

**East River Repowering Project  
Cost Allocation Study for the  
New York Public Service Commission  
Cases 07-S-1315 and 09-S-0029**

**May 7, 2009**



**Prepared by  
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## 1. Executive Summary

Consolidated Edison Company of New York, Inc. (“Con Edison” or the “Company”) hereby files this cost allocation study (the “Study”) for the East River Repowering Project (“ERRP”) in response to a requirement of the New York Public Service Commission (“PSC” or the “Commission”) in Case 07-S-1315, Order Establishing Rate Plan.<sup>1</sup> The Steam Rate Order required the Company to perform a study of how the Company allocates the costs of ERRP between steam and electric customers; identify alternative cost allocation methodologies and make a recommendation as to the appropriate cost allocation methodology to apply.<sup>2</sup> As shown herein, the current approach of using the well-established “incremental” method (the “Incremental Method”) of allocating costs between electric and steam should be continued.

The Incremental Method has been used by the Commission for allocating costs between electric and steam systems since 1978 and has been applied to ERRP costs since 2004. As the Commission stated in its 2004 Steam Rate Order:<sup>3</sup> According to the Commission:

To stem an unacceptable exodus of steam customers to electric, the Commission adopted steam rates, and set cost allocations, that were purposely designed to retain steam customers and maintain a viable steam system. **It selected the ‘incremental’ method that has remained in use ever since,** which requires steam customers to pay only the separate steam production and capital costs.<sup>4</sup> (emphasis added.)

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<sup>1</sup> Case 07-S-1315, *Proceeding on Motion of the Commission as to Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Steam Service*, Order Establishing Rate Plan (“2008 Steam Rate Order”) (issued September 22, 2008).

<sup>2</sup> 2008 Steam Rate Order, Attachment 1, p. 10.

<sup>3</sup> Case 03-S-1672, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Steam Service*, Order Adopting the Terms of a Joint Proposal (“2004 Steam Rate Order”) (September 27, 2004), p. 26.

<sup>4</sup> 2004 Steam Rate Order, p. 26.

In explaining the well-established regulatory principle of the Incremental Method to allocate ERRP costs between the Company's electric and steam departments, the Commission's 2004 Steam Rate Order found "that the ERRP was selected and is being constructed for the substantial benefits it will provide for both the electric and steam systems."<sup>5</sup> The benefits to the electric system described by the Commission in the 2004 Steam Rate Order continued to exist when the Commission looked at ERRP costs again in 2006 and in 2008. Indeed, these benefits still exist today.

Specifically, the 2004 Steam Rate Order found that the "electric system will receive substantial benefits from this in-City electric plant because it will serve load pockets on Manhattan's East Side and elsewhere in the borough."<sup>6</sup> These reliability benefits were specifically recognized again by the Commission in its 2006 Steam Rate Order where it stated that "ERRP also has provided valuable reliability benefits to customers in Westchester,"<sup>7</sup> and noted that "ERRP's initial operating experience has been consistent with our expectation ... that the plant would benefit electric customers by enhancing reliability in the lower Manhattan load pocket."<sup>8</sup> As explained in more detail below, ERRP enhances electric reliability by being available for second contingency operation during the summer and for outage support year round. Indeed, this Study demonstrates that without ERRP the electric system would not be able to meet its second contingency design criteria and would have insufficient resources in the East 13<sup>th</sup> Street load pocket. Thus, the existence of ERRP has avoided the need to build new transmission infrastructure into lower Manhattan to support these reliability criteria. Clearly, avoiding a large infrastructure expense provides a significant savings to the Company's electric customers.

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<sup>5</sup> 2004 Steam Rate Order, pp. 26-27.

<sup>6</sup> 2004 Steam Rate Order, p. 27.

<sup>7</sup> Case 05-S-1376, Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Steam Service, Order Determining Revenue Requirement and Rate Design ("2006 Steam Rate Order") September 22, 2006, p. 24, fn. 22.

<sup>8</sup> 2006 Steam Rate Order, p. 24.

The long-standing Incremental Method also recognizes that ERRP provides other significant benefits to electric customers. Those benefits, which have been repeatedly cited by the Commission, include both quantifiable benefits, such as the substantial proceeds from the sale of the First Avenue Properties that were made possible by the replacement of the Waterside plant by ERRP, as well as benefits that are difficult to quantify, such as regional air quality improvements, economic development, and the substantial savings to electric customers from the continued viability of the steam system. As so aptly stated by the Commission in the 2004 Steam Rate Order:

Beyond this, any suggestion that the ERRP does not make economic sense for electric customers is entirely eliminated by the fact that electric customers will share in the net gain and proceeds obtained from the sale of the utility property located on First Avenue, and they will obtain this electricity from a new, efficient facility that produces a low level of environmental emissions. We found that the sale of this real property provides an important opportunity for East Side redevelopment that offers substantial societal benefits for the greater metropolitan area. Moreover, the continued operation of the steam system means that Consolidated Edison will not construct (or incur the costs for electric transmission and distribution system reinforcements) that would be needed to serve the energy loads of the customers who would switch. This too amounts to a sizable savings for the electric department obtained by adopting the incremental approach to the steam system that is supported by virtually all the interested parties except for Westchester.<sup>9</sup>

Although difficult to quantify, there can be no question that the energy deliveries into lower Manhattan provided by ERRP has resulted in lower wholesale energy prices (in the form of lower locational based marginal prices or LBMPs) that accrue to all of Con Edison's market purchases, as well as to the market purchases of other load serving entities throughout New York City and

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<sup>9</sup> 2004 Steam Rate Order, pp. 22-28.

Westchester County. This Study demonstrates that continuing the Incremental Method will enable electric customers in New York City and in Westchester County to continue to experience significant savings in wholesale energy prices. Thus, the value of ERRP to Con Edison's electric customers is not only the avoidance of purchasing electricity at current market prices, but also the amount by which market prices decreased as a result of ERRP.

Similarly, the cost allocation of the fuel burned at ERRP using the Incremental Method assures that fuel use efficiency is maximized and that very low emission levels and other environmental benefits provided by cogeneration for the steam system are retained for the benefit of all customers. This was recognized by the Commission in the 2008 Steam Rate Order, where it noted the value produced by ERRP associated with "securing the economic and environmental benefits associated with the displacement and sale of the First Avenue Properties."<sup>10</sup>

Importantly, as initially recognized by the Commission in the 2004 Steam Rate Order,<sup>11</sup> shifting ERRP costs from electric to steam will harm the competitiveness of the Steam business and drive customers away from the steam system. Given the potential other increases in steam rates due to necessary improvements to the distribution system, the Hudson Avenue replacement and gas conversions at other steam plants, an increase in the level of ERRP costs allocated to steam customers would be neither practical nor prudent.

The Study further supports the continued use of the Incremental Method by analyzing at the allocation of fixed and fuel costs based on whether those costs support the electric or steam systems. For example, the Incremental Method allows fixed costs to be allocated based on a technical evaluation of the purpose of each piece of equipment. Thus, if a certain piece of equipment supports the electric system, its cost is allocated to electric and, similarly, if a certain piece of

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<sup>10</sup> 2008 Steam Rate Order, p. 39.

<sup>11</sup> 2004 Steam Rate Order, p. 26.

equipment supports steam generation it is allocated to steam. As such the Incremental Method supports the assignment of fixed costs on a cost causation basis. Similarly, the Incremental Method allows fuel costs to be allocated based on the reason why a quantity of fuel is being burned. For example, if the fuel is converted to electric energy in the combustion turbine generators, the cost of the fuel is allocated to electric customers. When fuel flows directly to the HRSG for supplemental steam production, 100% of this fuel is allocated to steam. With respect to non-fuel operations and maintenance (“O&M”), the Study shows that costs are charged to accounting codes that specify whether the benefits of the work apply to steam or electric production. The Study showed that slightly less than half of the 2008 O&M expenses were charged to steam.

