

RELATED CORRESPONDENCE

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD  
Before Administrative Judges:  
James P. Gleason, Chairman  
Frederick J. Shon  
Dr. Oscar H. Paris

DOCKETED  
3/31/83

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In the Matter of :  
CONSOLIDATED EDISON COMPANY OF NEW YORK, :  
INC. (Indian Point, Unit No. 2) :  
POWER AUTHORITY OF THE STATE OF NEW YORK :  
(Indian Point, Unit No. 3) :  
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Docket Nos.  
50-247 SP  
50-286 SP  
April 12, 1983

POWER AUTHORITY'S TESTIMONY OF CHARLES R. DEAN,  
HAROLD M. HOCHMAN AND PAUL H. RUBIN ON COMMISSION  
QUESTION 6.3

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# TESTIMONY ON THE ECONOMIC CONSEQUENCES OF CLOSING INDIAN POINT

## I. Introduction and Plan of Testimony.

This testimony addresses part of Commission Question 6 which asks:

What would be the energy, environmental, economic and other consequences of a shutdown of Indian Point Unit 2 and/or Unit 3?

The Power Authority of the State of New York (Power Authority) hereby presents a panel of witnesses to address the economic consequences of closing Indian Point Units 2 and 3.

Harold M. Hochman is a Professor of Economics and Director of the Center for the Study of Business and Government at Baruch College of the City University of New York, and Former Director of Studies in Urban Public Finance at the Urban Institute, Washington, D.C. He has lectured and written extensively in the areas of public sector economics and urban economics.

Charles R. Dean is an economic consultant who has worked on energy matters with the U.S. Department of Energy, and has testified in a number of hearings and court cases.

Paul Rubin is a professor of Economics and a Research Associate at the Center for the Study of Business and Government at Baruch College of the City University of New York. He is a specialist in law and economics, a subject on which he has published extensively.

Qualifications of the witnesses are included as an attachment to this testimony.

This testimony focuses exclusively on the economic consequences of closing the Indian Point units. The increases in production costs attributable to closing the plants have been projected by Eugene Meehan and Sally Streiter. We treat these cost estimates as givens in making our calculations, and deal only with their consequences. Similarly, the direct effects of increased operating costs for the New York City Transit Authority resulting from higher electricity costs have been discussed in the testimony of Frederick Dunbar; while our testimony builds on his work, it does not repeat it.

The first part of our testimony examines the effect of closing the Power Authority's Indian Point Unit 3 on the customers of the Power Authority in Southeastern New York (SENY). In the second part of the testimony we examine some general effects of closing both of the Indian Point units (Con Edison's as well as the Power Authority's) on the SENY economy. If these two lower cost sources of electricity were closed, all purchasers of electricity in SENY would pay higher prices. If this cost increase were spread over all SENY electric consumers, the relative percentage increase would obviously be smaller than it would be if the increase were limited to the direct customers of the Power Authority, but the effects would be more pervasive. In both parts of the testimony, we trace the primary and secondary effects of the price increase on the SENY economy.

In our testimony we deal with the overall effects of the increase in cost rather than on the particular rate or rates

that would be charged. Closing the Indian Point units means that more resources will be needed to produce the electricity used in SENY. Consequently, the suppliers (the Power Authority and Con Edison) will have to adopt some method of recouping these costs. While particular estimates of the effects of closing the Indian Point units are associated with particular assumptions about how costs will be recouped and customers will respond, we believe that the magnitude of the effects would remain very much the same if the additional costs of generation were recouped in different ways.

## II. Effects of Closing Indian Point on Power Authority Customers

### A. Alternative Sources of Energy for Power Authority Customers

Closing Indian Point 3 will result in a significant reduction of the generating capacity of the Power Authority in SENY. However, the Power Authority has additional capacity in the New York metropolitan area in the form of an oil-and-natural-gas-fueled plant in Queens (its Charles Poletti plant, formerly called Astoria 6), and substantial capacity in upstate New York. Aside from its nuclear plant in Oswego (the James A. FitzPatrick unit) the upstate capacity is primarily hydroelectric and pumped storage. The Authority also owns high voltage transmission lines that allow it to import electricity from Canada.

Power Authority customers in SENY are served primarily by the Indian Point 3 and Poletti plants. Other Power Authority



generating capacity is earmarked for specific upstate customers. If both Indian Point 3 and Poletti were operating at planned capacity, production from the two plants would not only be sufficient to supply the needs of the SENY customers of the Power Authority, but to provide net sales to Con Edison.

Ms. Streiter has examined the effects of closing Indian Point on the cost of electricity to Power Authority customers. Her testimony, which builds on the work of Mr. Meehan, assumed the adoption of the least-cost means of obtaining generating capacity to replace the low-cost nuclear capacity of Indian Point. It did not, however, identify how Con Edison and Power Authority costs would be transferred to customers.

Since the shutdown of Indian Point would entail a real resource cost, it is clear, from a social perspective, that the community will have to bear the net production cost penalty. Very likely most of the burden will be borne by electricity users in SENY, including customers of the Power Authority and the people they serve. However, the actual division of this burden among electricity users is uncertain and depends on factors beyond the scope of this testimony.

We shall assume that the Power Authority will retain all of its present customers, and that these customers will bear the full brunt of the identified production cost penalties. (These represent what we believe to be the full monetary cost of closing Indian Point, so far as Power Authority customers in SENY are concerned). The responses of the Power Authority customers (as well as Con Edison customers, discussed in

Part III) to the increase in electricity rates will determine the effects of closing the Indian Point unit on the SENY economy.

It must be recognized, of course, that some customers of the Power Authority might not be willing to pay rates as high as those implied by the production cost penalties and would, therefore, switch to alternative suppliers. If, for example, the Power Authority set its new rates at the level that would prevail if Poletti were its only SENY source of generating capacity, and if the capacity of Poletti were sufficient to supply the SENY customers that were to remain with the Power Authority rather than switching to alternative suppliers, the distribution of the burden of closing Indian Point would be different. To society, however, the overall cost of closing Indian Point would be no smaller. Some part of the production cost penalty would be transferred to other customers, either in SENY or in another part of the state. Even the Power Authority customers that switch to alternative suppliers would bear, at least in part, the burden of closing Indian Point, since rates charged by these alternate suppliers would be higher than those now paid to the Power Authority.

B. Impact of Closing Indian Point on Power Authority Customers

Exhibit 1 presents our calculation of the expected increase in the average cost of electricity associated with closing the Indian Point units. The table reflects the forecasts of Con Edison and Power Authority sales and prices for the period

1984-1990, plus the production cost penalties presented by Ms. Streiter in her testimony. For 1984, the overall cost increase for the Con Edison service area is somewhat more than 8 per cent, requiring an increase of \$453 million in the combined revenues of Con Edison and Power Authority. Over the seven years from 1984-90 the average cost increase is 6.2 per cent.

Not all consumers of electricity in SENY will face the same rate increases. In particular, those which now obtain electricity from the Power Authority will face a greater cost increase than the customers of Con Edison. The Con Edison cost increase averages 3.4 per cent from 1984 to 1990 and the Power Authority cost increase averages 23.7 per cent over the same period. These averages do not recognize that the range of Con Edison's prices is wider than the Authority's. The comparison between large users of Con Edison electricity and Power Authority customers (most of whom are large users) would be less extreme. However, these figures do indicate the average revenue increases that will be necessary if the Indian Point units are closed and both Con Edison and the Power Authority are to break even.

Exhibit 2 shows the sales in kilowatt hours to the major customers of the Power Authority since 1978. The largest customers are New York City and the Metropolitan Transportation Authority; in 1982 New York City used 32 per cent of the Power Authority's energy and the MTA used 35 per cent. The other major users were the New York City Housing Authority (13 per cent) and the Port Authority of New York and New Jersey (11 per

cent), with a variety of smaller customers accounting for the balance.

We now consider the likely effects of such a cost increase on the behavior of each major Power Authority customer. In examining the change in cost to each major customer, past usage has been used, as noted above. This usage is the basis for attributing the production cost penalty projected by Ms. Streiter to the various customers of the Power Authority.

