinitely.

4. Assuming 7% per year increases in oil prices, the lifetime costs of owning and operating Shoreham, discounted to 1984 terms, will be about $3.4 billion more than oil costs in the absence of Shoreham.

5. The lifetime costs of owning and not operating Shoreham will be about $3.1 billion more than the costs of owning and operating Shoreham, if it is assumed in both cases that ratepayers pay all of the investment-related costs.

6. Abandonment of Shoreham without charging ratepayers for most of the investment-related costs will in all likelihood lead to the bankruptcy of Lilco. However, if the combined direct and indirect costs of this bankruptcy to ratepayers (including any investment charges for Shoreham) are less than $3.4 billion, ratepayers will be better off under abandonment than if Shoreham is operated and they are charged fully for it.

7. Conclusions 1 through 4 were arrived at through a number of simplifying assumptions, but they are probably substantially correct, subject to Point #8. Conclusions 5 and 6 required a greater number of simplifying assumptions and are preliminary and tentative.

8. The assumptions used in developing these conclusions appear on the next page, along with a summary table.

Table 1: Costs of Different Shoreham Options

| | |
|---|---|
| 1. No Shoreham -- If Shoreham hadn't been built, and existing oil-fired plants produced Shoreham's likely output of 4.31 billion kWh per year | $5.2 Billion |
| 2. Shoreham -- If Shoreham is completed and operates to produce 4.31 billion kWh per year, and ratepayers pay all costs | $8.6 Billion |
| 3. Shoreham Scrapped, Ratepayers Pay -- Shoreham is completed but not operated, ratepayers pay for it, and existing oil-fired plants produce the 4.31 billion kWh per year | $11.7 Billion |
| 4. Shoreham Scrapped, Ratepayers Don't Pay -- Shoreham is completed but not operated, ratepayers don't pay, and existing oil-fired plants produce the 4.31 billion kWh per year | $5.2 Billion + Unknown Costs of Lilco bankruptcy |

Assumptions

6% annual general inflation

7% annual increases in oil prices

Shoreham is completed on January 1, 1984 at a cost of $3.2 billion

Shoreham operates (or would have operated) at 60% capacity factor for 30 years

Very modest allowances for nuclear waste disposal, decommissioning and repairs

(Other assumptions and data sources are set forth in footnotes on p. 6)

All costs are discounted to 1984 terms @ 9.5% per year

My name in Charles Komanoff. My business address is 451 Broome Street, New York, New York 10013. I am a private, independent researcher-consultant-writer in energy economics, specializing in the economics of electricity, particularly nuclear power.

Over the past decade, I have authored three books concerning the societal and monetary costs of electricity generation. My firm, Komanoff Energy Associates, has performed consultant studies on nuclear power for state government agencies in New York and ten other states including California, Illinois, Florida, Connecticut and New Jersey. I have presented invited testimony on power-generation economics to four Committees of the United States Congress and to the Select Committee on Energy of Great Britain's House of Commons. I have also published articles in technical and scientific journals on subjects ranging from the costs of air pollution control to the origins of regulatory requirements for nuclear power plants.[1]

I'm a native of Long Island and a graduate of the Long Beach public school system. My parents have lived in Long Beach for 35 years, and my mother has represented Long Beach on the Nassau County Board of Supervisors since 1974. Thus, it should not be surprising that during the dozen years in which I've worked professionally in energy policy, I've maintained a close interest in the Long Island Lighting Company and its nuclear power program.

I believe I can claim credit for early and accurate skepticism regarding the economics of Lilco's nuclear ventures. As far back as September, 1974, when Lilco was touting the savings that its Shoreham facility would generate

---

1. A summary of my professional background and experience is attached to this testimony.

for ratepayers I wrote that "Shoreham will cause rates to increase above present levels."[2] In the same letter, I noted that "Shoreham's capital cost is apparently the highest of any generating plant ever built in this country" -- perhaps the first time this all-too-accurate characterization appeared in print -- and I criticized Lilco for failing to reduce its power-demand projections to account for the impact of sharply higher electric rates.

Similarly, in 1979, in an article in Newsday, when Lilco was estimating that Shoreham's cost at completion would be only $1.5 billion, I wrote that "Turning back with a billion dollars already spent will be costly, but another billion may lie ahead -- with no end in sight. Shoreham may be too expensive to complete, and the best way out may be to halt construction and give up the plant."[3] A year later, after Lilco had raised its cost estimate to $2.2 billion, I wrote,

> LILCO says its new $2.2-billion figure allows for new design changes stemming from the Three Mile Island accident. But it will take years for the lessons of TMI to be distilled and fully applied to incomplete plants such as Shoreham. When this is done, the cost will again rise dramatically. Long Islanders will look back wistfully at the current $2.2-billion estimate.[4]

These prophesies may appear trivial today, but they were not so obvious in times past, when few eyes were on Shoreham and Lilco was insisting that completion of the plant lay almost 'round the corner for a mere additional

---

2. The source is a letter which I wrote with my mother to Lilco then-president Charles Pierce, September 24, 1974. The letter was one of several in which we urged Lilco to drop the proposed Jamesport nuclear facility and to redirect the company's investments into energy conservation.

3. Newsday, June 26, 1979,"Shoreham: Time for a Reappraisal."

4. Newsday, June 19, 1980, "Let's Halt Shoreham Work While Seeking True Costs."

half-billion. But it's not for self-aggrandizement that I dredge up these forecasts. The economics of what to do now with Shoreham depend, to a great extent, upon projections of the cost of oil, the rate of repair and maintenance costs for Shoreham, the operating performance of Shoreham, and the demand for electricity on Long Island, among other factors. Assessing the economics also requires framing the analysis in a clear and consistent fashion. As one with a good track record in forecasting Shoreham's costs and in anticipating important trends in the U.S. nuclear and electric utility sectors as a whole, I believe that my observations concerning the costs of different Shoreham options should be accorded particular weight.