In the 2008 Steam Rate Order, the Commission provided a clear summary of why the current allocation of ERRP is appropriate. Specifically, the Commission stated that:

previous decisions regarding ERRP clearly establish that the value of the plant and the allocation of its associated costs are based on a consideration of numerous factors, including the desire to ‘stem an unacceptable exodus of steam customers to electric and gas service’ and ‘retain steam customers and maintain a viable steam system’; enhancing reliability in Manhattan; securing the economic and environmental benefits associated with the displacement and sale of the First Avenue Properties; and avoiding cost for electric transmission and distribution system reinforcements that would have otherwise been needed.<sup>12</sup>

Thus, as the Commission has stated and reaffirmed on several occasions, the numerous benefits provided by ERRP to electric customers in New York City and Westchester demands that ERRP costs be allocated using the long-standing regulatory principle of the Incremental Method. This Study re-analyzes and re-confirms these benefits and demonstrates that there is no basis for the Commission to abandon its long-standing regulatory principle of using the

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<sup>12</sup> 2008 Steam Rate Order (footnotes omitted), p. 39.

Incremental Method to allocate ERRP costs between the Company's electric and steam departments. Accordingly, for the reasons set forth herein, the current Incremental Method should continue to be applied to ERRP costs.

## 2. Background

### A. Purpose of Report

The 2008 Steam Rate Order required Con Edison to perform a study of how the costs to Con Edison and its customers of owning and operating the East River Repowering Project are allocated between steam and electric departments.<sup>13</sup> The East River Repowering Project's rated capacity is 370 MW winter electric and about 300 MW of summer electric, and 3,200 Mlb of steam<sup>14</sup>

The genesis of the current Incremental Method of cost allocation is based on a series of Commission orders which are listed in Appendix A, Table 1. In general, this regulatory principle that the Commission has consistently supported since 1978 follows the accounting principles of cost causation, pursuant to which costs are assigned based on the function of a piece of equipment or an operating activity. The Incremental Method assigns costs which are shared between electric and steam to electric, while assigning costs associated with steam-only functions to the steam customers.

The Study's outline resulted from collaboration among parties to the Case 09-S-0029 during the first quarter of 2009. Sections 3 through 5 of this Study focus on the allocation of the costs and revenues of the East River Repowering Project using various allocation methods. Beyond a narrow discussion of cost allocation, the agreed upon outline called for the Company to identify benefits and costs to steam and electric customers that influence policy choices relative to sustaining the steam system. This broader discussion is contained in Section 6. Section 7 describes the importance of the steam system from a customer

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<sup>13</sup> 2008 Steam Rate Order, Attachment 1, p. 10.

<sup>14</sup> The nomenclature for the East River Repowering Project is as follows: East River Turbine 1, Boiler 10 (Unit 1/10) and East River Turbine 2, Boiler 20 (Unit 2/20).

perspective. Finally, Section 8 contains Con Edison's recommendations for ERRP cost allocation going forward.

## **B. Description of the Steam System**

Con Edison's steam system consists of six steam production facilities and approximately 105 miles of integrated distribution and service mains of varying diameters and design operating pressures. Four of the current Company's six steam production facilities were originally developed for electric generation as cogeneration facilities to support rapidly growing electric demand in New York City.<sup>15</sup> The steam distribution system was built to maximize the efficiency and utilize the waste heat from the conventional steam turbine-generators at these sites. The adjacent, dense and large heating loads of Manhattan enabled the establishment of large scale cogeneration and the resulting energy efficiencies inherent in the simultaneous production of electric and useful thermal energy. The result was the largest district heating system in the nation by far. Cogeneration, that utilizes waste heat from steam turbine-generators, uses approximately one-third less fuel than if the steam and electricity were produced separately. This environmental and fuel conservation benefit has been enjoyed by New York area residents since the beginning of the steam system's operation in the late 1800s.

When Con Edison divested its fossil electric-only generating plants in 1999 to foster New York State's goal of a competitive electric supply wholesale market, portions of the steam-electric cogeneration system were decommissioned. Specifically, electric generation was retired at the Waterside, 59<sup>th</sup> Street and 74<sup>th</sup> Street locations and much of the production at these locations became steam only. Therefore, significantly less steam is produced today from cogeneration

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<sup>15</sup> The Brooklyn Navy Yard Cogeneration Project ("BNYCP") is the only steam plant not owned by Con Edison. This plant cogenerates electricity and steam for Con Edison customers under a Power Purchase Agreement.

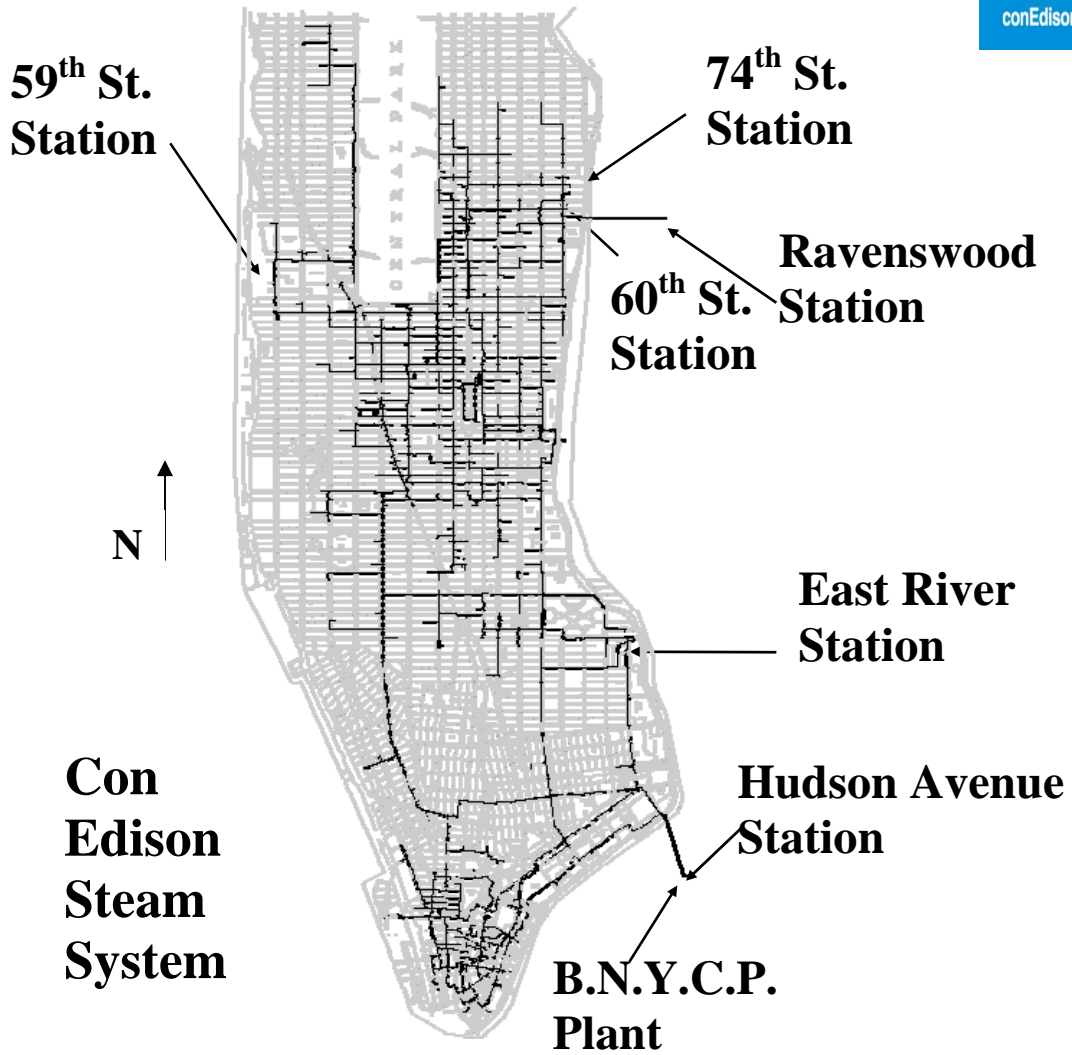
than had been the case previously. Still, over half of the system steam production comes from cogeneration at Con Edison's East River Generating Stations and at BNYCP, which is under a purchase contract. The Company continuously sought ways to improve overall system efficiency by maximizing the utilization of these cleaner, more efficient units. Today, the importance of energy conservation and environmental impact mitigation is a top priority of policy makers and the citizenry as a whole so the role of cogeneration plants in Con Edison's steam system is arguably even more important now than ever.