In this part of the analysis it is assumed that the customer's use of electricity will not change -- that the price elasticity of the demand for electricity of the various Power Authority customers is effectively zero. To the extent that this assumption is not true, the effects will be somewhat smaller. That is, to the extent it is possible for Power Authority customers to reduce consumption, the net monetary effects would be less than the zero elasticity assumption would imply. However, efforts at reducing consumption also have costs. Such reductions would require capital investment. Even though such investments would reduce the cost somewhat, cost increases would still leave customers worse off than they were before.

#### Metropolitan Transportation Authority

The MTA buys electricity from the Power Authority for all of the major transportation facilities it operates. Exhibit 3 shows purchases of electricity for the major users within the

MTA. The principal user of electricity is the New York City Transit Authority (NYCTA), the operator of the New York City subway system. In 1982 the NYCTA used about 83 per cent of total MTA electricity. The Long Island Railroad and Metro North (formerly Conrail) each used about 7 per cent. The Triborough Bridge Authority, Staten Island Rapid Transit, and New York City bus facilities used the rest. Our analysis will focus primarily on the NYC Transit Authority.

Mr. Dunbar has provided estimates of the major effects of the increased cost of electricity on MTA ridership. We rely on his estimates of the nature and size of these increases. Mr. Dunbar has estimated that the 6 cent fare increase needed to cover the higher costs of electricity would cause a nearly 3 per cent decline in ridership. This translates into a decrease in employment of 11,400 in the MTA service area, because this number of current riders would stop using subways to get to work and would not substitute any other method of transport. Mr. Dunbar also found that the number of riders lost would be greater if the MTA were decrease service rather than increase the fare. For our estimates we assume that the MTA uses the more efficient method of adjustment to the higher electricity costs, that is, the course of action that minimizes the job loss.

The loss of 11,400 jobs would not be distributed equally among income groups. The data in Exhibit 4 show the number of people, classified by income and alternative methods of getting to work in the New York metropolitan area in 1970, the most

recent year for which both income and ridership data are available. (Similar data from the 1980 Census will not be available until later this year.) The columns of data by specific income class show the percentage of people in the income class using each method of transport. (For example, 18.4% of those with income less than \$2,999 use buses.) The number in each class can be used, with the percentages, to compute the number of riders by mode in each income class. (Thus, 18.4% times 137,241 indicates that 28,941 persons with incomes below \$2,999 used the bus.)

From Exhibit 4 we see that lower income persons (which we take to be those with incomes below \$6500, remembering that these are 1970 incomes) are more likely to use public transportation (bus or subway) than are those with higher incomes. Thus, while 63 percent of those with incomes under \$6500 used public transportation, only 30 per cent of those with incomes over \$25,000 did so. (The 63% is calculated by computing the number of persons with incomes below \$2,999 who use "Bus" and "Subway or Elevated" as a mode of transport, and the number of persons with incomes between \$3,000 and \$6,499 who use these modes of transport, then summing these two figures to obtain a total of 430,182. There are 684,155 persons in these two income classes, that is, 157,291 plus 526,864. 63% is the ratio of 430,152 to 684,155. The 30% for those with incomes over \$25,000 is simply the sum of 9.2% and 21%.) If the job loss that results from the fare increase is distributed across all income classes in direct proportion to ridership, we



would expect the share of those who lose their jobs and are in the lower income category to be greater than the proportion of lower income workers in the economy generally. Mr. Dunbar's estimate of an employment decrease of 11,400 would then translate into 2,575 jobs lost by low-income workers. (In other words, 22.5% of the jobs lost are lost by low-income persons, but such persons comprise only 17.7% of the labor force in New York.) As a result of this loss in jobs, New York City would lose \$34 million in tax revenues.

In fact this figure probably underestimates the actual impact of the fare increase on low income persons, as we expect such persons to be much more likely to lack the means of access to higher cost substitutes. That is, Mr. Dunbar's estimate of lost ridership as a result of higher fares is broken down into those who would use other methods of transport and those who would stop travelling to work; this latter group is what he estimated to be 11,400 persons. We would expect the poor to be disproportionately represented in this group; the non-poor who stop commuting by subway would be more likely to shift to some alternate method of transport. This conclusion is based in part on studies of the elasticity (responsiveness) of demand to changes in transit fares. Such studies indicate that, in New York City, the elasticity of demand with respect to a fare increase is greater in lower than in higher income groups. (William Lassow, "Effect of the Fare Increase of July 1966 on the Number of Passengers Carried on the New York City Transit System", Transportation Research Record, #213, 1968).



Moreover, as is the case with the effects on other Power Authority customers, the job loss of 11,400 would also have secondary effects. These would occur as those who lose their jobs reduce their consumption and their former employers reduce their purchases of complementary inputs; producers of the goods and services such persons would have purchased would also lose their employment. These effects are discussed later in this testimony.

#### New York City

New York City is the second largest customer of the Power Authority in SENY. It used about 32 per cent of the energy sold by Power Authority to public customers in the region during 1982.

Exhibit 5 indicates the uses of this power. Sixty-eight per cent of New York's power is used in public buildings; 22 per cent is used for street lighting; 9 percent for sewage treatment; and other uses constitute the remaining one per cent. For the City, the direct cost increase associated with closing Indian Point 3 is expected to average \$68 million per year for the 1984-90 period. This estimate, it should be pointed out, does not include cost increases that might be passed on to the City by other customers of the Power Authority (the MTA, NYCHA and the Port Authority).

To adjust to the higher rates the City must either increase taxes or reduce public services, given the requirement that it balance its budget. If it were to respond to the rise in the

cost of energy through taxation, the City could increase its revenues in many different ways. The necessary revenue, could be raised, for example, through increases in the income, sales, or property tax, or by adjusting any or all of a variety of business taxes it imposes.

Local property, sales and income taxes are deductible in computing federal income tax liabilities and federal income tax rates are distinctly progressive (increase with income). Therefore, it is unlikely that the net burdens of the increments in New York City taxes will be progressive (increase with increases in income) and, indeed, quite conceivable that they will be mildly regressive (decrease with income). In other words, it is not reasonable to argue that the burden of the production cost penalties transmitted through the tax structure of New York City will be concentrated among individuals at the upper end of the income distribution.

The increase in energy costs may be met through cuts in public spending instead of tax increases. The impact of this policy can be illustrated by some simple examples, assuming that the expenditure reduction is concentrated in a decrease in expenditures on personnel. In FY 1983 it is estimated that the City of New York will employ approximately 180,000 persons and have a payroll of approximately \$7.5 billion, including not only direct payments for wages and salaries but also spending on pensions and fringe benefits. These estimates were derived from several sections of the NYC Executive Budget. These imply an average expenditure per full time employee of more than \$42,000.

Thus, a \$68 million decrease in personnel expenditures implies a reduction of 1,620 jobs. If we assume that these reductions occur in the major uniformed services, the estimated employment reductions are 1,315 positions in the Fire Department, or 1,660 in the Police Department, or 1,930 in the Sanitation Department.

The actual effects on jobs lost in New York would be greater than this estimate. For example, as workers are laid off, they reduce their spending on goods and services and their employers reduce expenditures on other inputs. Some of those who would have provided these goods and services would then lose their jobs. The cumulative result is a "multiplier" effect on jobs lost. Conservative estimates of this multiplier, in the range of 1.5 to 2, imply that the sum of the direct and indirect reductions in employment in New York City as a result of spending decreases needed to finance the increase in the cost of electricity would be at least 2,500 jobs, divided between the public and private sectors.

Additional employment effects would occur within both the government and the private sectors as a result of power cost increases that other Power Authority customers could shift to the City (discussed below.) The Port Authority could reduce lease payments for airports by \$15 million (see below). Moreover, if 11,400 jobs are lost (as Mr. Dunbar estimates) as a result of MTA fare increases, City revenues would fall by an additional \$34 million. These indirect effects could add \$49 million to the cost to New York City of closing Indian Point 3,

requiring additional taxes or layoffs (which would produce their own multiplier effects). If the City decided to finance this revenue loss by reducing public employment, another 1,150 jobs (somewhat more than 800 as a result of the effect of MTA rate increases and 350 as a result of the reductions of revenue from the Port Authority lease payments) could be added to our estimate of 1,620, making the total job loss 2,720.