At the same time, I would like to do more here than merely offer cost estimates. I want to provide guidelines -- intellectual models, if you will -- to help lawmakers and citizens who are not energy specialists to understand how the costs work in this kind of situation. So I will begin with general observations intended to clarify our thinking about Shoreham's cost impacts before I try to chart what those impacts might be.

Nuclear units such as Shoreham are characterized by high construction costs and relatively low costs for fuel, operation and maintenance (O&M) and repair. Thus, the "investment" cost is high but the "ongoing" costs are low. This does not mean, however, that ratepayers pay most of the costs up-front and realtively little during plant life. Rather, the utility, Lilco, must raise large amounts of money up-front to build the plant. Under normal circumstances Lilco would charge ratepayers over the life of the plant for the funds necessary to fulfill the obligations to bondholders, stockholders and federal, state and local tax authorities that arise from Lilco's investment in Shoreham.

These annual charges to ratpayers to amortize Shoreham will start high and then decline, year by year, as Shoreham is depreciated. Conversely, the cost to Lilco, and hence to ratepayers, for ongoing expenses such as fuel, O&M, and repairs will start low but will rise, partly because of inflation but also because more effort will be required over time to refurbish Shoreham and keep it operating. As a rough approximation, the declines in the amortization and tax charges will be offset by the increases in the charges for fuel, O&M and repairs. Thus, the annual cost borne by ratepayers to pay for Shoreham -- for both the initial investment and the annual operation and upkeep -- will tend to be constant. Again, this is a rough approximation, and one that holds only under normal ratemaking circumstances.

Figure 1, then, shows Shoreham's annual costs in schematic form. On the other side of the ledger, Shoreham's benefits fall into two categories. The first, and larger benefit, is the money saved by displacing fossil fuel, principally oil, which Lilco would have to burn in the absence of Shoreham. That is, Shoreham can be expected to generate a quantity of electricity each year (although the precise amount can only be guessed at and argued over today) -- electricity that the company presently generates with oil. The fuel saved by operating Shoreham in place of these oil-fired plants constitutes a benefit of Shoreham.

The second benefit is the generating capacity conferred by Shoreham. This would ordinarily be a considerable factor, but it presently counts for nothing since Lilco has more than enough capacity to satisfy its customers' electricity requirements. At some point, because of either rising demand or retirement of old facilities, the capacity represented by Shoreham will be useful to Lilco. When this point arrives will depend upon a number of variables, including the rate of growth (or decline) in the use of electricity on Long Island, the availability of capacity from interconnected

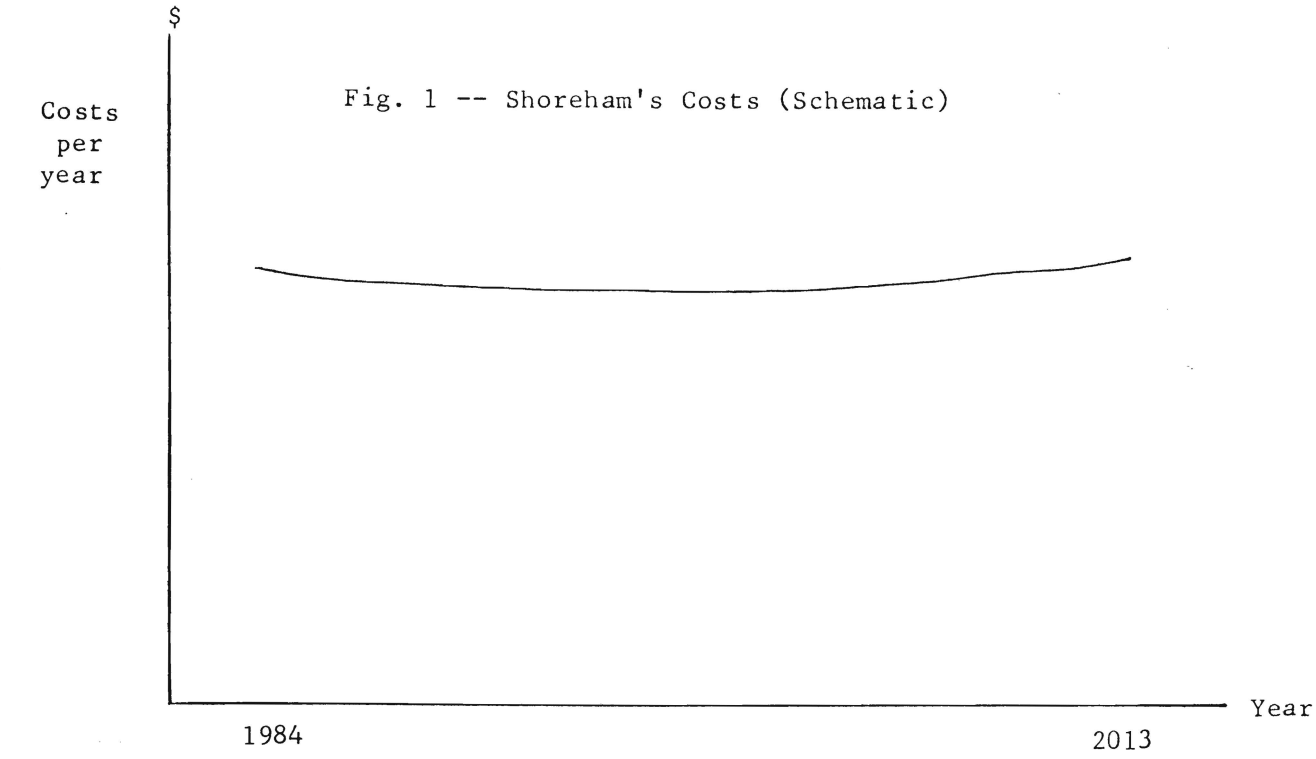



Fig. 1 -- Shoreham's Costs (Schematic)