The steam system currently has a total of 13,229 Mlb/hr of net steam generating capacity. A list of stations is shown in Figure 2.1 and a system map showing plant locations and the distribution system is depicted in Figure 2.2.

**Figure 2.1**  
**Steam Generation Rated Capacity (2008–2009 Winter)**

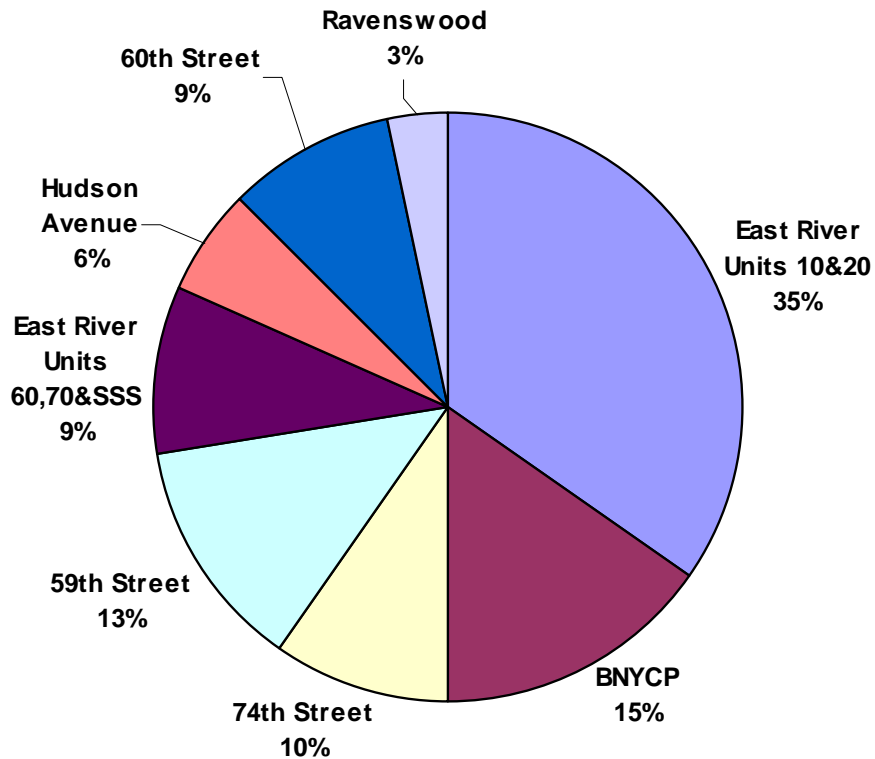
<b>Steam Generating Station</b>	<b>Net Capacity (Mlb/hr)</b>
East River 1/10 and 2/20	3,200
East River 6/ 60	830
East River 7/70	1,186
East River South Steam Package Boilers	650
Hudson Avenue Boilers	1,600
74 <sup>th</sup> Street HP Boilers	1,300
74 <sup>th</sup> Street Package Boilers	708
60 <sup>th</sup> Street Package Boilers	696
59 <sup>th</sup> Street HP Annex Boilers	950
59 <sup>th</sup> Street Package Boilers	381
Ravenswood Steam	750
BNYCP Contract	978
<b>Total</b>	<b>13,229</b>

**Figure 2.2**  
**Steam System Map**



The East River Repowering Project is made up of the newest steam production units. It provides the largest share of steam and its central location allows it to serve both downtown and midtown steam loads. Figure 2.3 provides a breakdown of sendout from the facilities supplying Con Edison's steam system for 2008.

**Figure 2.3**  
**2008 Steam Sendout by Station**  
(Total Sendout = 27,919,939 Mlb)



As shown in Figure 2.3, cogenerated steam from the East River Repowering Project Units (East River Units 1/10 and 2/20) and BNYCP (pursuant to the purchase contract) make up about half of the steam produced annually. The dispatch of steam units are based on cost, emission impact and system reliability

requirements. The East River Repowering Project units were installed in part to replace the aging Waterside steam-electric generating facility (“Waterside”), which had been the largest steam production facility. ERRP took over that role with the difference being modern technology, greatly reduced emissions and additional needed electric generation.

Another important aspect of the East River Repowering Project was the installation of the First Avenue tunnel and its 36-inch diameter steam main that enables East River Units 1/10 and 2/20 to serve the uptown district at the same location where Waterside steam was previously supplied. Steam supply can now be directed to uptown and downtown areas via remotely operated control valves.

The Con Edison steam system serves most of the large commercial buildings and many large residential buildings in Manhattan that are close to the steam distribution system, which extends from Battery Park in downtown north to 96<sup>th</sup> Street. There are approximately 1,760 customers and the system is a crucial component of the City’s energy supply portfolio.

### **C. Electric and Steam System Needs when the East River Repowering Project was permitted**

The East River Repowering Project was built to achieve the following objectives:

- To supply additional needed electric energy and capacity into the market at a time when capacity was urgently needed;
- To provide additional electric generating capacity in the East 13<sup>th</sup> Street load pocket where no other generating sites were available and where development of electric generation might otherwise be prohibitively expensive;

- To utilize existing space and structures made available as a result of retired electric generation at the site, thereby minimizing environmental impact;
- To improve local and regional air quality;
- To replace the Waterside, one of the oldest facilities in Con Edison's steam production fleet, and New York City's power generation fleet with modern cogenerated electric production;
- To replace Waterside's base loaded steam production at a location that could serve both midtown and downtown; and
- To take advantage of Waterside properties real estate value at a time when property values were at or near their highs.

ERRP is also a necessary element for meeting the Company's electric reliability requirements, which was recognized during the planning and approval phase of the project. Moreover, in 2001, 2002 and 2003 the New York Independent System Operator ("NYISO") indicated that the in-city capacity requirement was barely met even when the East River Repowering Project was included.<sup>16</sup> The in-City capacity need was so urgent that the NYISO reports also showed the need for the temporary repowering of 65 MW from Hudson Avenue Unit 10/100 and the addition of 440 MW of small combustion turbines by NYPA. The consensus among interested parties, regulators and generation suppliers was the extreme shortage of electrical generation in the New York City geographic area could lead to rolling blackouts and high prices which would hinder economic growth. The Commission and Staff supported the East River Repowering Project throughout the approval process.<sup>17</sup>

In addition, the East River Repowering Project was needed at its specific location to meet local reliability requirements of the East 13<sup>th</sup> Street load pocket. The documentation in the Article X application emphasized the East River

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<sup>16</sup> NYISO Power Alerts, 2001, 2002, and 2003.

<sup>17</sup> 2004 Steam Rate Order.