It must be noted that all of these estimates should be treated with caution. They are order of magnitude estimates, not exact forecasts. Nonetheless, they do indicate that closing Indian Point 3 would have a significant impact on the government and the economy of New York City.

#### New York City Housing Authority (NYCHA)

As indicated in Exhibit 2, the NYCHA used 13 per cent of the power sold by the Power Authority in SENY in 1982. To the NYCHA the increase in the cost of electricity caused by closing Indian Point 3 would be \$27.5 million per year over the 1984-90 period. Since the total income of NYCHA is \$812 million, this would represent a 3.4 per cent increase in NYCHA costs.

Individual units of housing operated by NYCHA are not metered. Thus, even though costs of electricity would increase, tenants would have no market incentive to reduce electricity consumption. Therefore, the only way the Housing Authority could reduce consumption in response to the higher price would be through Authority-wide projects aimed at this goal. Even if such savings were to occur, the total costs of

NYCHA would increase as a result of the increased electricity costs attributable to closing Indian Point 3.

Residents of housing units controlled by NYCHA are subsidized by the federal, state, and local governments. The federal subsidy in 1981 was \$417 million; the state subsidy was \$28 million; and the local subsidy was \$34 million. The result of an increase in electricity costs would be an increase in required subsidies of \$27.5 million, to be distributed among federal, state, and local taxes in some proportion. If this distribution were the same as that of current subsidies, the costs would be \$24 million for the federal government, \$1.6 million for the state government, and \$1.9 million for New York City.

#### Port Authority of New York and New Jersey

The Port Authority used about 11 per cent of Power Authority electricity in SENY in 1982. As a result of closing Indian Point 3, its annual costs would increase by about \$23 million. Exhibit 6 shows the amounts of electricity used by the facilities operated by the Port Authority.

The Port Authority resells much of the electricity it buys from the Power Authority. Most of the electricity is used at Kennedy and LaGuardia Airports (Newark Airport is not in the Con Ed service area) and at the World Trade Center. The tunnels, bridges, and piers use a relatively small proportion of the electricity. At the airports and World Trade Center the Port Authority sells the electricity to the airlines and

tenants on a metered basis for their direct use and on a pro-rated basis for general usage (landing lights and similar facilities at the airports, elevators and corridors at the World Trade Center); most of it is sold on a metered basis. (The rates these customers pay exceed Power Authority rates because the Port Authority must recover its costs of distribution.)

The Port Authority can shift some of its increased costs to New York City by reducing its rental payments for the airports. Under the terms of its leases, it can shift as much as 65 per cent of the projected \$23 million increase in its power costs in this way. Thus, as discussed above, \$15 million might be passed on to the City.

#### Other Customers

New York State, Westchester County, and subdivisions within Westchester County also purchase electricity from the Power Authority, and would therefore incur similar price increases. In direction, the effects would be the same as for New York City; increased costs would require either tax increases or service decreases or some combination of the two.

The production cost penalty that would have to be covered, in the aggregate, by increases in the rates paid by these jurisdictions is about \$19 million per year over the period 1984-90. It is reasonable to assume that the secondary effects of tax increases or expenditure reductions undertaken to finance this increase in the cost of energy would be roughly



proportional to those we have calculated for New York City. In other words, as a result of the cost increases these jurisdictions must meet, we would expect that employment (direct and indirect) would fall by approximately 450. (This result is based on the fact that the \$19 million increase in the cost of electricity here is just over one-fourth of the \$68 million increase for New York City; the expectation of a loss of 1,620 jobs in New York City translates into a job loss of 450 here.)

To this, of course, we must add most of the 400 operating jobs at Indian Point 3. We assume that a similar number of Con Edison jobs at Indian Point 2 would be lost. Moreover, the counties and communities surrounding the Indian Point plants would lose property taxes and payments in lieu of property taxes that they now receive from Con Edison and the Power Authority, respectively.

#### Summary of Part II

If Indian Point 3 were closed, the Power Authority's customers in downstate New York would see increases in the cost of electricity in the approximate range of \$210 million per year. This figure approximates the average of the production cost increase for the years 1984-1990. The major burdens would fall on its two largest customers, the MTA and New York City. The MTA would probably raise fares by about 6 cents per ride, leading to a 3 per cent decrease in ridership. New York City would be forced to raise taxes or reduce spending in order to



pay an additional \$68 million for the direct extra cost of electricity, without considering any secondary or indirect effects. The Port Authority would need to raise an additional \$24 million, though some of this increase could be passed on to New York City, requiring the City to raise additional revenue.

The direct effects of closing Indian Point 3 on increased costs of electricity of Power Authority customers and the direct and indirect effects on employment of their responses to this cost increase on an annual basis are summarized in the following table.

<u>Power Authority Customer</u>	<u>Cost Increase</u> (\$ millions)	<u>Employment Effect</u>
New York City	\$67.6	1,620 *
Metropolitan Transportation Authority	<sup>4</sup> 76.0	11,400 800 **
New York City Housing Authority	27.5	-
Port Authority	23.2	350 ***
All Others	<u>19.1</u>	<u>450</u>
Total	\$211.4 ****	14,800

- \* Direct and indirect effect
- \*\* Indirect effect on NYC
- \*\*\* Possible indirect effect
- \*\*\*\* Average of Power Authority production cost penalty 1984-90

### III. Overall Effects of Price Increase

In this part of our testimony we will examine the effects of an increase in electricity prices caused by closing the Indian Points units on the SENY economy. We are concerned with

pay an additional \$68 million for the direct extra cost of electricity, without considering any secondary or indirect effects. The Port Authority would need to raise an additional \$24 million, though some of this increase could be passed on to New York City, requiring the City to raise additional revenue.

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<u>Power Authority Customer</u>	<u>Cost Increase</u> <u>(\$ millions)</u>	<u>Employment Effect</u>
New York City	\$67.6	1,620 *
Metropolitan Transportation Authority	74.0	11,400 800 **
New York City Housing Authority	27.5	-
Port Authority	23.2	350 ***
All Others	<u>19.1</u>	<u>450</u>
Total	\$211.4 ****	14,800

\* Direct and indirect effect

\*\* Indirect effect on NYC

\*\*\* Possible indirect effect

\*\*\*\* Average of Power Authority production cost penalty 1984-90

### III. Overall Effects of Price Increase

In this part of our testimony we will examine the effects of an increase in electricity prices caused by closing the Indian Points units on the SENY economy. We are concerned with

the general effects throughout the economy of higher prices for electricity, rather than with effects on particular industries. The assumption is that closing these two plants will lead to a general increase in the price of electricity.

As a general rule, changing any one price of a good or service has widespread and pervasive implications. This is true even for prices of goods with narrow uses. The effects of a change in the price of electricity will be extremely pervasive since it is used in so many ways. The effects occur because of changes in consumer and producer behavior. We discuss each of these sectors, and provide some information about electricity usage in the New York economy. Finally, we present estimates of the general economic effects of a change in electricity prices for SENY. Those estimates are derived with the help of an econometric model of the regional economy developed from the well-known Wharton Economic Forecasting model.

#### Consumer Response Levels to Price Increases

To increase their utility (benefits or satisfaction) levels, consumers adjust their consumption to relative prices. This means that a change in the price of any good can have impacts on consumption of all other goods. Moreover, goods are "complements" or "substitutes" on the basis of relationships between them. Complements are goods consumed together (such as beer and pretzels); substitutes are goods like coffee and tea. Thus, when the price of any good increases, consumption of other goods will also change, with consumption of substitutes increasing and consumption of complements decreasing.

Therefore, changing the price of any one good will have effects throughout markets for all other goods in the economy.