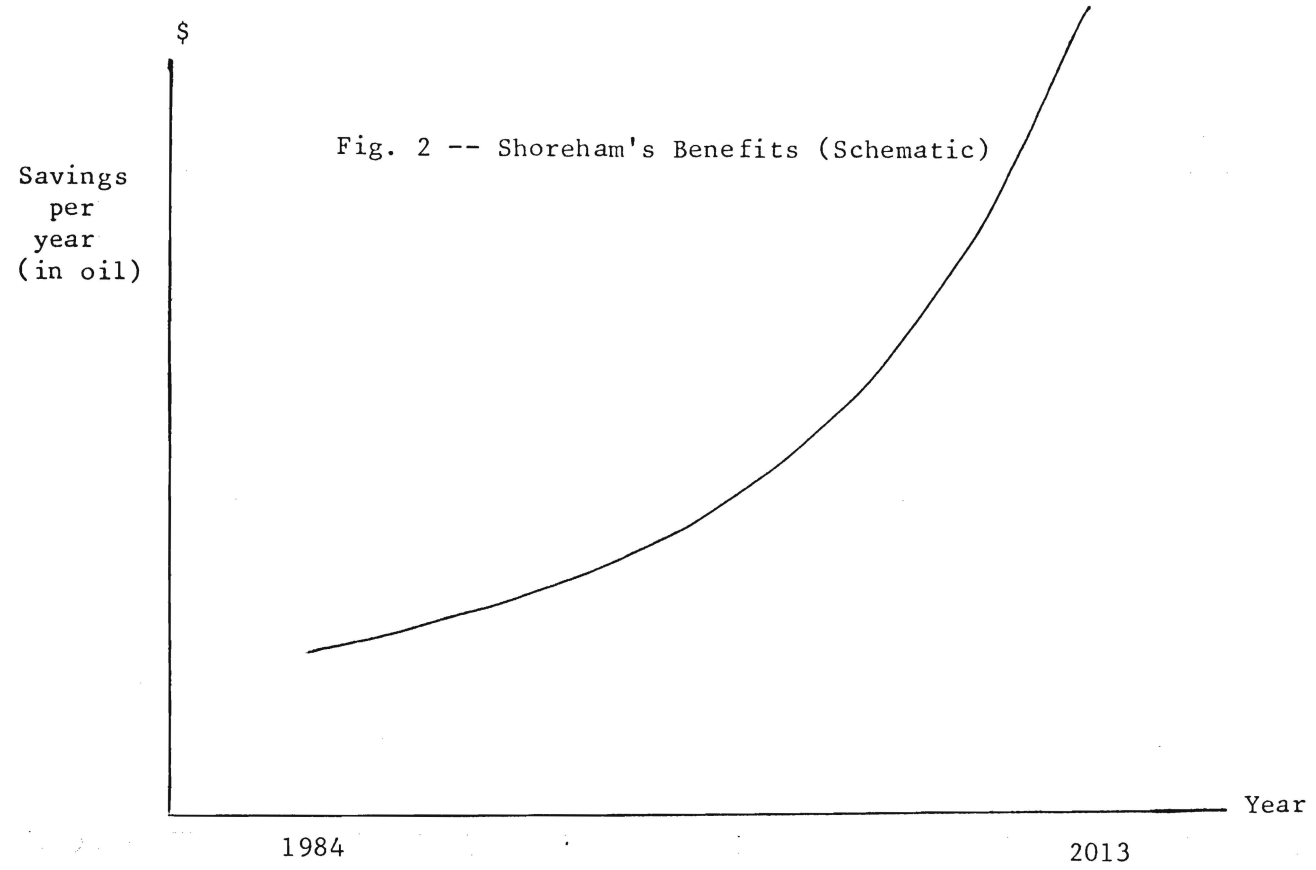



Fig. 2 -- Shoreham's Benefits (Schematic)

utilities, etc. Leaving aside this second, "capacity" benefit, for now, and focusing only on the "fuel-saving" benefit of Shoreham, Shoreham's benefits are essentially a function of the price of fossil fuel, principally oil.[5] If oil rises in price -- which is a pretty safe assumption over the long haul -- the benefits of Shoreham will increase. If the rate of rise is a constant percent each year, such as 7 percent, then the rate of increase in Shoreham's benefits will be "exponential," as shown schematically in Figure 2.

The next step, of course, is to quantify and combine the costs and benefits. Assuming as Lilco does, that Shoreham is completed for a cost of $3.2 billion and that it begins commercial service on January 1, 1984, the costs in the first year will be approximately $800 million —$700 million for amortization, depreciation and taxes, and $100 million for fuel and O&M expenses.[6] The savings in the same year, 1984, will be approximately $240 million, based on current oil prices.[7] Thus, in its first full year

5. Note that Lilco would operate Shoreham whether or not its capacity is "excess" because the operating, or ongoing, costs of Shoreham are less than those of Lilco's fossil-fuel plants.

6. The $700 million cost for amortization, depreciation and taxes is inferred from Column 1 of Exhibit No. 3 (prorated from $3.0 to $3.2 billion) and the "Shoreham Property Tax" Column in Exhibit No. 1, Page 13, using the "1984" entry in both cases, from Testimony of Adam M. Madsen, Lilco's Manager of Engineering, presented in the Shoreham Phase-In Proceeding before the New York Public Service Commission, Case 28252, filed in the fall of 1982. The $100 million cost for fuel and O&M is from the same source, Exhibit No. 1, Pages 9 and 13. All figures are rounded.

