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THE COST OF AN URBAN BLACKOUT
THE CONSOLIDATED EDISON BLACKOUT, JULY 13–14, 1977

A STUDY

PREPARED AT THE REQUEST OF

JOHN D. DINGELL, *Chairman*

SUBCOMMITTEE ON ENERGY AND POWER,

COMMITTEE ON

INTERSTATE AND FOREIGN COMMERCE

UNITED STATES HOUSE OF REPRESENTATIVES

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LETTER OF TRANSMITTAL

Congress of the United States,
House of Representatives,
Subcommittee on Energy and Power,
Committee on Interstate and Foreign Commerce,
Washington, D.C., June 5, 1978.

Hon. Harley O. Staggers,
Chairman, Committee on Interstate and Foreign Commerce, U.S. House of Representatives, Washington, D.C.

Dear Mr. Chairman: I recommend that the attached study, prepared at my request by the Congressional Research Service, Library of Congress, be issued as a Committee Print of the Committee on Interstate and Foreign Commerce.

The study provides an analysis of the costs incurred by consumers, the city of New York, the State of New York and the Nation, as a result of the massive power failure which occurred in the system of the Consolidated Edison Co. of New York on July 13–14, 1977. Its purpose is to provide the Congress, Federal, and State agencies and utility companies with a benchmark which will help them to evaluate the cost of improved system reliability as against the costs of system failure.

Sincerely yours,

John D. Dingell,
Chairman.

Enclosure.

LETTER OF SUBMITTAL

The Library of Congress,
Congressional Research Service,
Washington, D.C.

Hon. John D. Dingell,
Chairman, Subcommittee on Energy and Power, Committee on Interstate and Foreign Commerce, U.S. House of Representatives, Washington, D.C.

Dear Mr. Chairman: On September 27, 1977, you asked CRS to prepare an analysis of the economic impact of the July 13–14 Consolidated Edison blackout. In reply to that request, I am attaching a report entitled "The Cost Of An Urban Blackout, The Consolidated Edison Blackout, July 13–14, 1977."

This report breaks costs into two major categories, social and economic. Social costs are primarily those related to the riots, while economic costs encompass lost output both regional and national, utility and governmental revenue losses, as well as spoilage and damage.

The paper was prepared by Alvin Kaufman, senior specialist in business economics (Resources and Regulation), and Barbara Daly, research assistant.

Sincerely yours,

Gilbert Gude, *Director.*

Summary

On July 13, 1977 a major electrical outage occurred on the Consolidated Edison system, interrupting service to approximately 8 million people in New York City and Westchester County. As a consequence of the outage (which lasted up to 25 hours in some areas) costs were incurred—both economic and social. Inasmuch as these losses are a measure of the benefits that flow from not having an outage, and thus are a determinant of the degree of reliability that should be built into an electrical system, an assessment of these costs is useful. In this report, prepared at the request of Congressman John D. Dingell, chairman of the Subcommittee on Energy and Power, CRS attempts to quantify these costs.

In computing losses we have included explicit costs—such as lost and deferred production, damage to equipment, spoilage, etc. In addition, implicit losses incurred, such as regional and national impacts are estimated. Costs of the rioting and looting that occurred during the blackout period and their results are necessarily included in the total as a social cost. Beyond these, there are other implicit costs in terms of inconvenience and frustration which we are unable to quantify, but which must be noted. As it would be totally speculative, no attempt is made to assess any possible long-range economic consequences the city might face (closed businesses, loss of new business) as a result of the blackout.

This report estimates the July 13-14 blackout losses at approximately $310 million. As the figures in table 6 of the text indicate, this breaks down to $172.7 million as an economic cost and $136.8 million as a social cost. Thus had the social disorders which resulted from this blackout not occurred, the total cost would have been somewhat lower (by approximately 40 percent).

It should be noted also that while total economic losses are large dollarwise, these are not a large percentage of the output of the affected areas. Due to the nature of the NYC economy, most of the output losses (approximately 90 percent) which occurred during the blackout period were probably made up within a few days.

In presenting the data included in the text, it is our feeling that while the quality of the numbers varies from hard to speculative, the assumptions upon which calculations are based are quite conservative, the proportions between items appear logical, and the totals seem reasonable.