Repowering Project's contribution to electric reliability by pointing out that the East River Repowering Project is the only generating unit located in southern Manhattan and is interconnected to some of the most critical electric loads in the state. Specifically, Section 2.6 of the Article X Application states that the "...project will provide increased electric generating capacity in the lower Manhattan and overall in-City load pockets." There can be no question that but for ERRP the lower Manhattan load pocket would become deficient by 2005.<sup>18</sup> In fact, the East River Generating Station is the only source of generation located within the lower Manhattan load pocket. All other generation must be otherwise "imported" from other areas of the City. Additional discussion on East River Repowering Project's contribution to electric system reliability is contained in Section 9 of this Report.

From a steam supply perspective, the East River Repowering Project is the largest and most strategically located production resource. The Project provides base loaded steam capacity and also provides vital operating reserve. Finally, the East River Repowering Project is a low cost supply of steam to New York City customers since it maximizes fuel efficiencies as a cogeneration facility.

#### **D. Sale of the First Avenue Properties and Disposition of Proceeds**

As part of the restructuring of the steam system undertaken the late 1990s, the PSC approved replacing the output from Waterside by the East River Repowering Project, thus enabling the sale of the First Avenue Properties.<sup>19</sup> The Company received \$608.8 Million from the sale of the First Avenue Properties, resulting in a pre-tax gain of \$239.2 Million net of book value, cost of sales and closing costs. The as-approved net gain after taxes was \$131.2 Million. The net proceeds were distributed to electric, gas and steam customers in accordance

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<sup>18</sup> Article X, section 2.6, pp 2-8, (Case No. 99-F-1314), East River Repowering Project.

<sup>19</sup> Case 96-S-1065 et al, Order Concerning Phase II Steam Plan Report (issued December 2, 1999).

with PSC-approved allocations.<sup>20</sup> The Company also spent a portion of these proceeds on environmental improvement projects at its other locations throughout the City (see Figure 2.2), thus providing environmental benefits in the City and also in down wind areas where NOx would chemically react in the environment creating ozone, which is a contributor to respiratory health problems. These environmental benefits are explained in more detail in Section 7.

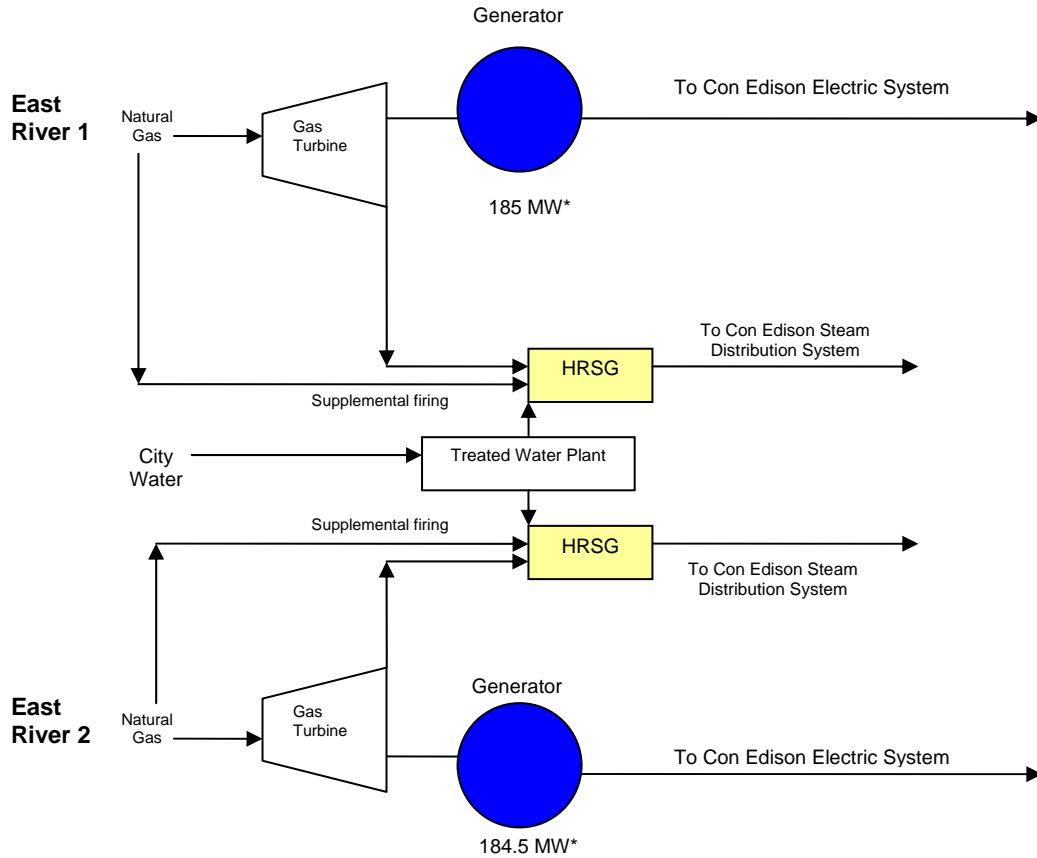
#### **E. East River Repowering Project Physical Plant Description**

The configuration of East River Units 1/10 and 2/20 (Figure 2.4) consists of two nominal 175 MW combustion turbines for electric production and two 1,600 Mlb/hr Heat Recovery Steam Generators (“HRSGs”) for steam production. Waste heat from the combustion turbine exhaust gases is recovered in the HRSGs for generating steam.

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<sup>20</sup> Case 01-E-0377, Order Approving Accounting and Ratemaking With Modifications (issued and Effective August 22, 2008).

**Figure 2.4**  
**Schematic for East River Repowering Project**  
**Units 1/10 and 2/20 Cogeneration Plant**



\* Winter Rating

Unlike the other steam-electric units in the system, this configuration does not have low pressure steam turbines and condensers due to the following site specific constraints:

- Water cooled condensers were no longer permissible for newer plants on East River because of water resource environmental regulations;

- Air cooled condensers were considered but not selected due to noise and thermal pollution considerations in the City neighborhood;
- The high capital cost of steam turbines and condensers would have increased the carrying charges for the electric customers; and
- The site had space limitations for air cooled condensers.

The East River Units 1/10 and 2/20 were built with an optimum configuration for this New York City site. At ERRP, electricity is produced in the gas turbines and steam is produced: 1) as a by-product utilizing the waste heat in the turbine exhaust, and 2) from duct-firing directly to the heat recovery steam generator. Consequently, steam cannot be produced without electric generation, and electricity cannot be produced unless steam is dispatched to the steam system. This requirement has placed operational constraints on both the steam and electric systems because the steam peak and electric peak demands do not occur at the same time. However this constraint comes with a benefit; the cogeneration process provides synergistic savings in energy costs and environmental benefits by avoiding wasteful heat dissipation in condensers or discharges up the stack. The overall thermal efficiency of East River Units 1/10 and 2/20 reaches about 87% considering the combined energy output of steam and electric production, compared to 35% in a typical simple cycle electric plant or 45% to 50% for a combined cycle plant with air cooled condensers.

Figure 2.5 below shows East River Repowering Projects' electric and steam production capacity under three operating modes. At maximum steam production capacity of 1,600 Mlb per unit, more than half the fuel comes from duct-firing. Below a steam sendout threshold of 750 Mlb per hour, steam production comes solely from the waste heat of the combustion turbines.