7. The $240 million fuel-savings figure was derived as follows: Lilco's average 1982 oil cost, $26.64/bbl, is equal to about $4.35 per million btu. I assume the cost stays constant through 1984 (probably dipping in 1983). Assuming that Shoreham displaces Lilco's more expensive oil, with a cost 10 percent above the average, and assuming a relatively inefficient "heat rate" of 11,000 btu per kWh for the displaced electricity generation, the fuel savings are 5.26¢/kWh. Adding maintenance savings brings the savings per displaced kWh to about 5.5 cents. Further assuming a 60 percent capacity factor, Shoreham's 819,000 kilowatts will generate 4.31 billion kWh per year, implying total savings of $240 million in 1984. The 60% factor is probably conservative in light of the 56% cumulative average through 1982 for the 10 U.S. reactors of Shoreham's design and size (representing 80 plant-years of operation). A further conservatism is the assumption that all savings are in oil, rather than in less expensive purchased power.

of operation, Shoreham will impose a net cost of $560 million upon ratepayers -- $800 million in gross costs minus $240 million in savings. Insofar as Lilco's annual revenues from sales of electricity are now about $1300 million, the new, additional cost of $560 million implies a cumulative rate increase of 40 to 50 percent ($560 million divided by $1300 million). This is the "rate shock" phenomenon we've all heard about during the past year.

These numbers seem to me relatively fixed; or, if not, to be more likely to change against than for Shoreham. The uncertainty begins as we try to project into the future. Insofar as the annual costs of Shoreham will be relatively constant[8], the uncertainty resides in the rate of growth in benefits. Here I will again follow Lilco and assume that oil prices rise by 7 percent per year starting in 1985 -- an assumption based in turn upon expected 6 percent annual inflation in the economy as a whole and 1 percent "real" increases in oil prices relative to general inflation.

We can now calculate the important quantity known as "turnaround time" -- the length of time required for Shoreham's annual costs and benefits to be equal. The result is 18 years. That is, assuming that oil prices grow by 7 percent a year, it will take 18 years for the benefits of Shoreham (measured only as fuel savings, and leaving aside, for now, the benefit of extra capacity) to grow to the point where they equal the annual costs of $800 million. Assuming plant operation starts in 1984, turnaround time would occur in the year 2001. This is shown in Figure 3.

Note that Shoreham will not have "broken even" vis-a-vis oil costs by the year 2001. Rather, it will only have reached equality with oil <u>for that year</u>, after 17 years of costing ratepayers more than continued use of oil would have cost. For Shoreham to fully break even with oil, it must

8. This can be seen by examining the annual costs projected for Shoreham by Lilco in the testimony noted in Note 6.

Fig. 3 -- Shoreham vs. Oil, Turnaround Year

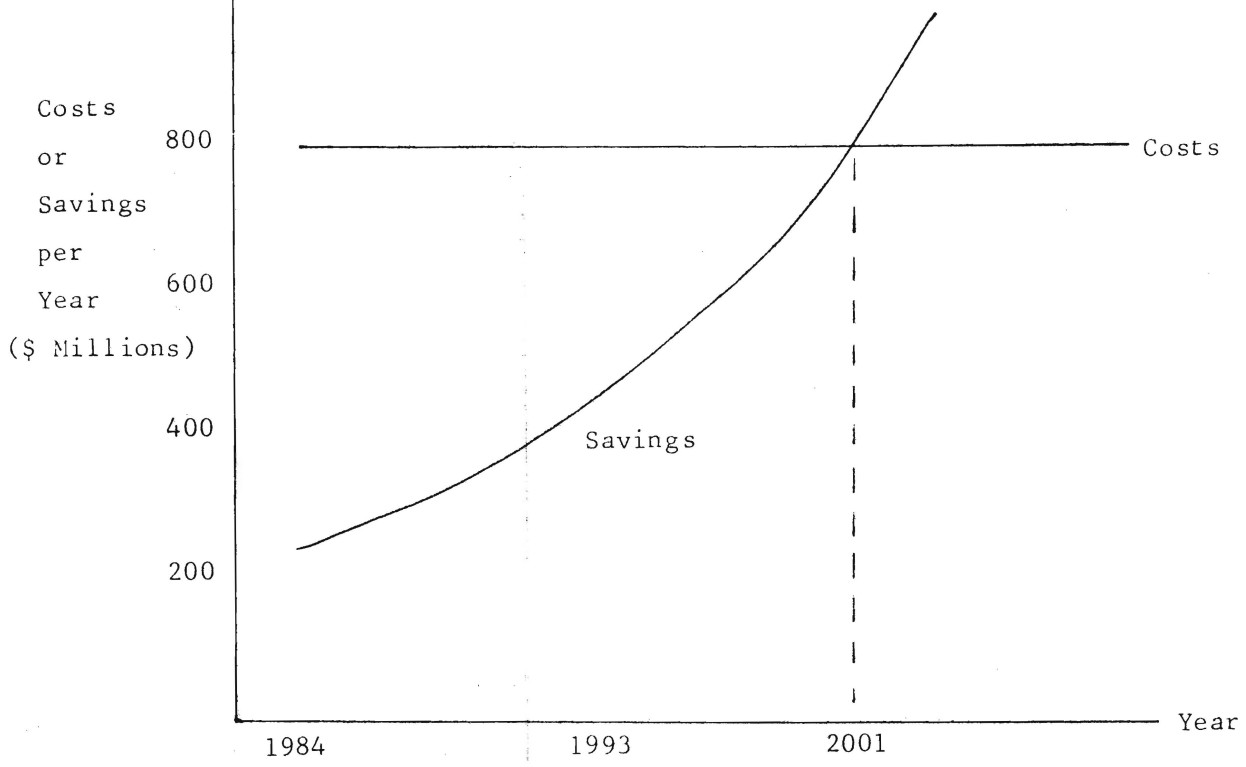
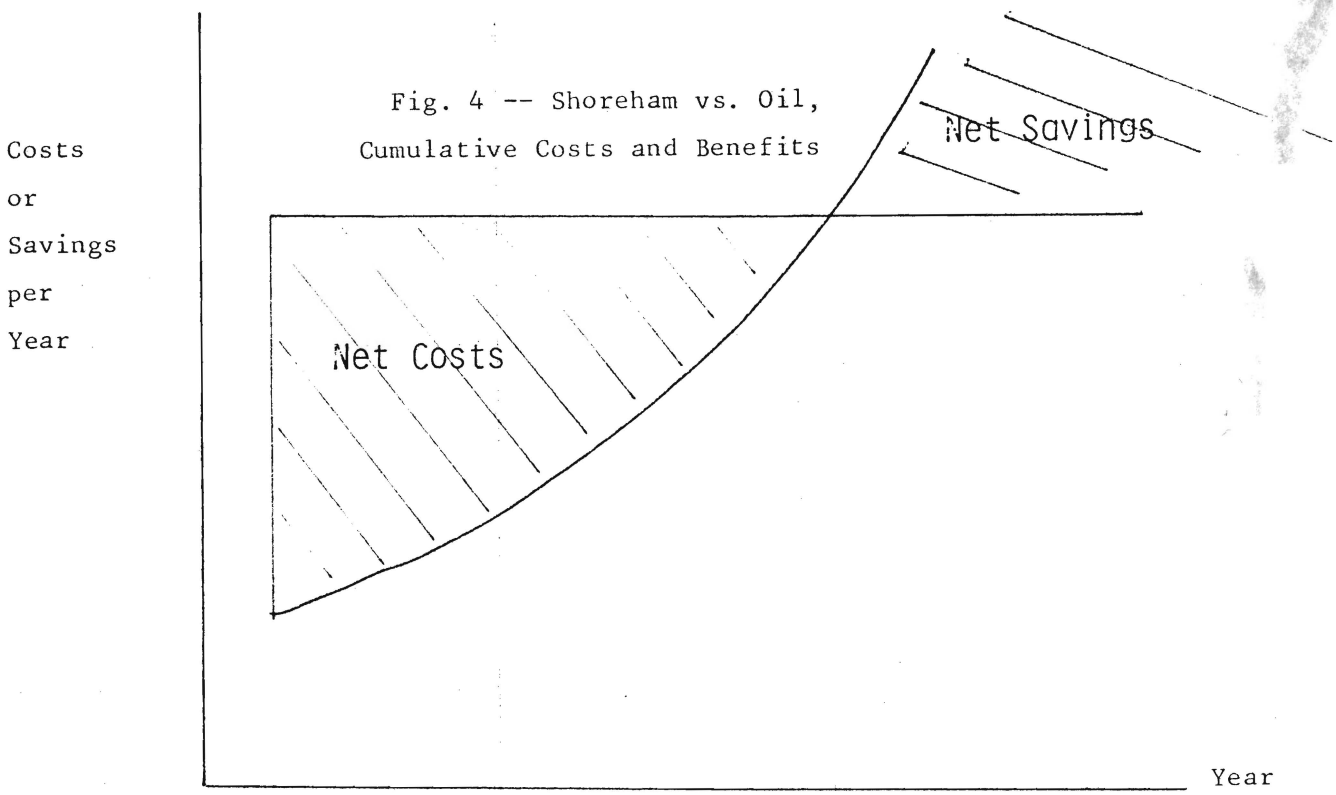