(IX)

The Cost of an Urban Blackout

(The Consolidated Edison blackout, July 13–14, 1977)

INTRODUCTION

On July 13, 1977, a major outage occurred on the Consolidated Edison electrical system, which interrupted service to some 8 million people in New York City and Westchester County for up to 25 hours. As a consequence of this outage, losses were incurred by the economy explicitly in terms of lost production, damage to equipment and spoilage, as well as implicitly in terms of inconvenience and frustration. In addition, losses were sustained by society as a consequence of rioting, looting, and pillage. Inasmuch as these losses are a measure of the benefits that flow from not having an outage, and thus are a determinant of the degree of reliability that should be built into an electrical system, an assessment of these costs is useful.

A CONCEPT OF OUTAGE COSTS

The costs of an outage are difficult to determine because of the multiplicity of factors involved and the general lack of data. For example, the nature and extent of the losses from the 1965 blackout, which impacted all of the Northeastern United States, are still unclear. These are estimated at $100 million, but the method used to compute the estimate and the items included are unknown.[1] Another indicator of the complexity of the subject is the large number of loss estimates published in the newspapers since the outage. A culling of these clippings indicate items such as:[2] (1) Consolidated Edison will incur losses for lost revenues and the cost of restoring services of approximately $10 million, while the replacement of damaged equipment will encompass another $10 million. (2) Lost tax revenues were estimated at $5 million, retail sales at $20 million and lost brokerage commissions at $15 million; (3) Losses from riot, pillage, etc. were estimated at $1 billion; (4) grants and loans totaling $114 million were available from the Small Business Administration, the U.S. Labor Department and the City Emergency Aid Commission to help riot victims reestablish themselves. These estimates indicated that losses ranged between $150 million to over $1 billion. This wide divergence between estimates indicates the lack of certainty involved in their preparation. In addition, there are several conceptual problems in the sense that lost business will be made up to some degree after electrical services are reinstituted. That is, some of the lost brokerage commissions, retail sales, etc., are not lost but rather deferred. People may not buy a suit on the day of the blackout, but will buy it at a later date. Another problem is that the costs noted above do not include governmental costs, such as overtime for police and firemen.

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[1] FPC. "Northeast Power Failure, Nov. 9 and 10, 1965," Dec. 6, 1965. p. 40. Also "Prevention of Power Failures." v. 1, July 9, 1967, p. 8.
[2] Various issues of the New York Times between July 15 and Aug. 5, 1977.

Another way of looking at outage costs is on a gross basis. For example, we could develop the relationship between Gross National Product (GNP) and electrical supply, and then compute the losses. An earlier study indicated, on a preliminary basis, that a 12 percent reduction in electric supply could reduce GNP by 7 percent in the short run.[3] If we apply this relationship to the present outage an estimate of economic loss could be derived. To do so we need to determine the megawatt hours lost as a proportion of U.S. electricity consumption.

Consolidated Edison had dropped 6,100 megawatts at the time of the outage. Its load curve on a summer-peak day, however, indicates a load of 3,300 megawatts at 5:00 a.m. rising to a peak of approximately 7,500 megawatts at 4:00 p.m. Working from these numbers we can postulate a probable maximum loss in energy during the outage period of 140,000 megawatt hours, or 0.007 of U.S. electric demand supply. In reality the energy loss was less, because some areas had service restored in a shorter time period than others. For our purpose, however, the 140,000 megawatt figure will be suitable. Based on the study referenced above, a 1 percent drop in electricity can cause a 0.58 percent drop in GNP. Assuming this to be correct, the GNP loss in the case of the Consolidated Edison blackout would be 0.004 percent or $60 million. This approach, however, does not include social losses resulting from rioting, nor does it cover nonmonetary losses for inconvenience, lost time, etc. In regard to the latter, it may not be possible to estimate these nonmonetary losses. On the other hand, this kind of estimate may overstate the situation since it does not take account of the specific local economy and the ease with which business output losses can be made up. In any case, such an estimating procedure is a rather gross measure and may be more appropriate for national electricity shortages than for blackouts covering a limited area.

Losses from a blackout of restricted geography will result in both regional and national costs. The latter will include all of the regional costs plus costs incurred by persons outside the impacted area as a result of the outage, less business transferred elsewhere. For example, in the case of the last point one could consider brokerage commissions collected on orders that would normally have been executed in New York, but were executed elsewhere, such as Chicago, as a result of the outage. Costs incurred by persons outside the area as a result of the outage will generally relate to lost output, although there will be some nonmonetary costs incurred by people unable to visit the city. Lost output outside the region will occur because of interrelations within the national economy. For example, a producer of gadgets in Philadelphia may suffer a loss because his New York supplier of widgets needed to make the gadgets is unable to maintain delivery schedules.