**Figure 2.5**  
**East River Units 1/10 and 2/20 Maximum Generation Capacity**

<b>Load</b>	<b>Electric East River Unit 1/10 MW</b>	<b>Electric East River Unit 2/20 MW</b>	<b>Steam Each Unit Mlb/hr</b>	<b>Impact on Steam System</b>
Electric Minimum (Operation below 50% of GT capacity not recommended.)	77	75	500	Steam can not be generated without GTs in operation. This results in a minimum steam load requirement.
Electric Maximum	185 (winter)  (146.9 summer)	184.5 (winter)  (148.1 summer)	750	Maximum steam production using CT exhaust without firing duct burners.
Steam Maximum	185  (146.9 summer)	184.5  (148.1 summer)	1,600	Duct burner firing increases steam sendout with no incremental electric production.

The East River Repowering Project units are equipped with selective catalytic reduction and oxidation catalyst for reducing air pollution. This equipment is located in the HRSGs so that the steam production process can cool the hot exhaust gases from the gas turbines to a temperature range where the environmental control equipment can perform in an optimum and economical manner. In addition, firm gas is supplied to the East River Repowering Project units and low sulfur distillate fuel oil is only burned during gas system emergencies. The duct burners for the HRSGs were designed to only run on natural gas.

### **3. The Incremental Method**

Since 2004 ERRP costs have been allocated between electric and steam using the long-standing regulatory principle known as the Incremental Method, which “requires steam customers to pay only the separate steam production and capital costs.”<sup>21</sup> Use of the Incremental Method recognizes that “ERRP was selected and is being constructed for the substantial benefits it will provide to both the electric and steam systems.”<sup>22</sup> A key element of the Incremental Method is the use of cost causation principles to determine whether certain pieces of equipment support electric or steam operation at ERRP. The following is a description of how the Incremental Method is applied to the various categories of ERRP costs.

#### **A. Capital**

The East River Repowering Project cogeneration plant costs are shared by the steam and electric customers based on the following principle: All costs (original equipment, property taxes, fuel and O&M) associated with the equipment needed for electric production are assigned through interdepartmental rent payments to the electric customers and those needed for steam production are assigned directly to the steam rate base and to the steam customers.

Capital costs allocated to electric production include the procurement and installation cost of the following major equipment and construction projects:

- Combustion turbine – generators;

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<sup>21</sup> 2004 Steam Rate Order, p. 26.

<sup>22</sup> *Id.*

- Accessory Electric equipment (such as generator step up transformers, circuit breakers, cables, etc.);
- Electrical Gas distribution and electric transmission interconnections;
- Electrical auxiliary system for the plant;
- Inside the plant gas supply piping to the gas turbines;
- Heat exchangers, with fresh water and salt water piping supply and oil water separators for cooling electric cables and turbine lubricating oil;
- Control systems;
- Environmental control equipment for removing pollutants from exhaust gases;
- Refurbishment of an existing Stack #2 for the East River Repowering Project use;
- Pre-East River Repowering Project relocations & Building alterations; and
- Structural work needed for installation of this equipment.

Capital cost for steam production includes the following steam production equipment:

- HRSGs;
- Inside the plant gas supply piping for duct burners;
- Back-up fuel oil storage tank refurbishment and piping;
- Water treatment plant, City water piping, storage tanks, and chemical storage;
- Waste water neutralization;
- Blowdown piping;
- Deaerators;
- Boiler feed pumps with motors and associated electric equipment;
- Steam equipment (pressure control valves, de-superheating stations and steam flow measurement);
- Control systems;

- Fire prevention & protection system;
- Steam piping inside the plant;
- Steam distribution piping reinforcement including first avenue tunnel to uptown;
- Structural work needed for installation of this equipment; and
- New condensate return piping from Stuyvesant Town.

Based on an allocation and compilation of the equipment and installation costs associated with the above equipment lists, the total capital costs were found to be in the ratio of approximately 2/3 to electric and 1/3 to steam at the time of commissioning the plant operation.

Appendix B, Table 1, shows the plant book value at commencement of commercial operation in April 2005 and for year-end 2006 through 2008. Appendix B, Table 2 and 3 show the split between electric and steam carrying charges respectively for the same time periods. These carrying charges include depreciation, return, income taxes and property taxes.

## **B. O&M**

Actual O&M costs incurred are charged as incurred and expensed on a monthly basis to steam and electric departments. O&M costs associated with electric production equipment (as described in Section 3 A, above) are charged to the electric department and those for steam production equipment are charged to the steam department. The major O&M accounts for electric pertain to the combustion turbines and other electric equipment. The major O&M accounts for steam pertain to the heat recovery steam generators and water treatment.

### **C. Property Taxes**

Property taxes associated with electric production equipment are charged to the electric customers and those for steam production equipment are charged to the steam customers. This allocation is shown in Appendix B, Tables 2 and 3.

### **D. Fuel**

In the East River Repowering Project plant design, there are two fuel streams: (1) fuel fired in the gas turbines for electric generation, and (2) fuel fired in the HRSG duct burners for supplemental steam generation. Fuel fired in the combustion turbines for generating electricity is charged entirely to the electric system, and fuel fired in HRSGs is charged entirely to the steam system. Natural Gas is procured on a non-interruptible basis to meet emission restrictions. Low sulfur distillate is available but restricted to 16 hours per year and only for emergency gas contingencies.

The fuel allocation to the electric customers is consistent with the Incremental Method. All of this fuel burn is necessary for electric generation in a simple-cycle process. This is because the wasted heat content of the turbine exhaust is used in the HRSG; therefore steam is a byproduct of the electric production. Unlike other cogeneration plant designs, the steam produced by the East River Repowering Project does not cause any electric de-rating. Steam production, in fact, facilitates electric production as the HRSGs are the only disposition for the gas turbine exhaust gases which would not be permitted to be released without going through the environmental controls located in the HRSG. The environmental controls would not be functional unless the turbine exhaust gases are cooled by the HRSG.

The fuel (natural gas only) fired in the HRSG duct burners for additional steam generation is charged entirely to the steam customers. This fuel does not

contribute to any electric generation as there is no steam turbine in this plant design.

**E. Electric Revenues (Energy, Capacity, Ancillary Services)**

All of the revenues derived from East River Repowering Project's sales for electric energy, capacity and ancillary services are allocated to the electric customers. Energy payments are based on the NYISO's published prices and delivered volumes applicable to each of the two East River Repowering Project units. Capacity payments are based on the amounts certified by Con Edison and accepted by NYISO in accordance with the NYISO's tariffs and procedures. Ancillary service payments cover voltage support service and are based on amounts certified by Con Edison and accepted by NYISO in accordance with the NYISO's tariffs and procedures.

#### **4. Analysis of the East River Repowering Project Electric Revenues and Costs and Steam Costs Using the Current Allocation Method**

##### **A. Energy and Fuel Cost Analysis**

###### **1. Market price assumptions when the East River Repowering Project was permitted**

This section of the Study examines price forecasts in 2000 when ERRP was permitted. Price assumptions used in the original East River Repowering Project economic analyses were provided in Case 99-F-1314 in Volume 1, Section 2 of the Article X application. Tables 2.6, 2.7, and 2.8 from the Article X application have been reproduced in this document as Appendix C. These Company exhibits were reviewed by the Siting Board and supported findings that the Project was in the public interest.<sup>23</sup>

On an overall avoided costs basis relative to Waterside and other alternatives, ERRP was determined to be economic. The Siting Board stated:

“Adding the electrical generation to the Project, the examiners concluded, would reduce electric production costs and enhance reliability within the lower Manhattan and in-City load pockets. The examiners observed that the project would displace the Waterside Station’s dispatch of approximately 600 Gigawatt-hours (GWh) of electricity per year and an additional 1,700 GWh of generation from other plants. Were this generation displaced in the year 2002, the examiners noted that the associated fuel cost savings would be approximately \$25 Million....