Fig. 4 -- Shoreham vs. Oil, Cumulative Costs and Benefits



save large sums of money for many years after the turnaround year of 2001, in order to offset the large costs incurred prior to 2001. This is shown in Figure 4.

To calculate how far Shoreham must go past the year 2001 to reach its breakeven point, one would like to simply find, in Figure 4, the year in which the "savings" area to the right of 2001 equals the "costs" area to the left of 2001. However, such a comparison must account for differences in the value of dollars spent and received in different years. Because people value money in hand more than money gained in the future, dollars saved by Shoreham after the year 2001 will not be as valuable to ratepayers as dollars expended on Shoreham prior to 2001. To sum up the costs incurred and the benefits conferred by Shoreham in different years, we must "discount" all of the dollars to a common reference point. The closer to the present that a cost is incurred, the more weight it will receive in the overall sum. The further in the future a benefit is conferred, the more it must be discounted or shrunk, to make it comparable to present dollars.

Discounting is the standard way to measure and combine costs occurring over time. It is used especially widely in the utility industry, which is constantly performing calculations spanning long time horizons. (It was by reading Lilco's analyses of power plant costs in the Jamesport proceeding in 1974 and 1975, that I first became acquainted with discounting methodology.) Yet Lilco does not discount in its public calculations of the costs and benefits of Shoreham. Lilco counts the dollars Shoreham will save customers in the next century as equal in value to the dollars it will cost them in the 1980s and 1990s, when inflation and consumers' preference for money today over money tomorrow will actually make each of those far-off dollars worth only about a dime in today's terms. Lilco's widely publicized estimates of

$10 to $20 billion to represent Shoreham's net savings over its lifetime are, accordingly, a fraud.[9]

What discount rate is appropriate for comparing costs and benefits over different years? In my calculations here I've assumed a 9.5% discount rate, based on 6% inflation and an assumed "real" cost of capital of 3 to 4 percent (i.e., assuming that interest rates would be 3-4% in the absence of inflation, reflecting the long-term average return on capital, net of inflation). With this assumption and the others stated previously concerning Shoreham's cost and the rate of increase in oil costs, one can calculate that, "discounted to 1984," ratepayers will pay a total of about $8.6 billion over the life of Shoreham, both to pay off the investment cost and to keep the plant running for 30 years (again, this assumes normal rate-making treatment). Shoreham's savings, measured as the value of the oil it will displace, total $5.2 billion, also discounted to 1984. Thus, Shoreham's net costs, measured vis-a-vis the continued operation of existing oil-fired plants, and discounted to 1984 terms, are $3.4 billion ($8.6 billion minus $5.2 billion).

This means that Shoreham will be so costly to consumers between 1984 and 2001 that it will not save enough between 2001 and 2013, the year in which it is expected to be retired, to offset its prior costs. Of course, one could hypothesize that Shoreham will operate past 2013, but based on the foregoing assumptions it would need to run for 60 additional years for the discounted accumulated oil savings to pay back the investment and operating costs. Based on experience with other nuclear plants, the assumed 30-year life is speculative, let alone 90 years.