The regional costs, which will comprise the bulk of the losses will vary depending on the extent of the area impacted. In this case, they will include losses for New York City and for Westchester County. In addition, the extent of the impact could be variable within the region. For example, in the Consolidated Edison case an area not reconnected to the system for 25 hours and having a high commercial-industrial load will suffer far greater losses than a similar area reconnected within 9 evening hours.

[3] Technical Advisory Committee on the Impact of Inadequate Electric Power Supply. "The Adequacy of Future Electricity Power Supply: Problems and Policies." Federal Power Commission. National Power Survey, March 1976. p. 81.

Further, the makeup of the area will have an impact on the effect. Commercial-industrial customers are the most severely affected by an outage during working hours. In this particular case, the outage occurred in the evening, but the inability to restore service to the bulk of the area during the night would have an impact on the commercial-industrial sector. These losses would include lost output, retail sales, employee absenteeism with consequent lost wages, equipment damage, etc. Some of these losses would be made up at a later date.

Residential customers, on the other hand, would be most severely impacted in the evening hours or during a winter cold wave or a summer heat wave. Residential losses would be primarily nonmonetary in terms of inconvenience and time lost, but could include food spoilage due to lack of refrigeration, as well as equipment damage.

In addition, the utility will suffer direct costs in terms of lost revenue, the cost of restoring service and the replacement and repair of damaged equipment. Aside from the above, the governments of the area will incur losses as a consequence of a blackout. These would include reduced tax collections due to lower sales and wages, additional expenses for overtime and police and firemen on duty, compensation costs for police and firemen hurt as a consequence of riots or working in the dark, the closing of airports, environmental damage due to an inability to use sewage treatment and other abatement facilities, etc.

On top of such costs will be losses imposed on society by those who take advantage of the situation to riot, loot, and pillage. Such losses include damage to buildings and equipment, the value of stolen or destroyed goods, costs inherent in arresting large numbers of people and the costs attributed to an increased crime rate, etc. Such costs will not be incurred in every case. For example, there was no such damage in the 1965 blackout. In fact, the number of crimes committed during that event actually declined.

The above discussion thus indicates that we can break outage costs into two major classes, social cost and economic cost. The social costs are those incurred external to the event, in terms of rioting, pillage and governmental costs. Economic costs will include utility losses and nonutility losses internal to the outage. The latter will comprise lost output, spoilage, damage to nonutility plant and nonmonetary costs. Utility losses will include lost revenue, service restoration, and equipment damage.

THE JULY BLACKOUT

The cost of an outage may be impacted by the sequence of events. Therefore, before looking at cost, it may be useful to review that sequence.[4] On the evening of July 13, Consolidated Edison was producing approximately 3,800 megawatts and importing an additional 2,000 megawatts from other systems. Of the 3,800 megawatts generated by the company, approximately 800 megawatts were located

[4] Material in this section is based on the following: A. "New York Blackout; Weak Links Tie Con Ed to Neighboring Utilities." Science, v. 197, No. 4802, July 29, 1977. pp. 441–442.

B. Federal Power Commission; "Staff report on July 13–14, 1977, Electric System Disturbance on the Consolidated Edison Co. of New York Inc. System." Aug. 4, 1977. pp. 2–3.

C. Board of Review; "First Phase Report, System Blackout and System Restoration, July 13–14, 1977." Consolidated Edison Co. of New York, Inc., July 26, 1977.

D. ———— "Second Phase Report (Analysis of System Separation)." Aug. 4, 1977.

outside of the city; the import figure includes 870 megawatts from Indian Point 3, now owned by the Power Authority of the State of New York.

The company's operating reserves were approximately 2,000 megawatts. All interties were in service at the time except for the Hudson-Farragut connection to the Pennsylvania-Maryland-New Jersey power pool (PJM). At approximately 8:30 p.m., lightning knocked out transmission facilities between the Millwood West and Buchanan South substations. This resulted in the automatic shutdown of the Indian Point No. 3 generating unit, since there was no transmission available. In addition, transmission between Buchanan South and Ladentown went out due to faulty equipment. A second lightning strike at approximately 9:00 p.m. took out transmission between Millwood, Buchanan, and Sprainbrook. Shortly afterward, the Pleasant Valley lines tripped out. The company reduced voltage up to 8 percent, blacked out portions of Westchester County and started some combustion turbines. These efforts were insufficient to stabilize the system. As a result, Long Island Lighting Co. was forced to cut its tie to Consolidated Edison in order to save the overloaded line.