The sum of the fuel cost savings and other production cost savings resulting from the Project, the examiners found,

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<sup>23</sup> Case 99-F-1314, pp. 38-39, Initial Order, August 21, 2001.

would amount to \$27 Million per year.... If the Real Estate Benefits were included, the total economic benefits from the Project to ratepayers would average approximately \$45 Million per year over 20 years.”

Article X - Table 2.6 in Appendix C shows the monthly fuel price for both Waterside and the Con Edison steam stations, as well as the annual Market Energy and Capacity prices, for 2002. This table identified and calculated the monthly avoided costs for the Study Year of 2002 in the Con Edison system that would be generated from the introduction of the East River Repowering Project. Article X - Table 2.7 further analyzes these avoided costs and extends them over a 20-year period to obtain the overall levelized avoided costs of the project.

At the time that the Article X application was filed, the annual average gas price in NYC was shown to be around \$3.40/ MMBtu, which is significantly lower than the 2008 market conditions. The gas price forecast used to generate the levelized fuel costs savings in Article X - Table 2.7 estimated that the gas price would escalate throughout the 20 year period, shown in the increasing avoided fuel costs in subsequent years. Based upon the levelized cost analysis, the gas prices used in the original East River Repowering Project analysis ranged from \$3.40/MMBtu - \$4.90/MMBtu.

The Energy Market price for Study Year 2002 was an annual average of \$29/MWh, as shown in Article X - Table 2.6, which is also much lower than current market conditions. The Energy Market price forecast used to generate the levelized Energy Cost savings shown in Article X - Table 2.7 estimated that the energy price would escalate throughout the 20 year period, shown in the increasing avoided energy costs in subsequent years. Based upon the levelized cost analysis, the energy prices used in the original East River Repowering Project analysis ranged from \$29/MWh - \$44/MWh.

Figure 4.1 below provides the projected fuel costs and energy revenues using this same set of forecasted prices from 2002 through 2008. The table shows that fuel costs were expected to exceed energy revenues through 2008. This demonstrates that fuel costs anticipated at the time the project was permitted might not be fully recovered through offsetting energy revenues.

**Figure 4.1**

	<b>ERRP Forecast</b>						
	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Generation (MWh)	2,360,000	2,360,000	2,360,000	2,360,000	2,360,000	2,360,000	2,360,000
Electric Fuel (\$1000)	\$107,300	\$109,200	\$111,100	\$113,000	\$115,200	\$117,400	\$119,600
<b>Fuel (\$/MWh)</b>	<b>\$45.47</b>	<b>\$46.27</b>	<b>\$47.08</b>	<b>\$47.88</b>	<b>\$48.81</b>	<b>\$49.75</b>	<b>\$50.68</b>
Energy (\$1000)	\$68,652	\$70,210	\$71,768	\$73,325	\$75,001	\$76,700	\$78,376
<b>Energy (\$/MWh)</b>	<b>\$29.09</b>	<b>\$29.75</b>	<b>\$30.41</b>	<b>\$31.07</b>	<b>\$31.78</b>	<b>\$32.50</b>	<b>\$33.21</b>
Net Fuel (\$1000)	\$38,648	\$38,990	\$39,332	\$39,675	\$40,199	\$40,700	\$41,224
<b>Net Fuel (\$/MWh)</b>	<b>\$16.38</b>	<b>\$16.52</b>	<b>\$16.67</b>	<b>\$16.81</b>	<b>\$17.03</b>	<b>\$17.25</b>	<b>\$17.47</b>

2. East River Repowering Project Electric Energy Market Prices and Fuel Prices from In-Service date through first quarter 2009 And Forecast Prices through 2011

Figures 4.2 shows unit monthly average prices for electric energy along with associated unit fuel costs charged against the East River Repowering Project production cost for the period starting with the plant's in-service date of April 2005 in-service date through first quarter 2009.<sup>24</sup> Both fuel and electric prices have increased substantially between the time the Project was permitted and late 2008. The wholesale energy prices in the figure reflect extreme market volatility in both gas and electricity markets where the energy prices ranged from a low of \$52/MWh to a high of almost \$150/MWh. The average electric price through the period was \$85/MWh. Monthly fuel unit costs during this same time period ranged from a low of \$8/MMBtu to a high of \$15/MMBtu with the average price being \$10/MMBtu.<sup>25</sup> The standard deviation for wholesale electricity prices during this period was \$24/MWh or 28% around the mean and for gas it was \$2.31/MMBtu or 23% around the mean.

Figure 4.2 also shows forecasted electric energy and fuel prices from May 2009 through December 2011. There has been a drop-off in natural gas prices since early 2009. These low gas prices are anticipated to continue through 2010 due to a combination of industry-specific and general economic factors.<sup>26</sup> Figure 4.3 shows the extent of the reduction since June 2008. For example, forward prices as of June 2008 for summer 2009 were above \$11.00 and have dropped below \$4.00.

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<sup>24</sup> The unit electric energy prices are monthly averages derived from hourly prices and hourly deliveries.

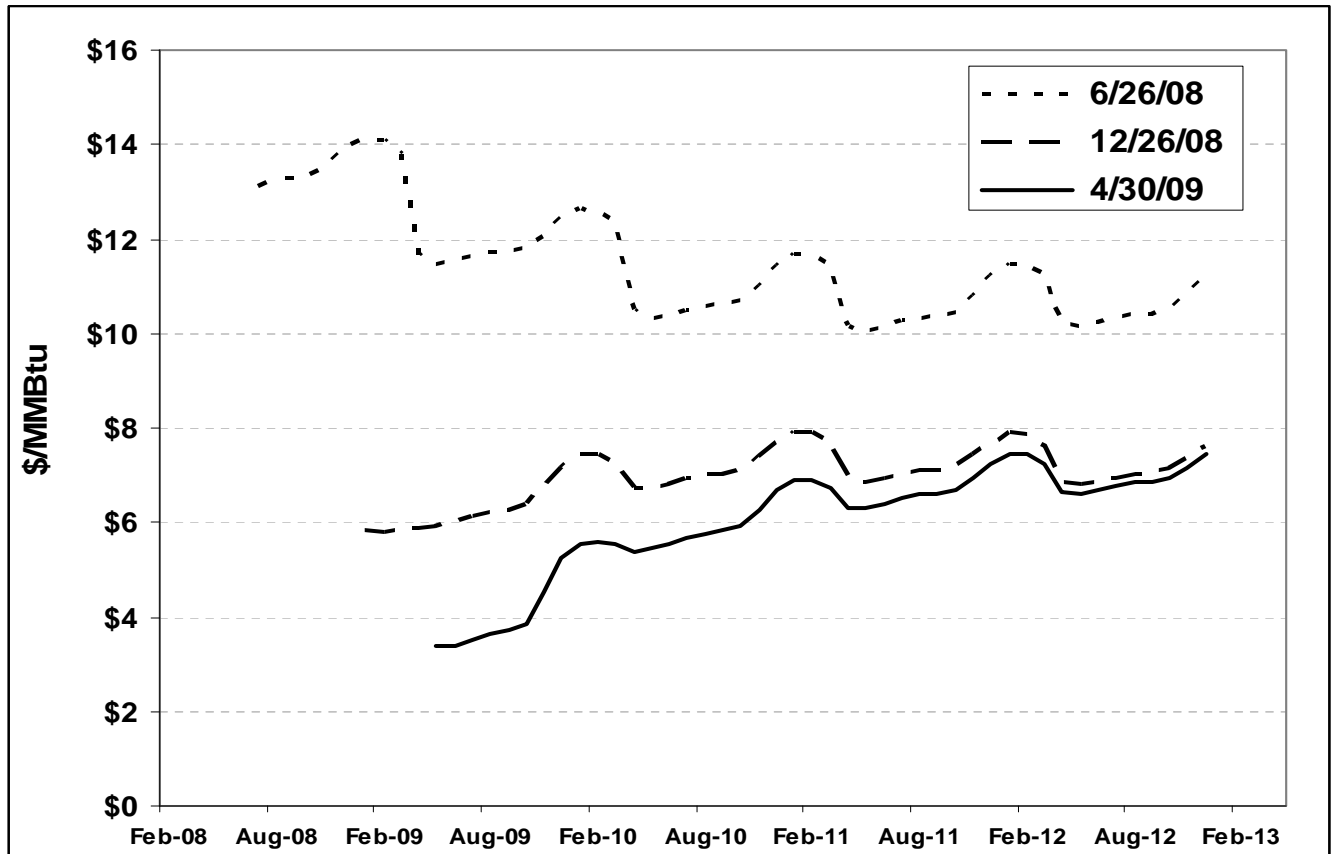
<sup>25</sup> The fuel prices are shown in terms of \$/MWh in Figure 42a and Figure 42b shows the conversion of unit gas prices to unit electric energy prices based on the East River Repowering Project heat rate.