These conclusions -- that Shoreham's annual costs will exceed the

---

9. Strong language, yes, but Shoreham's economics are difficult enough without Lilco deliberately adding to the confusion. This point is developed further in my Newsday article, "Lilco's Owners Should Share the Burden," January 11, 1983. The dime figure in the text is a rough average of the discounted value of a dollar received 20 years from today (16¢) and 30 years (7¢), assuming a discount rate of 9.5% as used in the text, below.

annual savings until the year 2001, and that the discounted lifetime costs will exceed the discounted lifetime savings by about $3.4 billion -- rest upon many assumptions, the key one of which is that oil prices rise 7 percent a year (based on a 6 percent overall rate of inflation). Table 2 shows different results based on different assumptions. It shows that oil prices must rise by about 11 percent a year in order for Shoreham to break even with continued use of oil.

Several factors are missing from this analysis. The most important is the value of Shoreham's capacity. Although Shoreham's generating capacity isn't needed now, it is reasonable to expect that at some time, probably in the 1990s, Shoreham's 819 megawatts of rated capacity would be necessary to help Lilco meet user demand. At some point, then, if Shoreham hadn't been built or if it does not operate, Lilco would need to build a new generating facility, probably coal-fired, to provide those megawatts. Since Shoreham would defray the need to build such a facility, its cost should be counted in Shoreham's benefits.

Although I haven't counted those costs, I've excluded several other factors that help balance out this omission. First, if a coal-fired plant were to be built in lieu of Shoreham, then the value of the fuel saved by Shoreham would have to be measured in terms of coal, which is less expensive (and hence less valuable) than oil. Second, by starting the analysis in 1984 I've omitted the several hundred million dollars ratepayers will have paid for Shoreham since the late 1970s, when the Public Service Commission began permitting Lilco to charge its customers for a small percentage of Shoreham's "Construction Work In Progress." I've also adopted Lilco's assumptions concerning Shoreham's operating life (30 years) and the costs of waste disposal and decommissioning. Although I haven't calculated the net effect of these factors, correcting them would probably trim no

Table 2: Shoreham vs. Oil -- Costs and Breakeven Conditions

All figures assume 6% general inflation rate, plant completion on January 1, 1984 for $3.2 billion, a 60% capacity factor, and a 30-year plant life. Costs are discounted to 1984 @ 9.5% per year.

1. Total Cost to Own and Operate Shoreham to Produce 4.31 billion kWh per year . . . . . $8615 Million

2. Total Cost for Oil in Lieu of Shoreham (i.e., Shoreham's Savings)

| Annual Increase in Oil Prices | Total Cost for Oil (in Millions) | Turnaround Time (to get equal annual costs) | Breakeven Time (to get equal lifetime costs) |
|---|---|---|---|
| 6% | $4700 | 21 Years | ** |
| 7%* | 5250 | 18 " | 91 Years |
| 8% | 5950 | 16 " | 54 " |
| 9% | 6750 | 14 " | 41 " |
| 10% | 7700 | 13 " | 34 " |
| 11% | 8800 | 12 " | 29 " |

* This is the oil-price increase rate assumed in the testimony.

** Indicates that Shoreham could never break even with oil price rises of only 6% per year, regardless of operating lifetime. This is because present benefits of far-future oil savings would be vanishingly small.

Note: Changing the assumed capacity factor from 60% to 70% has approximately the same effect on turnaround and breakeven times as adding one percentage point to the oil price increase rate.

more than $1 billion, and probably considerably less (if anything), from the net cost of $3.4 billion calculated above. That is, adding these factors to the calculations would probably still leave Shoreham costing at least $2.4 billion, net, in dollars discounted to 1984.[10]

These figures show that barring very rapid increases in fossil fuel prices - far higher than Lilco and virtually all other authorities predict -- Shoreham is a very bad deal for Lilco's ratepayers.[11] And this conclusion is reached by comparing Shoreham against what is obviously a "second worst case" -- continued use of oil -- rather than against a better case which assumes that investments were made in energy conservation or coal-fired facilities during the 1970s so that oil use could have been reduced starting in 1984 without the use of Shoreham.

To be sure, Lilco would argue that this type of analysis is irrelevant because, by counting all costs from scratch, it assumes no money has been spent on Shoreham. I disagree, for two reasons. First, in evaluating today's options concerning Shoreham, it is important to understand the project's total worth. Second, although close to 3 billion dollars has been spent on Shoreham (and, according to Lilco, $3.2 billion will have been spent by the end of the year), the question of who pays this cost is very much up for grabs. The rest of my testimony is concerned with exploring this uncertainty and the ramifications for Lilco and its ratepayers.

But first we must develop one more number: the amount of Shoreham's lifetime cost that represents obligations on sunk costs, as opposed to the

---

10. If the analysis presented here is pursued further, it would be highly desirable to include these factors. Time constraints rather than any judgment as to their importance caused me to exclude them here.

11. My analysis does not incorporate any "phase-in" or "rate moderation" assumptions because these are irrelevant to the net discounted cost of Shoreham. Any moderation of rate increases related to Shoreham in the 1980s can be accomplished only by additional Lilco borrowing that will raise rates in the 1990s or later by equal (discounted) amounts. The lifetime rate impact of Shoreham may be thought of as a bubble. Squeezing the bubble can alter its shape (i.e. its distribution over time) but will not reduce its volume (i.e., the total burden).

amount that represents future, and thus discretionary, expenditures. I would guess -- and it is only a guess -- that of the $8.6 billion estimated total cost to own and operate Shoreham over its anticipated life (as calculated above, discounted to 1984 terms), about three-fourths, or $6.5 billion, represents obligations -- amortization, depreciation, and taxes -- on the capital cost. The other one-fourth, or about $2.1 billion, would represent future, hence avoidable, expenditures for fuel, operation and maintenance, repairs, and decommissioning.[12]

This assumes that Shoreham goes into service and ratepayers are obligated to pay all of the costs pertaining to the plant's construction. I now want to suspend these assumptions and examine the consequences for Lilco's ratepayers and the Company.