For electricity, which is used in conjunction with many other goods, these effects would be extremely important. Electricity is both a complement (to water heating, air conditioning, and most rotating machinery) and a substitute (for oil, natural gas, and other fuels, but also for insulation and longer lasting light bulbs). Electricity is used in cooking, so that changing the price of electricity will have effects on the demand for various types of food. Electricity is used in watching television, so that a change in its price could have impacts throughout the entertainment industry. Changes in electricity prices will thus have definite impacts on the economy.

Moreover, each of the changes in the demand for goods will have impacts in other markets. In particular, as the demand for some goods decreases, some of those employed in production of those goods will lose their jobs, while there will be increases in employment in other industries in which demand has increased. If, however, the triggering event is an increase in the price of some good attributable to an increase in the cost of a resource required for its production, we know that the real incomes of consumers will be reduced and therefore the net effect will be a reduction in employment.

#### Producer Response to Price Increases.

Just as consumers combine many goods in order to maximize utility (satisfaction), so producers combine many inputs in

order to produce outputs. Moreover, producers choose inputs on the basis of relative price as well as technology. Energy in the form of electricity is an input into the production process.

When the price of an input changes, several effects follow. First, producers use relatively less of that input and relatively more of other inputs. Even though at any one time it may appear that technology determines the mix of inputs used, this mix is generally variable and is sensitive to changes in relative prices. Thus, one effect of an increase in the price of electricity would be the substitution of other inputs for energy. Second, an increase in the price of an input will lead to an increase in the price of goods using this input intensively, and thus a reduction in amounts of these goods demanded. As a result, less of the input will be used because less output will be produced.

Where an increase in the price of an input is localized, there is another important effect, because production is geographically mobile. Simply put, when the price of one input such as electricity is higher in one region than in another, production processes which use this input intensively tend to shift to other locations. Moreover, in the situation with which we are now dealing, this effect is likely to be important, because the price increase would affect SENY but not the rest of the country. If those industries which use electricity more intensively than others are given further reason to leave the New York area, further damage to its economic base will result.

Given that electricity prices have historically been higher in New York than elsewhere, we would expect that many industries would have already moved from New York. Certainly, this has been the case for manufacturing, which now accounts for only a small fraction of value added in New York City. Presumably, the industries which remain are those for which electricity prices are not significant or for which prices of other inputs are low enough to compensate for the high electricity prices. Nonetheless, further increases in electricity prices would clearly lead to some further migration of industries and firms from New York to other locations. This is because adjustments to economic variables such as higher prices are never all or nothing; rather, such adjustments are always more or less, and when the price of something increases, use of that input decreases.

The industries most likely to be affected by the closing of the Indian Point plants are those manufacturing industries that tend to be more dependent on electricity. The manufacturing industries that are the largest volume users of electricity in the New York SMSA are those shown in Exhibit 7. This exhibit also shows the price paid for electricity for each of the SIC groups and the comparable price paid in New York State and in the nation. Prices paid for electricity in New York City are higher than in the rest of the state and about twice as high as in the country as a whole.



### Econometric Results

Because of the complex nature of responses to price changes, it is extremely difficult to measure the total impact of such price changes without an econometric model. Such a model is a system of simultaneous equations, describing basic economic relationships which show linkages among various economic sectors, so that the inter-relationships among the variables are captured.

To illustrate what might happen to the SENY economy if the Indian Point Units were closed, Exhibit 8 presents econometric estimates of the effects of an increase in the price of electricity of 5 per cent, for the period from 1984 through 1992. Five per cent was selected because it approximates the increase in the cost of Con Edison electricity. To the extent that the actual increases are lower (See Exhibit 1), the impacts will be commensurately smaller. The results represent incremental changes in a baseline forecast of the New York economy prepared by the Wharton Econometric Forecast Associates, Inc. This model is based on a Wharton econometric model for the New York region and has been adopted to show the impact of changes in electricity costs.

For present purposes, the forecast values generated by the model hold no particular interest. What is of interest in the kind of structural analysis in which we are engaged is the change in the forecast values that would be produced by a change in one particular variable, the price of electricity.



We are therefore demanding much less of the model than economists do when they use models of this sort to forecast the economy. Since we are dealing only with changes from a baseline forecast, our results are less sensitive to changes in parameters than they would be if we were attempting to forecast the future. This is because changes in parameters would affect the baseline and the forecast in the same manner, leaving the net changes unaffected.

The outcome of the simulation exercise is summarized here: In each year beginning with 1984, employment in New York City will be reduced by approximately 5,000--as compared with what it would be if there were no increases in the cost of electricity. These are not cumulative losses, increasing year by year, but continuing. There would be a ten-year cumulative loss of 48,400 man-years of employment. Value added, a measure that reflects income generated in the area, would be reduced in New York City by \$160 to \$726 million each year (from 1984 to 1992, in current dollars with Wharton's inflation rate of about 5.7%) as a result of the increase in the cost of electricity. About 80 per cent of the decline in employment would be concentrated in the non-durable manufacturing, wholesale and retail trade, and service sectors of the New York economy.

The econometric model does not separately consider Westchester County apart from a group of counties called the Northern suburbs (Bergen, Rockland, and Putnam as well as Westchester). The model results indicate that employment reduction in these suburbs (as a group) will be about 1,500 per year assuming the 5 percent increase in the cost of electricity.

The effect on the Northern suburbs (as a group) amounts to about 35 percent of the effect on New York City, and the Department of Commerce reports that aggregate payroll figures for Westchester County (the only part of the Northern Suburbs that interests us here) amount to 45 percent of payrolls in the Northern suburbs. Thus, it is reasonable to project that employment in Westchester County will fall by 700 per year, with a ten-year cumulative loss of 7,000 man-years. Value added in Westchester will fall by about \$22 million to \$56 million in each year (from 1984 to 1992, in current dollars).

Thus, it is our belief that the effects of closing the Indian Point plants on the SENY economy, operating through the change in the price of electricity, either as an input to production or as a consumer good, would be significant. Several thousand persons would lose their jobs and would be forced to find other sources of income or leave the region.

Moreover, because the econometric model itself does not take into account the responses to electricity rate increases of the government units that are the SENY customers of the Power Authority, the "general" effects it estimates do not duplicate the particular economic effects of closing Indian Point 3 that we reported in Part II.

#### IV. SUMMARY OF TESTIMONY AND CONCLUSIONS

We have presented several statistical estimates of the effects of closing the Indian Point plants on the regional

economy. At this point it may be worthwhile to step back and put our conclusions in perspective.

The first and most important conclusion is that closing these plants will impose a real resource cost on the economy of at least \$400 million per year (the average production cost penalty associated with closing Indian Point). Residents of SENY will be forced to give up this amount of goods and services to pay the added cost of electricity; they will be poorer to this extent. This is where we start.

Second, the cost of shutting Indian Point will not be distributed evenly or equitably among persons in the region. The major identifiable group which loses more than the average are subway and bus riders. Electricity costs are a major component of the operating costs for the Transit Authority. Users of public transportation must pay about \$75 million, about one fifth of the total cost of closing Indian Point, leaving \$325 million to be paid by others.

Users of public transport tend disproportionately to be relatively low income persons. Nevertheless, they would pay roughly twice as much as the average. The other \$325 million would not, of course, be borne equally by all citizens in the region. Much of it would be reflected in increased taxes, since New York City would be forced to pay about \$68 million more for electricity. The burden of such taxes is unlikely to be progressive and could be regressive, depending on the way in which the City chooses to finance its additional tax bill. Moreover, the various adjustments that would occur throughout

the economy would lead to the loss of thousands of jobs; clearly, those who lose their jobs would pay more than their proportionate share of the cost of closing Indian Point.

In addition, the economy of the area may also suffer other losses. If electricity users in SENY reduce their consumption of goods and services other than electricity, these reductions would be reflected in a decrease in economic activity. The extra cost of electricity will lead to payments, in substantial measure, to energy producers outside New York City, such as oil exporting countries and electricity exporting countries (Canada). The decrease in expenditures on goods and services other than electricity will largely be reflected (through a multiplier process) in decreased income within the area.