The overloaded Goethals-Linden line then faulted out and Consolidated Edison was on its own. As a consequence, and despite additional load shedding, Ravenswood 3 (Big Allis) overloaded and shut down. By approximately 9:30 p.m. the remaining system generation had tripped out and the city was in darkness. Restoration efforts began at once. By 11:00 p.m. the first intertie had been restored and by midnight several others were back in service. Service restoration began at approximately 2:00 a.m. on July 14 for portions of Westchester County. All interties with the New York Power Pool were back in service by 4:00 p.m. Full service was not restored throughout the Consolidated Edison territory, however, until 10:30 p.m. on July 14.

The delay in restoring service was stated by at least one Commission of Inquiry to be the result of an inability to pressurize the underground high-voltage cable system, an inadequate communications system, and the failure of the load-shedding system to operate.[5]

The blackout had widespread impact. Many businesses, particularly in Manhattan, were unable to attract customers. Further, the Wall Street community, which depends on rapid communication for survival, was forced to close down. This, in turn, resulted in a drop in business at exchanges in other parts of the United States due to a lack of market leadership from the larger New York exchanges. All of this was further compounded by the inability of people to get to their jobs and, therefore, many businesses remained closed during the blackout period. The business losses were further compounded by social disorder that erupted on the night of July 13. As a consequence, 18,000 merchants suffered riot losses, of which 80 percent were believed to be uninsured. In an effort to quell the unrest and put out the fires, local police and firemen worked long extra hours and some 250 State police were called on for duty the following night. There were 3,776 arrests and two deaths reported. Further, some 44 firemen and 418 policemen were injured in the line of duty.

[5] Special Commission of Inquiry into Energy Failures, Report of Special Commission, Vol. I and II, Dec. 1, 1977, p. 186.

The social costs

Social costs break down into those incurred by government as a consequence of the riots, and those incurred by the victims of the riots. In the latter case, initial estimates went as high as $1 billion.[6] These appear somewhat overblown. A more accurate gauge of riot losses can be obtained from several sources including the Small Business Administration (SBA) and the Emergency Aid Commission (EAC).

The latter has granted some $2.9 million for cash assistance and business reestablishment. Although this is a relatively minor amount of money, the Commission has made available considerable detail as to the profile of their applicants.[7] Assuming these people to be representative gives us an indication of who got hurt and where. The bulk (55 percent) of the damage occurred in Brooklyn, followed by the Bronx (25 percent) and Manhattan (18 percent). Damage in Queens and Staten Island was relatively minor. Of the businesses damaged approximately 27 percent reported damage below $5,000, while 15 percent were between $5,000 and $10,000, 20 percent between $10,000 and $25,000, 16 percent between $25,000 and $50,000, and 12 percent between $50,000 and $100,000. Seven percent reported damage over $100,000 and there was no information provided on 3 percent. Thus the bulk of the damages—about 80 percent—was below $50,000. A large number of the businesses damaged (88 percent) employed 10 people or less, with 41 percent of the total employing between 2 to 4 people. Close to one third of the businesses were grocery or clothing stores, with another third comprising bars and restaurants, furniture, personal service, liquor, jewelry, service stations, and TV-record shops. The grants approved by the EAC represent $61.8 million in damage. A substantial portion of this total is covered by insurance or SBA loans. We, therefore, will only use the value of the grants in order to avoid duplication.

In addition to the EAC grants the U.S. Department of Labor is reported to have made available $11.3 million in grants and loans. The riot areas, however, were officially declared a disaster area thus making the occupants eligible for disaster relief loans. The SBA is responsible for administration of this program, which constitutes the bulk of the damage claims.

The SBA damage loans may only comprise a part of the total damage since those deciding not to rebuild would not apply and others may have some other source of funding, such as insurance. Further, the SBA has a limit of $55,000 for home and $500,000 for business loans. In this case, based on the EAC data cited earlier, the limits might well cover most of the damage. Loan applications may also reflect a certain amount of "padding" which SBA presumably would eliminate in the loan processing procedures. As of November 4, 1977, the Small Business Administration had approved $35.1 million in loans, another $22.7 million was still in the pipeline, $3.4 million had been withdrawn, and $14.6 million in requests had been refused. The latter represent actual damage, but may have been refused because the applicant lacked a suitable credit rating or collateral. SBA standards for disaster loans are far more lenient than for regular loans and these tend to be

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[6] Newsweek, July 25, 1977. p. 19.
[7] Memorandum from D. McCarthy to Monte Wasch, Emergency Aid Commission, Nov. 21, 1977.

undersecured in any case, but some kind of security or adequate credit rating is required. The people refused thus tend to represent very poor credit risks.