If Shoreham does not operate, ratepayers will have to spend $5.2 billion for oil or other fuels over the 30-year period in which Shoreham would have generated electricity. Additionally, if Shoreham does not operate, ratepayers will have to spend some amount, ranging from zero to $6.5 billion, to pay Lilco for the investor and tax obligations that under normal circumstances, Lilco would charge over the life of the plant to pay for its $3.2 billion investment in Shoreham. If ratepayers pay the full amount of $6.5 billion, then their total payments in this context are $11.7 billion ($6.5 billion to pay for the obligations on the construction cost, plus $5.2 billion to pay for the oil-fired generation needed in lieu of Shoreham). If ratepayers pay none of the $6.5 billion, then their total payments are only the $5.2 billion for the fuel. If ratepayers pay about half of the $6.5 billion, or $3.3 billion,then their total payments are $8.5 billion -- $3.3 billion in construction cost obligations, and $5.2 billion

---

12. I must stress again that this division of costs into sunk and discretionary is a rudimentary, rough guess. The precise figures should be calculated before this analysis is used further, since the true division could be very different from what I've assumed here.

for the fuel in lieu of Shoreham.[13]

The latter figure, $8.5 billion, is essentially the same as the $8.6 billion total cost calculated earlier to own and operate Shoreham over its life (assuming ratepayers pay all of the obligations on the construction cost). Accordingly, if Shoreham is not operated and at the same time ratepayers can avoid paying for about half of the future obligations on the assumed $3.2 billion construction cost, then ratepayers will be, roughly, neither better nor worse off than if Shoreham is operated and ratepayers must pay all of the obligations on the construction cost.

Of course, Lilco and its investors would be far worse off under such an outcome. In fact, it seems certain that Lilco could not survive the revenue shortfall implied in permitting ratepayers to pay only half of the future capital cost-related obligations on Shoreham. The shortfall to Lilco in that circumstance would be in the neighborhood of $3 to $3½ billion, equivalent to roughly 15 years worth of common stock dividends. Needless to say, omitting the dividend for 15 years would destroy virtually the entire value of Lilco's common stock, prevent the company from raising any new funds, and bankrupt Lilco in either practical or legal terms or both. Any ameliorative tax consequences in that situation would probably make little material difference. Similarly, even if bondholders were willing to reduce, defer or forego their interest entitlements for a period of years, Lilco would almost certainly be too damaged to continue functioning as an investor-owned entity. Although I am not expert in these matters, I would guess that any outcome in which roughly a quarter or more of Lilco's

---

13. I regret not casting these numbers in terms of percentage increases in consumer rates, but such figures are difficult to calculate on a 30-year basis and are outside the scope of this testimony. First-year rate impacts are simple to compute, but these put the nuclear side in a misleadingly bad light (since fuel-saving benefits of Shoreham are lowest in the first year) that far overstates the average impact over the life of the plant.

obligations on Shoreham's construction costs are not recovered from ratepayers, probably implies the demise of the Long Island Lighting Company.

Nevertheless, it does not follow that we can't consider whether it is desirable to shield ratepayers from a large share of Shoreham's cost. Bankruptcy of Lilco does not mean terminating the production and distribution of electricity to Long Island. Nor does it mean that Lilco's thousands of employees are replaced by new employees, or that existing generation and transmission facilities are ripped out and replaced by new (and more expensive) ones. It does not even mean that local municipalities and school districts which presently receive payments from Lilco through property taxes will necessarily cease receiving such payments. (The court-appointed trustees who would manage the affairs of the bankrupt Lilco could, and presumably would, continue to include an allowance allocable to property taxes in rates charged for electricity).

In short, a Lilco bankruptcy does not imply anarchy. There would be electricity for all customers, but it would not be free. It is possible that electricity woul continue costing about what it costs today, and that local governments would continue realizing the same tax revenue from the sale of electricity. In effect, Long Island might be in the "No Shoreham" option, wherein ratepayers pay only for the continued use of oil and Lilco's investors are left with the cost obligations arising from Shoreham's expended costs. That is, the moneys that were expected to be paid by ratepayers to Lilco's bondholder and stockholders, would not be paid. The bonds and stocks would be worthless.

Now, I am not in a position to say that bankruptcy would look like this. Quite possibly, ratepayers might be forced, through a political or judicial outcome, to assume some or even all of Lilco's obligations to investors. Alternatively, to the extent that some (many?) of the investors live on

Long Island or nearby, any loss of dividend or interest income would have an impact on the Long Island economy. In addition, Long Island could expect to have to pay a premium for funds raised in capital markets for years to come. But leaving aside these latter two uncertainties, it appears, as a rough approximation, that if Shoreham doesn't operate and ratepayers pay only half of the obligations related to the construction cost, they will be no worse off than if Shoreham operates and they must pay the full obligations. Moreover, if ratepayers pay none of the obligations, then it would appear that they could absorb considerable impacts through the loss of local investment income and the deterioration of credit ratings and still emerge better off than if Shoreham operates and they must pay the full costs.

I will say once more that these conclusions are preliminary and tentative. The calculations need refining, and, more importantly, the implications of a Lilco bankruptcy must be thought out further -- considerably further. I offer these observations in the hope of providing an appropriate analytical framework for the Shoreham debate. I believe the figures I have generated in doing so are reasonable, first-order approximations.