In this testimony we have examined the costs of closing Indian Point and have found that these costs are real and they will not be shared equally by persons living in the area.

Exhibit 1. ELECTRICITY COST INCREASES IN THE CON EDISON SERVICE AREA  
WITH INDIAN POINT SHUTDOWN (Current Dollars)

Year	Revenue in \$ millions			Net Shutdown Cost Penalty					
	Without Indian Point Shutdown			\$ millions			Percentages		
	Con Edison	Power Authority	Area	Con Ed	NYPA	Area	Con Ed	NYPA	Area
1984	4600	729	5329	210	243	453	4.6	33.3	8.5
1985	5000	782	5782	184	221	405	3.7	28.3	7.0
1986	5300	839	6139	150	213	363	2.6	25.4	5.9
1987	5600	901	6501	146	159	305	3.1	17.6	4.7
1988	5900	967	6867	184	183	367	3.1	18.9	5.3
1989	6200	1038	7238	217	208	425	3.5	20.0	5.9
1990	6500	1114	7614	243	153	496	3.7	22.7	6.5

Sources:

1. Con Edison revenues supplied from Con Edison revenue forecast model.
2. New York Power Authority from the 1983 forecast supplied by the Authority.
3. Net shutdown penalty costs, in current dollars, from Streiter Testimony, Table 4.

Exhibit 2. POWER AUTHORITY SALES, BY CUSTOMER (from "Monthly Comparison")  
(Millions of kilowatt hours)

	<u>1982</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>
MTA	2,260.8	2,261.0	2,125.9	2,161.6	2,141.6
Port Authority	690.3	681.3	664.7	642.4	657.0
NYCHA	853.9	856.9	867.1	839.6	821.4
New York City	2,064.9	2,022.9	1,990.1	1,955.0	1,915.3
NY State	229.3.	213.2	206.5	203.8	162.5
Westchester County	90.3	79.5	77.4	68.8	60.2
West. Municipals	172.3	168.0	173.1	170.8	170.8
West. St. Lights	<u>58.9</u>	<u>57.8</u>	<u>57.0</u>	<u>57.1</u>	<u>54.1</u>
TOTALS	6,422.0	6,341.7	6,162.6	6,100.0	5,983.2

Sources:

1. Energy Ledger "Eng. Tab" of 3/17/83, the Power Authority of the State of New York, except for streetlight data in New York City figures and Westchester streetlights.
2. Streetlight data from Streetlighting Energy Ledger, "Strlgt", 3/11/83, The Power Authority of the State of New York.

Exhibit 3. METROPOLITAN TRANSPORTATION AUTHORITY PURCHASES OF ELECTRICITY  
FROM THE POWER AUTHORITY, BY USE  
(millions of kilowatt hours)

	<u>1982</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>
NYC Transit Authority	1,879.3	1,890.9	1,762.1	1,801.1	1,788.5
NYC Bus Facilities	14.5	13.8	13.6	14.1	13.6
Staten Island Rapid Transit	15.4	15.1	16.7	13.2	13.1
Triborough Bridge & Tunnel Authority	52.2	53.5	52.7	52.6	54.7
Long Island RR	160.1	156.1	156.5	155.8	158.5
Metro-North	<u>139.2</u>	<u>131.5</u>	<u>124.4</u>	<u>124.2</u>	<u>113.3</u>
TOTALS	2,260.8	2,261.0	2,125.9	2,161.6	2,141.6



Exhibit 4. INCOME CLASSES & MODE OF TRANSPORTATION IN NEW YORK CITY

	<u>Income Classes</u>						
	<u>Under \$2,999</u>	<u>\$3,000 -6,499</u>	<u>\$6,500 -9,999</u>	<u>\$10,000 -14,999</u>	<u>\$15,000 -19,999</u>	<u>\$20,000 -24,999</u>	<u>Over \$25,000</u>
Private Auto	13.9%	14.9%	25.9%	34.4%	36.4%	37.7	41.2%
Bus	18.4	19.4	16.2	13.7	12.9	12.0	9.2
Subway or Elevated	36.7	45.8	42.2	36.8	33.6	30.3	21.0
Railroad	1.7	1.3	2.3	4.7	8.2	1.2	17.1
Taxi	1.3	0.9	0.9	0.8	0.8	1.1	2.6
Other	28.1	17.7	12.6	9.7	8.3	7.6	8.9
TOTALS	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number in Class	157,291	526,864	745,265	1,044,054	651,348	328,675	393,550

Source: Special run of 1970 Census data for the Tri-State Regional Planning Commission.

Exhibit 5. NEW YORK CITY PURCHASES FROM THE POWER AUTHORITY  
(millions of kilowatt hours)

	<u>1982</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>
Public Buildings	1,405.1	1,359.9	1,329.3	1,305.9	1,298.0
Electric Heating in Schools	9.5	10.5	10.5	10.8	10.2
Sewage Treatment	194.8	198.4	199.8	190.2	157.3
Street Lights	<u>455.1</u>	<u>454.1</u>	<u>450.4</u>	<u>448.1</u>	<u>449.8</u>
TOTALS	2,064.5	2,022.9	1,990.0	1,955.0	1,915.3

Exhibit 6. PORT AUTHORITY PURCHASES FROM POWER AUTHORITY, BY USES  
(millions of kilowatt hours)

	<u>1982</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>
LaGuardia, Kennedy Airports & Bus Terminal	383.2	390.5	393.7	392.2	404.7
Lincoln and Holland Tunnels	47.2	42.8	37.0	33.3	32.8
World Trade Center	259.6	247.6	233.7	216.6	219.2
Other	<u>0.3</u>	<u>0.3</u>	<u>0.3</u>	<u>0.3</u>	<u>0.3</u>
TOTALS	690.3	681.2	664.6	642.3	656.9

Exhibit 7. PRICES OF ELECTRICITY, NEW YORK CITY, NEW YORK STATE,  
AND THE U.S., FOR SIC MANUFACTURING INDUSTRIES THAT ARE  
LARGE USERS OF ELECTRICITY IN THE NEW YORK SMSA

SIC Code	Industry Name	Usage in NYC SMSA (mill.kwh)	Price (cents per kwh)		
			NYC	NYS	U.S.
23	Apparel, other textile prod.	618.9	8.42	7.59	3.26
27	Printing and publishing	517.7	8.04	7.02	4.62
20	Food and kindred products	462.6	7.78	5.06	3.87
28	Chemicals and allied prod.	444.3	6.12	2.38	2.94
34	Fabricated metal products	342.0	7.31	4.84	4.30
26	Paper and allied products	322.9	6.84	4.00	3.05
30	Rubber, misc. plastic prod.	317.4	7.47	4.93	3.97
33	Primary metal industries	247.6	7.47	4.93	2.58
39	Miscellaneous manuf. ind.	246.3	7.43	5.70	4.72
22	Textile mill products	239.5	7.77	6.13	3.26
35	Machinery, not electrical	219.1	7.17	4.01	4.12
37	Transportation equipment	200.0	8.00	4.83	4.02

Source: Fuels and Electric Energy Consumed 1980 Annual Survey of Manufactures,  
U.S. Bureau of the Census M80(AS) 4.1 and 4.2.