On this basis, and assuming that the applications in the pipeline will be approved at the initial value, and that the $3.4 million in withdrawn applications represents people who have suffered damage but decided not to rebuild, the SBA total stands at some $75.8 million. In addition some $30 million in damage claims were filed with private insurance companies. Assuming all of these will be approved at face value and considering the various loan and grant programs operated by Government agencies, we estimate total riot damage at $120 million. By way of comparison, the SBA estimated total damage at $156 million shortly after the blackout.[8]

Governmental costs.—In addition to the costs of riot damage, the various governmental jurisdictions incurred costs for emergency services, cost of arresting and holding large numbers of people, compensation and medical costs for police and firemen injured in the line of duty, for the repair of public buildings and equipment, and for general cleanup of the streets, parks, etc. In order to assess these costs, both the city of New York and Westchester County were contacted for appropriate estimates. Their replies are shown in appendix A. In addition, some costs (such as those for arresting, processing, and jailing 3,776 people) were estimated by the authors. Additional cost estimates (such as repair of public buildings and equipment) were derived from various newspaper and magazine estimates.[9]

TABLE 1.—*Social costs, Consolidated Edison blackout, July 13–14, 1977*

Item	Millions
Riot damage:	
Small Business Administration	$75. 8
Insurance claims	30. 0
U.S. Labor Department	11. 3
Emergency Aid Commission	2. 9
Total riot damage	120. 0
Government costs:	
Emergency services:	
New York City	12. 1
Westchester County	0. 1
Total emergency services	12. 2
Repair and replacement buildings and equipment	2. 9
Cleanup	1. 0
Other[1]	0. 7
Total Government costs	16. 8
Grand total, social costs	136. 8

[1] Includes estimate of cost of arresting, processing, and jailing 3,776 persons, 2 deaths, and injury compensation plus medical costs for 462 police and firemen.

The Total.—As indicated on table, 1, total social losses are estimated at close to $137 million of which 88 percent constitutes riot damage, and another 9 percent for emergency services. The latter are primarily overtime costs for police and firemen. In addition, the injury and cleanup costs may turn out to be larger than estimated. Cleanup

[8] Newsweek, Aug. 1, 1977.
[9] Major sources used were the New York Times, July 27 edition and Newsweek, August 1 issue.

costs are particularly hard to determine since much of the cleanup was done by people already on the government payroll, and combined with regular sanitation services. In other cases there may be an overlap between the riot damage and cleanup cost categories. Injury costs were estimated by the city at $300,000, and this may be somewhat arbitrary. These items, however, are minor in relation to riot damage, so that an error of several orders of magnitude would be required to make a statistical difference.

Not included in the social costs are those related to environmental damage. Equipment such as precipitators, sewage plants, etc., would not operate as a result of the lack of electricity, and thus would spew out their waste material. Inasmuch as this was summer with an absence of heating load, no power plants were operating, and automobile traffic was minimal, air quality was probably not hurt and may well have been improved.

Water quality, on the other hand, may have been substantially degraded as a result of the dumping of raw sewage into streams and watercourses. No information on the extent of this damage was obtained from the city. Westchester County, on the other hand, did estimate the cost of operating sewage plants at $35,000 per day. If we assume the abatement cost to be equal to damage costs we would have a rough indicator of the environmental costs.

The economic costs

The cost of the blackout to the economy will include output lost or deferrred, utility losses, governmental costs in terms of lost taxes and other revenues, spoilage and damage to equipment, as well as inconvenience and frustration. The latter items are not measurable and therefore are not considered here.

Spoilage and equipment damage are difficult to estimate. Spoilage comes about as a result of a lack of refrigeration on a hot July day so that almost every resident of the city must have experienced some cost. Equipment damage, on the other hand, results from voltage surge or line overloads. Con Ed was asked for the total of the damage claims and law suits pending against the company as a consequence of the blackout. They have not been able to provide this information. As a consequence, we have derived a nominal figure based on the estimated daily value of food sales.

Con Ed was also asked to provide information on its own blackout costs including lost revenue, cost of service restoration, and repair or replacement of damaged equipment. The company, once again, was uncooperative and we have been forced to use estimates attributed to the company and published in the newspapers.[10] Con Ed equipment damage consisted primarily of transformers and cable put out of service as a result of overloading.

Output losses.—The New York City economy is primarily a commercial rather than an industrial economy. As shown in table 2, more than two-thirds of the city's output is contributed by the wholesale and retail trade sector with wholesale trade alone comprising 60 percent of the total. In considering these figures, one must keep in mind that data for the various sectors are not strictly comparable concepts, but there is sufficient similarity for our purpose.