<sup>26</sup> Northeast Gas Association, Regional Market Update, February 2009, pp. 11- 12.

**Figure 4.2**  
**East River Repowering Project Natural Gas Prices**  
 (\$/MMBtu and \$/MWh)

	2005		2006		2007		2008		2009		2010		2011	
	\$/MMBtu	\$/MWh	\$/MMBtu	\$/MWh	\$/MMBtu	\$/MWh	\$/MMBtu	\$/MWh	\$/MMBtu	\$/MWh	\$/MMBtu	\$/MWh	\$/MMBtu	\$/MWh
Jan			\$13.8	\$81.7	\$8.7	\$68.0	\$10.9	\$93.8	\$10.1	\$74.6	\$9.0	\$70.0	\$10.0	\$80.0
Feb			\$10.6	\$73.8	\$10.8	\$90.8	\$11.2	\$97.8	\$8.1	\$53.6	\$8.0	\$70.0	\$9.0	\$80.0
Mar			\$9.2	\$70.7	\$10.1	\$79.8	\$11.3	\$90.9	\$7.5	\$53.4	\$7.0	\$60.0	\$8.0	\$60.0
Apr			\$9.2	\$66.5	\$9.5	\$82.1	\$12.0	\$102.8	\$5.0	\$50.0	\$6.0	\$60.0	\$7.0	\$60.0
May	\$8.8	\$66.0	\$8.6	\$62.1	\$9.2	\$75.0	\$12.6	\$104.3	\$5.0	\$50.0	\$6.0	\$60.0	\$7.0	\$70.0
Jun	\$8.1	\$92.6	\$7.5	\$70.1	\$9.3	\$82.6	\$13.7	\$149.3	\$5.0	\$60.0	\$7.0	\$70.0	\$7.0	\$70.0
Jul	\$8.4	\$101.5	\$7.3	\$92.9	\$8.6	\$76.9	\$15.0	\$144.6	\$5.0	\$70.0	\$7.0	\$80.0	\$7.0	\$90.0
Aug	\$9.2	\$130.3	\$8.4	\$97.7	\$7.6	\$80.1	\$11.1	\$91.3	\$5.0	\$70.0	\$7.0	\$80.0	\$7.0	\$90.0
Sep	\$12.9	\$144.5	\$8.2	\$51.7	\$7.2	\$65.5	\$10.0	\$81.9	\$5.0	\$60.0	\$7.0	\$60.0	\$8.0	\$70.0
Oct	\$15.7	\$131.2	\$5.7	\$62.0	\$8.3	\$70.0	\$8.9	\$67.1	\$5.0	\$50.0	\$7.0	\$60.0	\$8.0	\$70.0
Nov	\$15.8	\$90.6	\$9.4	\$69.2	\$9.4	\$69.4	\$8.8	\$66.5	\$6.0	\$50.0	\$8.0	\$60.0	\$8.0	\$60.0
Dec	\$13.9	\$114.6	\$10.7	\$64.6	\$10.1	\$93.3	\$10.7	\$67.5	\$8.0	\$60.0	\$9.0	\$60.0	\$9.0	\$60.0
<i>Forecast</i>														

**Figure 4.3**  
**Changes to Natural Gas Forward Prices since June 2008**  
 (NYMEX – Henry Hub)



Electric energy prices, which track natural gas prices during on-peak periods in Zone J, are also dropping. Figure 4.2 includes a recent set of forward electric prices for zone J dropping to the \$50s and \$60s. The forecasts also indicate that the “spark spread” which is the difference between the fuel production cost and the energy price, will generate positive revenues for ERRP in some months and that there will be a significant reduction in East River Repowering Project’s fuel costs not recovered from electric energy revenues that is allocated to electric in 2009. For example, July and August NYC gas prices are forecasted to be \$5.00/MMBtu and zone J energy prices are forecasted to be \$70/MWh. This indicates a market heat rate during this time frame of 14.0, well above ERRP’s actual heat rate.

3. Actual Monthly East River Repowering Project Electric Revenues and Costs

Fuel Costs and Electric Energy Revenues

Appendix D, Table 1 shows monthly fuel costs and electric energy revenues from April 2005 through first quarter 2009. This table reflects the extreme price increases and its impact on fuel costs and electric revenues. Fuel costs charged to electric range from a low of slightly under \$60 Million per month to a high of nearly \$180 Million. As shown in Appendix D, Table 2, fuel consumption and resulting electric production volume have been steady at the ERRP plants. Therefore, this wide swing in fuel costs and in net fuel costs, after receipt of electric revenues, is due almost entirely to the fuel and electric price swings discussed above. The monthly margin ranged from positive (electric over fuel) \$2 Million to negative \$14 Million. Figure 4.1 also shows forecasted fuel and energy prices through 2011. The figure shows that the East River Repowering Project energy revenues may exceed fuel costs for much of the next 24 months. Based on 2008 fuel volumes and energy sales, the monthly margin will range

from positive \$2.5 Million to negative \$4.5 Million and the total annual net fuel cost for the period April 2009 through March 2010 is forecasted to be negative \$15 Million. This substantial reduction in forecasted net fuel costs is a result of the low gas price environment discussed previously.

4. Monthly East River Repowering Project Steam Costs

Actual fuel usage and actual fuel costs are shown in Appendix D, Table 1 and 2. Over half of the plant's steam production capability is met through duct-firing capability. When steam sendout exceeds approximately 750 Mlb per Unit, duct-firing is required and all fuel used for duct-firing is allocated to the steam department (See Section 2, Figure 2.5). Thus, the proportion of fuel charged to steam will vary depending on the level at which the plant is run.

**B. Analysis of Capacity Market Prices Relative to Fixed Cost Recovery**

1. Capacity Prices at the time the Project was Permitted.

The capacity market price was assumed to be starting at \$105/kW-yr in 2002 or an annual average of \$8.75/kW/month. As was discussed previously, the Article X application anticipated that there would be significant new supply coming into the market that would drive prices down to the "long-run cost of a new in-City CTG by 2010." This assumption can be seen in the significant decline in Capacity Costs shown in Article X - Table 2.7 between 2002 and 2010. After 2010, the analysis assumed that capacity prices would increase slightly year to year for the remainder of the 20 years. From this analysis it can be seen that the Capacity Market price was expected to range from \$77/kW-yr - \$105/kW-yr during the 20 year period evaluated. This is comparable to capacity price ranges experienced since the Project's operation in 2005. These actual prices are shown in Figure 4.4 below.