EXHIBIT 8: ESTIMATED EFFECTS OF A FIVE PERCENT ELECTRICITY PRICE  
INCREASE ON EMPLOYMENT AND VALUE ADDED IN SOUTHEASTERN NEW YORK 1984-1992

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
Employment (000)									
New York City	3414.5	3406.1	3415.0	3439.8	3465.6	3482.4	3499.7	3531.7	3564.8
Westchester	<u>391.7</u>	<u>389.0</u>	<u>387.9</u>	<u>389.8</u>	<u>392.8</u>	<u>395.5</u>	<u>398.9</u>	<u>403.6</u>	<u>407.2</u>
Total Area	3806.2	3795.1	3802.9	3829.6	3858.4	3877.9	3898.6	3935.3	3972.0
Employment Loss (000) with 5% price increase									
New York City	4.3	4.3	4.3	4.2	4.2	4.2	4.2	4.1	3.9
Westchester	<u>.7</u>	<u>.7</u>	<u>.7</u>	<u>.7</u>	<u>.7</u>	<u>.7</u>	<u>.7</u>	<u>.7</u>	<u>.7</u>
Total Area	5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.8	4.6
Value Added Loss (\$ million in current year values) with 5% price increase*									
New York City	161	271	497	419	501	559	587	654	726
Westchester	<u>31</u>	<u>22</u>	<u>35</u>	<u>50</u>	<u>38</u>	<u>59</u>	<u>62</u>	<u>62</u>	<u>49</u>
Total Area	192	293	532	469	539	615	645	716	775

Source: Special run of Wharton New York Econometric Model for this  
testimony provided by William Lawrence of Sociometrics, Inc.

\* Rate of inflation, derived from Wharton Model, varies from 5.0 to 7.5 percent over  
forecast period.

## R E S U M E

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### Education

S.B. Harvard College 1945  
Ph.D. (economics) Columbia University 1960

### Experience

1980-1981

Deputy Director, Interim Synthetic Fuels Office, Office of the Under Secretary, Department of Energy. Administration of fast-track interim synthetic fuels program of the DOE prior to start-up of the U.S. Synthetic Fuels Corporation. The position involved working with the Director to organize the DOE's resources to provide financial assistance to commercial scale synthetic fuels production; to develop transition policy, program guidance, provide programmatic integration and to serve as operations manager. Also served as coordinator with the states affected by synthetic fuels projects.

1977-1980

Sobotka & Company, Inc. Consulting research on public policy questions primarily in the fields of energy, environment, and transportation. Projects included:  
...economics of synthetic fuels industry  
...reconciling economic growth and clean air goals  
...effects of national energy plan on specified industries  
...construction of a database for the U.S. petrochemical industry  
...exempt agricultural trucking as a model for deregulating the trucking industry.

1974-1977

Free lance consulting. Projects included:  
...an incentive discharge grant for parents of foster children  
...health task force of the Community Council of Greater New York  
...possibility of vouchering the subsidy to post secondary education in New Jersey  
...reorganization of Health Department in West Virginia

1972-1974

Staff Economist. Comprehensive Health Planning Agency for the City of New York.



1971-1972

Director, Office of Policy Research, Human Resources Administration, City of New York  
...set up office, hired personnel, planned and supervised initial studies, including contracts with the Rand Institute

1962-1971

Contract economic research mostly through consulting firms. Since 1965 through C.R. Dean Economics, Inc. Some of the completed studies:

...for Planned parenthood/World Population establishment of an evaluation research unit; supervision of initial studies; participation in the establishment of a nation-wide family planning information system.

...for the National institute of Child Health and Human Development and National Association of Pediatric Department Chairmen  
two national inventories of the inputs, outputs, and funding of pediatric departments of medical schools

...for the Department of Defense  
productivity of Army recruiters  
analyses of specified military pay incentives  
issues in military retirement pay

...for the Ford Foundation  
a development chartbook for those countries receiving development assistance from the Foundation  
Staff economist for a review committee to examine the adequacy of graduate training in the U.S. for economists from less developed countries

...for New York Airways  
probability of a helicopter crash between the East River and the Pan Am building

...for the New York Housing Authority  
effects of temperature fluctuations on the revenues of Con Edison

...for several industrial clients  
consultation and testimony in antitrust matters and other litigation involving economic issues such as tariff problems and value of contract violations

1956-1962	General Electric Company economist in antitrust damage suits from electrical equipment conspiracy cases operations research group for Medium AC Motor , and Generator Department
1953-1956	Harpur College, S.U.N.Y. Binghamton, New York instructor in economics
1949-1951	City College of New York lecturer in economics
1946-1949	Newark College of Rutgers University instructor in economics

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1. "An Estimate of the Costs of Adding Coverage for Ambulatory Care Benefits to Health Insurance Policies in New York", The Cost of Health Care in New York State, Temporary Commission on Living Costs and the Economy, April 1974.
2. "Rehabilitation of the Mentally Ill from an Economic Point of View", paper before the mental Health Section of the APHA, San Francisco, November, 1973.
3. Health Planning and the NYC Budget Process, CHPA for NYC, 1973
4. "Staffing Patterns and Clinic Efficiency," Family Planning Perspectives, October, 1970
5. "Planned Parenthood Patients: Black and White", Family Planning Perspectives, January, 1970 (with George Varky).
6. "Another Way of Counting the Medically Indigent", Need For Subsidized Family Planning Services, Office of Economic Opportunity, 1969.
7. "Straightening Out the Data Maze", Family Planning Perspective, September, 1968.
8. "Product Variation and Price Indexes: A Case Study of Electrical Apparatus", Proceedings of the Business and Economics Section of the American Statistical Association, 1961 (with H.J. DePodwin).
9. Industrial Maturity and Monopoly Behavior, Schenectady, New York, 1960.

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### EDUCATION:

Ph.D., Purdue University, 1970  
M.S., Purdue University, 1968  
M.A., University of Cincinnati, 1964  
B.A., (Honors), University of Cincinnati, 1963

### PROFESSIONAL EXPERIENCE:

Professor of Economics, Baruch College, City University  
of New York, Beginning 1982  
Senior Staff Economist, Council of Economic Advisers,  
1981-82  
Professor of Economics, University of Georgia, 1980-82  
Associate Professor, University of Georgia, 1975-1980  
Assistant Professor, University of Georgia, 1968-1975  
Herman C. Krannert Fellowship, 1967-1968  
Instructor, Purdue University, 1964-1967  
Economist, Small Business Administration, Summer, 1966

### FIELDS OF INTEREST:

Microeconomic Theory; Industrial Organization; Public  
Choice; Law and Economics

### TEACHING EXPERIENCE:

Principles of Economics; Introductory Statistics;  
Industrial Organization; Economic Analysis of Law  
(Economics Department and Law School); Undergraduate  
and Graduate Price Theory

### BOOKS:

Congressmen, Constitutents, and Contributors, Martinus  
Nijhoff, 1982, with J.B. Kau.

Editor, Evolutionary Models in Economics and Law, (Central paper by Jack Hirshleifer) Volume 4 of Research in Law and Economics, 1982.

PUBLICATIONS IN PROFESSIONAL JOURNALS:

"The Expansion of Firms," Journal of Political Economy, July-August, 1973, 936-949.

"New Estimates of the Determinants of Urban Crime," Annals of Regional Science, February, 1975, with J. B. Kau, 68-76.

"A Theory of the Determination of the Mark-Up Under Oligopoly: A Comment," Economic Journal, March, 1975, with C. D. Delorme, 148-149.

"On The Form of Special Interest Legislation," Public Choice, Spring, 1975, 79-90.

"The Electoral College and the Rational Vote," Public Choice, Fall, 1976, with J. B. Kau, 101-107. (Also, "The Electoral College and the Rational Vote: A Correction," Public Choice, Spring, 1977, with J. B. Kau, 155-156.)

"Measurement Techniques, Grades and Ratings of Instructors," Journal of Economic Education, Fall, 1976, with J. B. Kau, 59-60.

"Why is the Common Law Efficient?", Journal of Legal Studies, January, 1977, 51-63.

"An Empirical Investigation of Voting on Energy Issues," Public Choice, Fall, 1977, with A. L. Danielsen, 121-128.

"The Theory of the Firm and the Structure of the Franchise Contract," Journal of Law and Economics, April, 1978, 223-233.

"Voting on Minimum Wages: A Time Series Analysis," Journal of Political Economy, April, 1978, with J. B. Kau, 337-342.

"Public Interest Lobbies: Membership and Influence," Public Choice, 1979, with J. B. Kau, 45-54.