[10] "Con Edison Posts Gains in Results For 2d Period." Wall Street Journal, July 27, 1977, p. 6.

TABLE 2.—VALUE OF OUTPUT, NEW YORK CITY, 1972 AND 1977

[Dollar amounts in billions]

Sector	Output		Percent of output
	1972 [1]	Estimated 1977	
Construction	$3. 0	$2. 5	1. 2
Finance, insurance, real estate	5. 5	12. 0	5. 9
Manufacturing (value added)	11. 6	21. 6	10. 6
Retail sales	15. 0	23. 4	11. 6
Services	12. 8	22. 7	11. 2
Wholesale sales	72. 6	120. 7	59. 5

[1] Technical Services Unit, "New York State Statistical Yearbook, 1977" New York State Division of the Budget, September 1977, p. 100–116.

To derive our 1977 estimates we updated actual 1972 data using the New York State Department of Commerce business index, and adjusted the result for inflation. The index (1967=100) is computed separately for New York City, various other parts of the State, and the State as a whole. It is a seasonally adjusted, weighted composite of 7 sectoral indices, each measuring the physical volume of activity in a sector of the economy. These include factory output, retail and wholesale trade, services, construction, transportation—communication—public utilities, as well as finance—insurance—real estate. The index thus provides a fairly good indicator of business activity in the State and its political subdivisions.

It should be noted that if inflationary impacts were not included, the real dollar volume would be somewhat less than in 1972 since there have been actual declines in construction, retail sales, and to a lesser extent, wholesale sales. Value added by manufacturing increased, services have held constant, while the finance—insurance—real estate sector has exhibited substantial real growth.

The overall index for the city indicates business activity is below the 1967 level, and in July 1977 was equal to July 1976 (table 3). The city and State indices tend to follow the same trend, although the State exhibits a somewhat faster growth rate. Business activity in the State is above the 1976 level, primarily as a result of activity outside of New York City. The latter, however, constitutes such a large portion of the State economy, that fluctuations in the city are bound to be reflected in the State data. As a consequence, the city and State indices are highly correlated. This close relationship, resulting from the fact that one is part of the other, negates our ability to use growth in State business activity as a guide to the output losses in the city. A review of the two indices over a 15-month period (June 1976—August 1977) shows no appreciable variation between them, nor does the July city index show any noticeable impact from the blackout. This may be due, in part, to the process used to adjust the data for seasonal variations, and partially to imprecision in the numbers. A major contributor to the failure of the monthly index to pick up the impact of the blackout is the fact that a full day's output would only constitute 4 percent of the monthly total. The actual proportion lost would be even less inasmuch as the city economy is such as to assure

that the bulk of the output lost on the day of the blackout will be made up at a later date. For example, the stock markets did not appear to suffer substantial losses (table 4). Trading during the week of the blackout was greater than it had been the previous week (which included the July 4 holiday), but less than the comparable week the year before. The year before had been rather high although succeeding weeks in that year were at a lower level. In 1977, volume continued to build from the week of the blackout. Considering the erratic nature of the market and its sensitivity to political and economic events of the moment, it is difficult to draw firm conclusions. On balance, however, losses appear to be minimal.

TABLE 3.—INDEXES OF BUSINESS ACTIVITY, NEW YORK STATE AND CITY BY SELECTED MONTHS, 1976 AND 1977 [1]

Area and month	Business index (1967=100; seasonally adjusted)	
	1976	1977
New York City:		
June	96	96
July	96	96
August	95	97
New York State:		
June	107	108
July	107	108
August	106	110
Upstate:		
June	117	120
July	117	119
August	117	120

[1] New York State Department of Commerce; "Business Trends in New York State," September and October 1977; and "Quarterly Summary of Business Statistics, New York State, July–September 1976."

TABLE 4.—WEEKLY TRADING BY STOCK MARKETS, SELECTED WEEKS, 1976 AND 1977

[In millions of shares]

Stock market	Week of—			
	July 11, 1977	July 4, 1977	July 5, 1976	July 12, 1976
New York Stock Exchange	94.5	83.7	79.8	116.0
Midwest	5.7	4.3	3.6	6.3
Pacific	4.5	3.8	3.4	3.9
NASD	4.5	3.2	4.3	5.1
Philadelphia	1.4	1.1	1.2	1.7
Boston	.9	.6	.7	1.2
Cinncinnati	.9	.9	.5	.6

Source: Barron's, issues of July 11 and 18, 1977, and July 12 and 19, 1976.