To debate meaningfully, we must also be realistic. No one is going to bail out both the ratepayers and Lilco. Either rates will go up by more than they would have without Shoreham, or Lilco will go down, or some combination of the two. Neither Albany nor Washington will come to the rescue -- there are too many other troubled utilities, and not enough money. Paying for Shoreham means big rate increases, and giant ones if Shoreham is paid for and doesn't operate. Conversely, not paying for Shoreham might spare ratepayers, but it means that Lilco goes out of business, with as-yet unknown consequences. Citizens and the legislature must explore these possible consequences together to make the best determination of what's best for Long Island.

Charles Komanoff

# KOMANOFF ENERGY ASSOCIATES

451 BROOME ST 11th FLOOR NYC 10013

Charles Komanoff is a consulting economist, author and director of Komanoff Energy Associates in New York City. He is internationally recognized as an expert on the U.S. electric power sector, particularly on the changing economics of nuclear and coal power generation and the effects of those changes on the electric utility industry.

Over the past decade, Komanoff's work has anticipated, chronicled and explained the major developments in the nuclear and coal sectors and the larger energy scene as a whole: the environmental problems of coal-fired electricity, the nuclear safety controversy, the rising costs and disappointing performance of nuclear reactors, the increased cost of electricity generation, and the transformation of electric utilities from healthy growth to financial crisis. His work is distinguished by attention to actual cost trends, based on costs as they are, not as they have been idealized to be. Komanoff's data base of current U.S. nuclear plant costs, for example, is the most comprehensive of its kind.

Because of his attention to empirical data and his excellent track record in projecting future cost trends and industry developments, Komanoff is continuously sought after by the financial and technical press. He is regularly quoted in publications such as The New York Times, The Wall Street Journal, Nucleonics Week, Science, and Barron's, among many others. In recent years, Komanoff has probably been the most widely quoted student of nuclear power economics in the United States.

Since 1976, Komanoff has been retained by State governmental agencies in eleven states as a consultant and expert witness in regulatory proceedings concerning the economics of nuclear and coal-fired electricity. These agencies include public utility commissions, energy commissions, attorneys general, and consumer protection agencies in California, Connecticut, Florida, Idaho, Illinois, Kentucky, New Jersey, New Mexico, New York, Washington, and Wisconsin - states with a combined population of more than one-third of the entire United States. Komanoff has also served as a consultant to the General Accounting Office and the Office of Technology Assessment, both of which are agencies of the U.S. Congress. He has presented invited testimony before four Committees of the U.S. Senate and House of Representatives and before the Select Committee on Energy of the House of Commons, U.K.

Komanoff is author of three major books on the monetary and social performance of the U.S. electric power industry: The Price of Power: Electric Utilities and the Environment, published by the Council on Economic Priorities (CEP) in 1972 and the M.I.T. Press in 1974; Power Plant Performance: Nuclear

and Coal Capacity Factors and Economics, published by CEP in 1976; and Power Plant Cost Escalation: Nuclear and Coal Capital Costs, Regulation, and Economics, published by Komanoff Energy Associates in 1981 and Van Nostrand Reinhold in 1982.

Komanoff's books have been influential in the decade-long U.S. debate over the costs and benefits of nuclear power and coal. The Price of Power (1972) compared the environmental performance of the U.S. electric power industry with the current state-of-the-art, and demonstrated that the power industry as a whole was failing to implement available emissions-control technology and lagging in developing advanced control devices. Many of the recommendations in The Price of Power, such as the development of "baghouse filters" for coal-fired plants and pooling of pollution-control research, have since been implemented by the utility industry.

Power Plant Performance (1976) was the first systematic study of nuclear and coal plant operating reliability, based on empirical examination of plant performance and an analysis of engineering and safety constraints on plant productivity. The study's major conclusions - that power plants grow less reliable with increasing size and that large nuclear plants should be expected to average only 55% capacity factor - inspired detailed rebuttals by the federal government and the utility industry. But the actual large-reactor performance record since 1976 - averaging exactly 55% - has confirmed Komanoff's projection.

Komanoff's 1981 book, Power Plant Cost Escalation, was the first systematic analysis of increases in both regulatory stringency and capital costs for nuclear and coal power in the U.S. The book examined the actual capital costs of all U.S. nuclear and coal plants completed during 1972-78 to measure -- for the first time -- industry-wide rates of cost increase. It demonstrated that capital costs have increased primarily to accommodate new regulatory requirements designed to reduce the environmental and safety risks of electric power generation. It also developed a theory of the origination of new nuclear regulatory standards that was published as an article in Nuclear Safety (a scientific journal published at Oak Ridge National Laboratory under the sponsorship of the Department of Energy and the Nuclear Regulatory Commission). Other chapters of the book were published in the Journal of the Air Pollution Control Association and in Public Power. Sales of Power Plant Cost Escalation to reactor manufacturers, architect-engineers, oil and natural resource companies, consulting engineers, and electric utilities in 25 countries on every continent have exceeded $50,000.

Komanoff also consults frequently for environmental and other public-interest organizations. His 1982 prepared testimony and oral arguments for the Natural Resources Defense Council helped persuade the Nuclear Regulatory Commission to deny the request by the Department of Energy for a licensing exemption for the Clinch River Breeder Reactor. Komanoff's 1973-77 analyses of the economics of Consolidated Edison's Storm King plant for the New York City Environmental Protection Administration and the Scenic Hudson Preservation Conference were instrumental in leading to the settlement terminating that project.

In addition to the journals listed above, Komanoff has published articles on energy issues in The New York Times, the New York Review of Books, Newsday, the Los Angeles Times, the St. Louis Post-Dispatch, the Bulletin of the Atomic Scientists, Public Utilities Fortnightly, and New York Affairs.

Prior to his 1974-76 work for the Council on Economic Priorities and his launching Komanoff Energy Associates in 1977, Komanoff was senior quantitative analyst for the New York City Environmental Protection Administration during 1972-74 and a research fellow for CEP in 1971-82. Komanoff was graduated from Harvard College with honors in Applied Mathematics in 1968. He was born and raised in Long Beach, NY, and has lived in New York City since 1968.