## PUBLICATIONS IN PROFESSIONAL JOURNALS (CONTINUED):

- "Government and Privacy: A Comment on 'The Right of Privacy'," Georgia Law Review, Spring, 1978, 505-511.
- "Self Interest, Ideology, and Logrolling in Congressional Voting," Journal of Law and Economics, November, 1979, with J. B. Kau, 365-384.
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- "The Size of Government," Public Choice, 1981, with J. B. Kau, 261-274.
- "The Economics of the Women's Movement," Public Choice, 1980, with Janet Hunt, 287-296.
- "Teaching and Research: The Human Capital Paradigm," Journal of Economic Education, 1981, with Chris Paul, forthcoming.
- "Human Capital and Covenants not to Compete," Journal of Legal Studies, January, 1981, with Peter Shedd, 93-110.

## PUBLICATIONS IN PROFESSIONAL JOURNALS (CONTINUED):

- "Are Humans Optimistic?" Journal of Social and Biological Structures, January, 1981, 93-96.
- "Unenforceable Contracts: Penalty Clauses and Specific Performance," Journal of Legal Studies, June, 1981, 237-248.
- "Union Membership and Campaign Contributions," Atlantic Economic Journal, September, 1981, with Chris Paul, 99-104.
- "The Output Distribution Frontier: A Comment," American Economic Review, with Donald Keenan, September, 1981, 796-799.
- "A General Equilibrium Model of Congressional Voting," Quarterly Journal of Economics, May, 1982, 271-294, with James Kau and Donald Keenan.
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- "Some Notes on Methodology in Law and Economics", Research in Law and Economics, forthcoming.
- "Property Rights, Human Rights, and Minorities: Comment", Journal of Labor Research, forthcoming.

## CHAPTERS IN BOOKS:

- "The Economic Theory of the Criminal Firm", in The Economics of Crime and Punishment, Simon Rottenberg, ed., American Enterprise Institute, Washington, 1973, 155-166.
- "Government Regulation and Economic Efficiency: The Role of Conservative Legal Foundations", in A Blueprint for Judicial Reform, Patrick B. McGuigan and Randall R. Rader, eds., Free Congress Research and Educational Foundation, Washington, 1981, with Ellen Jordan, 241-271.



## CHAPTERS IN BOOKS (CONTINUED):

- "A Socioeconomic Model on National Olympic Performance", in Sport, Culture, and Society, John Loy et al, eds., Lea and Febinger, Philadelphia, 1981 (with A.R. Grimes and W.J. Kelly), reprinted from Social Science Quarterly, December, 1974.
- "A Paradox Regarding the Use of Time", in Readings in Labor Economics, J.E. King, ed., Oxford University Press, 1980, reprinted from Indian Economic Journal, 1973.
- "The Economics of Crime", in The Economics of Crime, Andreano and Siegfried, eds., Wiley, 1980, reprinted from Atlanta Economic Review, 1978.
- "Constitutional Limits on the Role of the Federal Government in the Economy", in Dolores Martin, ed., Security in the Eighties: Private Initiative and Public Policy, University of Nebraska Press (forthcoming), with Jerry Jordan.
- "The Impact of Labor Unions on the Passage of Economic Legislation", in The Collective Bargaining Process, Jean Baderschneider, ed., Business Publications, Inc., 1982, reprinted from Journal of Labor Research, 1981, with J. B. Kau.

## MISCELLANEOUS PUBLICATIONS:

- "A General Equilibrium Problem," The American Economist, Spring, 1974, 139-41.
- "Information, Discrimination, and Resale Price Maintenance," Journal of Economics, 1977, with R. Higgins, 53-55.
- "The Differential Impact in Competition and Monopoly of a Change in Costs on Price and Quantity," American Economist, Spring, 1979, with D. R. Kamerschen, 41-43.
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- Review of Bell, The Economics of the Ghetto and Tabb, The Political Economy of the Black Ghetto, Kyklos, v. 24, 1971.

## MISCELLANEOUS PUBLICATIONS (CONTINUED):

"Past Injustice: Present Compensation," Collegiate Forum, Spring, 1978.

"Determinants of Laws Affecting Small Business," The Regional Environments for Small Business and Entrepreneurship, Small Business Administration, Washington, D.C., 1981, (with J. B. Kau).

## OTHER PROFESSIONAL ACTIVITIES:

## Paper Presentations:

American Economic Association, Winter, 1979; Fall 1980.  
 Econometric Society, Winter, 1970, 1971, 1974, 1975, 1977, 1978  
 Western Economic Association, June 1974  
 Southern Economic Association, November, 1977, 1978, 1980, 1981  
 Public Choice Society, 1978, 1979, 1980, 1981  
 European Meetings, Econometric Society, 1978

## Session Chairman or Discussant:

Southern Economic Association, 1971, 1976, 1977, 1979  
 Western Economic Association, 1975  
 Public Choice Society, 1977, 1979, 1981  
 American Economic Association, 1981

## Invited Conferences:

Seminar on the Economics of Regulated Public Utilities, University of Chicago, 1975.  
 Legal Institute for Economists, University of Miami, Center for Law and Economics, Summer, 1977.  
 Conference on Private Alternatives to the Judicial System, Miami University, Center for Law and Economics, March, 1978.  
 Conference, "Toward Liberty," Virginia Polytechnic Institute and State University, Center for Study of Public Choice, Summer, 1978.  
 Conference, "Evolutionary Theory in Law and Economics," Miami University, Center for Law and Economics, May, 1980.  
 Conference, "Advertising in the 1980s," American Enterprise Institute, Washington, D.C., June, 1980.

## OTHER PROFESSIONAL ACTIVITIES (CONTINUED):

Guest, Second Annual G. Warren Nutter Memorial Lecture, Hoover Institution, Stanford, California, 1981.  
 Conference, "Regulatory Authorities, Corporate Privacy, and the Corporate Attorney," Emory University, Law and Economics Center, 1981.  
 Discussant, Carnegie Conference on Political Economy, Pittsburgh, April, 1982.

## Invited Presentations:

"Economic Determinants of Congressional Voting," Auburn University, 1978.  
 "Unfair Competition," Law and Economics Workshop, University of Chicago, 1978.  
 Discussant, Conference on "Change in the Common Law," Law School, University of Chicago, May, 1979.  
 "Economic Analysis of Employment Contracts," Liberty Fund Seminar on Law and Economics, University of Chicago Law School, Summer, 1979.  
 "Human Capital and Covenants not to Compete," Law and Economics Center, University of Miami, December, 1979.  
 Senior Discussant, Liberty Fund Summer Fellows Program, May, 1980.  
 "A General Equilibrium Model of Congressional Voting," Duke University, February, 1981.  
 "Common Law and Statute Law," Emory University, April, 1981; Hoover Institution, Stanford University, 1982; VPI, 1982.

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Summer Research Fellowship, Liberty Fund -- Center for Libertarian Studies, Summer, 1979

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National Science Foundation; American Economic Review; Quarterly Journal of Economics; Journal of Law and Economics; Journal of Legal Studies; Journal of Economic Behavior and Organization; Annals of Regional Science; Journal of Economics and Business; International Regional Science Review; Public Choice; Southern Economic Journal; Journal of Labor Research.

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Baruch College and The Graduate Center  
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Director  
Center for the Study of Business and Government  
Baruch College

Education: B.A., with high honors in economics, Yale University, 1957  
M.A. Yale University, 1959  
Ph.D., Yale University, 1965

Honors and Graduate Fellowships: Phi Beta Kappa  
Boies Fellow, Yale Graduate School, 1957-58  
Gerard Swope Fellow, General Electric Foundation, 1960-1961  
Who's Who in Economics: A Directory of Major Economists  
Who's Who in the East

Teaching and Research Experience: Fiscal Economist, Office of Tax Analysis,  
Office of the Secretary, U.S. Treasury,  
September 1962-March 1963

Research Economist, Institute for Defense Analyses,  
Arlington, Virginia, April 1963-1965

Assistant Professor, James Wilson Department of Economics,  
University of Virginia, Spring, 1969

Research Appointment in Department of Preventive Medicine,  
University of Virginia, Spring, 1969

Member, Senior Research Staff, The Urban Institute,  
1969-1970; Director of Studies in Urban Public Finance,  
1970-1974; Principal Research Associate, 1974-1975

Visiting Appointments: Visiting Research Professor, Faculta di Giurisprudenza,  
Laboratorio di Economia Politica, University of Turin,  
Fall, 1968

Academic Visitor, London School of Economics and The Centre  
for Environmental Studies, Fall, 1971

Visiting Lecturer, Graduate School of Public Policy,  
University of California at Berkeley, 1973-1974

Lady Davis Visiting Professor of Economics, The Hebrew  
University of Jerusalem, 1980-1981

Other Experiences:

Consultant to the Deputy Undersecretary of State for Administration, on Foreign Affairs Programming System and Management Planning, July 1966-June 1967.