On the other hand, Bureau of Census retail trade data for the city indicate a decline in daily sales from $52 million in June 1977 to $48 million in July. A part of this decline is the result of seasonal influences. The unadjusted retail sales business index indicates a decline between June and July of 2 to 3 percent due to seasonal factors. Adjusting our July data for seasonal influences indicates a retail sales loss from the blackout of approximately $3 million. These minor losses appear logical when one considers that wholesale and retail orders not placed on July 14 can just as easily be placed on another day. Thus, close to

95 percent of the retail business lost on the day of the blackout was recovered afterward.

Estimation of losses from other sectors of the economy are more difficult to make due to a lack of data. As a consequence, we have turned to a grosser method and prepared a simple trend of the business activity index for the city to determine where the index might have been without the blackout. In this regard it should be kept in mind that although the percentage variations are small, the numbers are large.

Working from the implied annual city output of $202.9 billion in table 2, and adjusting for seasonal influences, we estimate total output in July 1977 to be $16.3 billion. From the trend calculation referred to earlier we estimate this output would have been 0.3 percent higher if the blackout had not occurred. Thus we can estimate lost output as a result of the blackout at $49 million. This comprises 9 percent of the average daily output of $526 million, indicating that 91 percent of the output was made up in the ensuing days.

In deriving this estimate we have not included data for Westchester County because service was generally restored by morning. Thus business life should not have been severely impacted. Further, as the county economy is small relative to the city, its data would have been lost in the rounding process.

During the course of the blackout, virtually all commercial activity came to a halt except for hotels. These did a rather good business. Although most of these businesses recouped their lost output in subsequent days, they did suffer a deferral of income, and in some cases additional costs for overtime, interest charges, etc. To compensate for this deferral of revenue we have considered as an economic loss interest at the rate of 8 percent per year on the $477 million in recouped output. Although there is no way of determining the rate at which these deferred losses were made up, we have estimated that construction and manufacturing deferrals were recouped through overtime at the rate of 2 hours per day for 4 days, that 25 percent of services (including hotels) were never deferred and the remainder made up in 2 days, and that all other deferrals were recouped over the following week. An extra day's interest was levied to cover the intervening Sunday. This may well be a rather conservative estimate.

Aside from the costs of the deferral, the city government would lose revenue due to reduced sales and wage tax collections, off-track betting revenues not collected, subway and bus fares forgone, etc. The wage taxes lost are particularly difficult to estimate since some employers paid wages for the day and some did not. For example, the city and Federal Governments paid for the day, but the state did not. Despite the difficulty, the city has estimated its revenue loss at close to $20 million.

To the above costs, however, would have to be added an amount to cover the inconvenience suffered by the population in terms of lack of elevators, lack of air conditioning, lack of lights, etc. These costs, however, cannot be quantified in any definitive fashion and we have not tried.

National costs.—The bulk of the blackout costs incurred by the economy will be regional in nature, and generally will have minimal

impact outside of the Consolidated Edison area. As noted earlier, however, the stock markets located in other cities generally operated at lower levels for the day. Also, various TV broadcasting functions had to relocate to Washington, D.C., for the period of the blackout. Further, losses were sustained by businessmen outside the region who were unable to buy or sell to those inside, as well as by those unable to ship to the city or receive goods from the city. In order to estimate these losses we have derived a multiplier based on the direct and indirect requirements per dollar of delivery to final demand for the wholesale and retail trade sector.[11] This we have taken at 1.5 times the city's output loss. In computing this multiplier the wholesale and retail trade sectors were utilized, since these account for 80 percent of New York City total output. In computing national costs, we have made no effort to deduct business transferred elsewhere, since as far as we can determine, there was none.

In addition, the computed national costs implicitly include an allowance for lost revenues suffered by other utilities that would have supplied Consolidated Edison with energy had the system been operating. We estimate the average daily purchase at $0.5 million based on July 1977 purchases of 666.7 million kilowatt/hours for $14.3 million. The company also paid capacity charges which are not reflected in the losses since we assume these would be paid in any case.

Thus, we estimate national losses as $73.5 million or approximately 2 percent of the nation's total daily output ($4 billion).

The total.—As indicated in table 5, 43 percent of the economic costs were suffered by the Nation, and 29 percent were regional output costs. The importance of national costs is the result of our interdependent economy and the ripple effect that this engenders. It should be noted that if the city were more of an industrial bastion, the national costs would have been higher even with the same local output loss because the multiplier impact of most manufacturing industries is greater than the wholesale-retail trade sector.

The cost of the blackout

The cost of the blackout tends to be evenly divided between social and economic costs with the latter comprising 56 percent of the total (table 6). The largest single item of cost is riot damage (39 percent) followed by national economic costs (24 percent).

The costs imposed on the Nation by the blackout are a minuscule portion of annual GNP (less than 0.1 percent), but do comprise 7 percent of the daily average GNP.

It may well be that the sheer size of the city coupled to the completeness of the outage combined to produce costs that would not be duplicated elsewhere, although the makeup of the city economy offsets these factors to some extent.

In presenting the data it is our feeling that while the quality of the numbers varies from hard to speculative, the proportions between items appear logical, and the totals seem reasonable.

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[11] Summary Input-Output Tables of the U.S. Economy: 1968, 1969 and 1970. Staff paper 27, Bureau of Economic Analysis, U.S. Department of Commerce, September 1975. p. 94.

TABLE 5.—*Economic costs, Consolidated Edison blackout, July 13–14, 1977*

Item	Millions
Regional output costs:	
Output lost	$49. 0
Deferral costs	. 4
Total	49. 4
Utility costs:	
Revenue losses and service restoration	10. 0
Damaged equipment	10. 0
Total	20. 0
Governmental costs	19. 8
Spoilage and damage	10. 0
National costs	73. 5
Grand total—economic costs	172. 7

TABLE 6.—*The cost of an urban blackout, July 13–14, 1977*

Item	Millions
Social costs:	
Riot damage	$120. 0
Government costs	16. 8
Total	136. 8
Economic costs:	
Output costs	49. 4
Utility costs	20. 0
Governmental costs	19. 8
Spoilage and damage	10. 0
National costs	73. 5
Total	172. 7
Grand total	309. 5

APPENDIX A

GOVERNMENTAL COST ESTIMATES BY THE CITY OF NEW YORK AND WESTCHESTER COUNTY

THE CITY OF NEW YORK,
OFFICE OF THE MAYOR,
New York, N.Y., January 4, 1978.

Mr. ALVIN KAUFMAN,
Senior Specialist in Business Economics (Resources and Regulations), The Library of Congress, Congressional Research Service, Washington, D.C.

DEAR MR. KAUFMAN: In response to your November 18, 1977, letter to Mayor Beame, I submit the attached estimate of the cost of the July 13-14, 1977, blackout.

I hope this information is adequate.

Sincerely,

ARTHUR L. BORUT,
Acting deputy director for development.

Attachment.

COST OF BLACKOUT, EXPENSES AND DAMAGES

[In thousands of dollars]

	Costs				
	Total	PS	OTPS	CAP	Total
Agency:					
Corrections	770	540	80	150	
Education (BOE plus CUNY)	469	38	431		
Fire	[1] 566	[1] 475	46	45	
Housing authority operations	390	360	30		
Housing authority police	120	120			
HDA (demolitions)	1,800		1,800		
HHC	200	180	20		
Human resources	2		2		
Libraries	3		3		
Parks	9	9			
Police	9,512	9,502		10	
Real estate	8			8	
Sanitation	61	35	26		
TAD	59	59			
TA operations	728	620	11	97	
TA police	150	150			
Water and sewers	203	40		163	
Total	15,050	12,128	2,449	473	
Revenue losses:					
Taxes, fires, OTB and water charges					17,400
HHC					365
TAD					166
TA					1,825
Total					19,756

[1] $300,000 additional in disability claims for firemen.

Note: Total damages, expenses and revenue losses, $34,806,000.

(13)

WESTCHESTER COUNTY,
White Plains, N.Y., December 6, 1977.

Mr. ALVIN KAUFMAN,
Senior Specialist in Business Economics, Library of Congress, Congressional Research Service, Washington, D.C.

DEAR MR. KAUFMAN: This is in reply to your letter dated November 18, 1977, in which you requested the costs incurred by the various communities in Westchester as a result of the July 13–14 blackout. A survey was made by my office of Disaster and Emergency Services covering all political jurisdictions throughout the county. The figures are broken down into four (4) main categories and are as follows:

    (1) Protective measures (police, fire, DPW, etc.), $75,924.96;
    (2) Utilities (water, sewers, etc.), $12,907.76;
    (3) Public facilities and related equipment $3,283.87; and
    (4) Other, $16,375.

The grand total spent in Westchester County was $108,490.49. In addition to this money, the communities spent $46,335.35, which included administrative costs and fringe benefits.

We were unable to come up with an estimate of the environmental damage. However, the per day cost to operating the sewage treatment plants in Westchester County is $34,550.

If additional information is needed, please contact my office.
    Sincerely.

ALFRED B. DELBELLO,
County executive.

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