Consultant to the Assistant Administrator for Program Coordination of the Agency for International Development, on the Substitution of Credit Sales for Military Grant Aid and on the Coordination of Foreign Assistance, June 1966-March 1967.

Consultant to the Economic and Political Studies Division, Institute of Defense Analyses, September 1965-June 1967.

Member of Faculty, "Planning, Programming and Budgeting Seminars," Interagency Training Programs conducted by the Bureau of Training, U.S. Civil Service Commission, in cooperation with the University of Virginia, 1967-1968.

Member, Committee on Urban Economics, 1970-1976.

Member, Federal Taxation and Finance Committee, National Tax Association-Tax Institute of America, 1980-1982.

Member, Editorial Advisory Board, The National Tax Journal, 1972-Present.

Member, Editorial Board, Public Finance Quarterly, 1972-Present.

Member, Editorial Board, Policy Review, 1977-Present.

Member, Editorial Advisory Board, International Journal of Urban Systems, 1977-Present.

Chairman, Scientific Committee, International Institute of Public Finance, 1971-1972.

Consultant, Public Education Association, New York City, 1977.

Consultant, Bentley-Clark Associates, Yonkers, New York, 1979.

Consultant, The Ford Foundation, 1980 - present

Grants:

NSF Institutional Grant, University of Virginia,  
October 1965-December 1967: Research on Governmental  
Decisionmaking.

Summer Research Grant, University of Virginia, 1968.

Einaudi Foundation of the Bank of Italy Research Grant,  
Fall, 1968: Research in Turin, Italy.

NSF Grant, July 1, 1971-June 30, 1973: "Studies in  
Metropolitan Political Economy" (principal investigator).

NSF Grant, July 1, 1971-June 30, 1972: "Innovations  
in Economic and Institutional Arrangements for Providing  
Public Services," (co-investigator).

NSF Grant, March 15, 1972-February 29, 1974: "Collaborative  
Research on Utility Interdependence, Income Redistribu-  
tion and Fiscal Structure" (co-investigator).

City University, New Faculty Award, January 1, 1976-  
December 31, 1978: "Intra-Family Decisionmaking and  
Child Development Policy".

HUD Grant: October 1, 1976-December 31, 1977: "Local  
Regulation in the City of New York," (principal investigator)

Publications:

Principal Author, "The Military Assistance Planning  
Process: Critique and Recommendations," a Study  
prepared for the Assistant Secretary of Defense for  
International Security Affairs (ASD/ISA) by the Economic  
and Political Studies Division, Institute for Defense  
Analyses, October 1965 (with A.M. Fraser).

"Some Aggregative Implications of Depreciation Acceleration," Yale Economic Essays 6 (1): 217-274.

"Taxation, Interest and the Timing of Inter-generation  
Wealth Transfers," National Tax Journal XX (2): 219-226,  
June 1967 (with Cotton M. Lindsay).

Readings in Microeconomics, New York: Holt, Rinehart and  
Winston, 1968; Italian and Spanish editions; Second  
Edition, 1971. (Co-editor, William Breit).



Publications:  
(continued)

"A Dilemma of Military Assistance Planning: Grant Aid or Credit Sales," Journal of Developing Areas, 4: 461-476, July 1970 (with Tait Ratcliffe).

"Pareto Optimal Redistribution: Reply," American Economic Review, 60: 997-1002, December 1970 (with James D. Rodgers).

"Professor Head on Equity and Efficiency: Comments and Addendum," Public Finance/Finances Publiques, 25 (3): 536-545, 1970.

"Is Efficiency a Criterion for Judging Redistribution?" in Public Finance/Finances Publiques, Proceedings of the 26th Congress of the International Institute of Public Finance, Leningrad, September 16-19, 1970 (with James D. Rodgers).

"Utility Interdependence and Income Transfers Through Charity," in K. Boulding and M. Pfaff, Transfers in an Urbanized Economy: Theories and Effects, Wadsworth, 1973 (with James D. Rodgers).

"Social Problems and the Urban Crisis: Can Public Policy Make a Difference?" American Economic Review 61: 346-353, 1971 (with Worth Bateman).

"Individual Preferences and Distributional Adjustments," American Economic Review, 62: 353-360, May 1972.

"On the Income Distribution as a Public Good," Quarterly Journal of Economics, 87: 311-15, May 1973 (comment on a paper by Lester Thurow with James D. Rodgers and Gordon Tullock).

"On the 'Unavoidable Indeterminacy' of the Social Rate of Discount," Rivista di Scienza delle Finanze e Diritto Finanziario, Anno XXXI, No. 3, 1972.

Editor of Redistribution Through Public Choice, Columbia University Press, 1974 (with George E. Peterson). Author of Chapter 12, "Rule Change and Transitional Equity," Redistribution Through Public Choice, pp. 320-341.

Issues in Urban Public Finance, Editor's Preface and Summary Paper, Proceedings of the 28th Congress of the International Institute of Public Finance, New York, September 12-15, 1972.

Publications:  
(continued)

"Brennan and Walsh Reconsidered: Mutt and Jeff Ride Again," Public Finance Quarterly, 1: 369-371, October 1973 (with James D. Rodgers).

Editor, The Urban Economy, W. W. Norton, 1976.

"The Simple Politics of Distributional Preference," Thomas Juster, Editor, The Distribution of Economic Well-Being, National Bureau of Economic Research, 1977 (with James D. Rodgers).

"The Optimal Tax Treatment of Charitable Contributions," National Tax Journal, March 1977, pp. 1-18 (with James D. Rodgers).

"The Over-Regulated City: A Perspective on Regulatory Procedures in the City of New York," Public Finance Quarterly, 9: 197-220, April, 1981.

"Contractarian Theories of Redistribution," in E. Helpman, A. Razin, and E. Sadka, eds., Social Policy Analysis, Academic Press (forthcoming).

"Economic Principles," in Perspectives on State and Local Finance, Ralph Eisenberg, editor, Report No. 4, SREB Seminars for Journalists, Atlanta: Southern Regional Education Board, 1968, pp. 74-97.

"Pareto Optimal Redistribution," American Economic Review, 59: 542-557, September 1969 (with James D. Rodgers).

"Monetary and Fiscal Policy: Ambiguities and Definitions," in Finanz-und Geldpolitik im Umbruch, Heinz Haller and Horst Claus Recktenwald, editors, Mainz: v. Hase and Koehler Verlag, 1969, pp. 357-387 (with Francesco Forte).

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

DOCKET  
UNIT

'83 APR 14 A11:26

In the Matter of )

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC. )  
(Indian Point, Unit No. 2) )

POWER AUTHORITY OF THE STATE OF NEW YORK )  
(Indian Point, Unit No. 3) )

Docket Nos.  
50-247 SP  
50-286 SP

April 12, 1983

Certificate of Service

I hereby certify that I have served copies of: THE TESTIMONY OF CHARLES R. DEAN, HAROLD M. HOCHMAN AND PAUL H. RUBIN UNDER COMMISSION QUESTION 6 to the service list below on this 12th day of April, 1983 by depositing it in the United States mail, first class.

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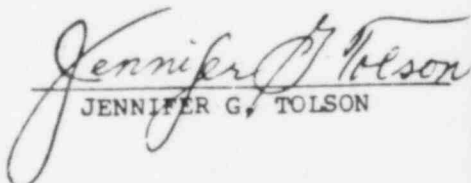
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