**Figure 4.4**  
**Annual Capacity Prices**

<b>Year</b>	<b>Annual Price (\$/kW)</b>
2005	107.02
2006	105.88
2007	107.54
2008	65.86

2. East River Repowering Project Fixed Costs and Capacity Payments

East River Repowering Project fixed costs for electric and steam are shown in Appendix B, Table 2 and Table 3. Fixed costs consist of:

- Depreciation expense;
- Cost of debt and equity;
- Income taxes;
- Property taxes; and
- Maintenance expenses.

The table shows that the carrying charge component of the fixed costs, which consists of depreciation, cost of debt and equity, and income taxes, declines as the book value of the plant declines with depreciation. This is offset by increased fixed maintenance costs and potential increases in property taxes. The East River Repowering Project is depreciated over a 30 year period at 3.3% per year. Since the cost of debt and equity and income taxes are a percentage of the depreciating book value of the plant, the carrying charge declines over time.

Capacity revenues reflecting sales of unforced capacity of approximately 300 MW (summer) and 360 MW (winter) are shown in Appendix D, Table 1. They

range from a winter low of less than \$1 million per month to a summer period high of over \$3.7 million per month. As discussed previously, the monthly interdepartmental rents charged to the electric department represent payment for the share of total plant that has been designated for electric service

3. O&M directly charged to electric and steam

Appendix B, Table 4 shows 2008 O&M charged to electric and steam. As discussed previously in Section 3 B, allocation of charges between electric and steam for O&M are based on whether the associated equipment is classified as electric production or steam production equipment. In 2008, 57% of O&M was charged to electric and 43% charged to steam.

## 5. Steam Production Costs for Steam-only Stations and Alternative Steam/Electric Cost Allocation Methods

This part of the Study, which analyses the impact of alternative allocation methods, was requested as a result of input from the active parties in Case 09-S-0029. In this section, the Study reviews system wide steam production costs: (i) prior to ERRP's operation, (ii) during the operation of ERRP through the present; and (iii) forecasted production costs. In addition, this part of the Study reviews system production costs under alternative East River cost allocation methods.

### A. Cost of producing steam at Con Edison's other steam stations when the East River Repowering Project was permitted

Annual steam production unit costs and total costs are shown for the years 2000 through 2004 in Table 5.1. The stations included are the same as those currently operating with the exception that Waterside was operating and not the East River Repowering Project. The table shows the average annual unit production cost, total sendout and total fuel cost for these years. It should be noted that these unit costs reflect fuel prices during this time frame. Details are shown in Appendix E, Table 1.

**Table 5.1**  
**Annual Steam Production Costs (2000 – 2004)**

Year	2000	2002	2002	2003	2004
Sendout (MMlb)	26,757	25,593	25,117	26,823	26,147
Total Cost (\$MM)	\$207	\$212	\$165	\$259	\$254
\$/Mlb	\$7.73	\$8.28	\$6.57	\$9.65	\$9.70

**B. Actual cost of producing steam at steam stations other than the East River Repowering Project in-service date through 2008.**

Annual steam production unit costs and total costs are shown for the years 2005 through 2008. Supporting details are shown in Appendix E, Table 2. The stations included are those producing “live steam” which excludes steam cogenerated by the East River Repowering Project units 1 and 2 as well as the Brooklyn Navy Yard’s share or steam costs. It should be noted that these unit costs reflect fuel prices during this time frame.

**Table 5.2  
 Annual Steam Production Costs (2005 – 2008)**

Year	2005	2006	2007	2008
Sendout (MMlb)	9,062	11,946	15,341	13,592
Total Cost (\$MM)	\$138	\$183	\$233	\$278
\$/Mlb	\$15.21	\$15.28	\$15.19	\$20.48

**C. Forecasted cost of producing steam at new steam boiler plant proposed at Hudson Avenue.**

Forecasted annual steam production unit costs and total costs are shown for the balance of 2009 through 2011. The costs are based on the fuel forecasts the Company provided in the ongoing steam proceeding multiplied by the expected steam heat rate for the proposed new package boilers. See Appendix D, Table 3 for supporting details.

**Table 5.3**  
**Annual Steam Production Costs (2009 – 2011)**

Year	2009	2010	2011
Gas Price (\$/MMBtu)	\$5.64	\$7.49	\$8.00
Steam Cost (\$/Mlb)	\$8.36	\$11.10	\$11.86

**D. Description of Other Methods for Cost Allocation and Comparison of the Resulting Allocation of Costs to Current Method**

Comparison of Alternative Cost Allocation Methodologies

This part of the Study examines the following alternate cogeneration fuel cost allocation methodologies and compares them with the current method. The following approaches are reviewed:

- Current Method (Incremental Method which includes the use of cost causation)
- Above-market reallocation
- East River 6 method.
- “Proportional Method” (used from 1975 to 1978)
- “Steam as a by-product” (used before 1975 and after 1978)

Figure 5.4 shows how system wide steam and electric production costs vary based on application of these alternative methods. Appendix F provides a detailed explanation of each alternative method as well as the backup for this summary table. The 2008 steam systemwide fuel production cost was \$12.22/Mlb. If the portion of the East River Repowering Project fuel costs that are consumed in the gas turbine for electric production and not offset by electric revenues are allocated to steam, the table shows that the steam system fuel

production cost becomes \$14.86/Mlb, a 16% increase in fuel costs and approximately an 8% increase in all-in rates. The table shows that electric rates would decrease by 0.6% if the fuel costs that are higher than the market value of electric are allocated to steam.<sup>27</sup> This is called the “above market method.”

**Figure 5.4**

Comparison of Fuel Cost Allocation Methodologies Using Year 2008 Actual Data							
Method	Method Description	Steam System Fuel Cost	ER 1, 2 Net Electric Fuel Cost*	Cost Shift from Electric to Steam	Electric Price % Savings from Cost shift to Steam	Steam Price % Increase from Cost Shift to Steam - all-in	Steam Price % Increase from Cost Shift to Steam - Non-fuel
		\$/Mlb	\$1,000	\$1,000			
Current	Charge GT fuel to electric, HRSG fuel to steam.	\$12.22	\$62,499	NA	NA	N/A	N/A
Above Market	Current method modified: transfer GT fuel costs above electric revenue to steam.	\$14.86	\$0	\$62,499	0.62%	8.07%	15.6%
East River 6 Method	Steam charged for fuel @ 1185 Btu/Mlb of steam, balance to electric.	\$17.51	-\$62,664	\$125,163	1.25%	16.17%	31.3%
Used from 1975 to 1978, PSC Case 26794	Electric and steam share fuel savings arising from cogeneration process on equal percent savings basis.	\$16.17	-\$30,993	\$93,492	0.93%	12.08%	23.4%
Steam priced as byproduct (Pre-1975 method)	Electric is charged entire fuel cost estimated of a proxy generator with Heat Rate 12.09 Btu/kW, remaining fuel charged to steam.	\$11.16	\$87,718	-\$25,219	-0.25%	-3.26%	-6.3%
Steam priced as byproduct (Modified Pre-1975 method)	Electric is charged entire fuel cost estimated of a proxy generator with Heat Rate equal to that of ER 1&2, remaining fuel charged to steam.	\$12.22	\$62,527	-\$28	0.00%	0.00%	0.0%

\* Electric fuel cost = cost of fuel charged to electric net of electric revenue.

<sup>27</sup> Electric revenue savings based on Con Edison total revenues at 4/1/08 (including supply)(\$62.5 M/\$9,832 M).

Other methods have been applied to Con Edison steam-electric plants prior to divestiture of electric generating plants in 1999. In those cases, the plants were constructed primarily to meet electric needs and steam was produced from waste heat. Steam was extracted from a steam turbine or bypassed a steam turbine. In either case, steam usage caused reduced electric generation. Overall plant efficiency improved however. Given these circumstances, and because most of the plant fixed costs, which was initially designed as an electric plant, was allocated to electric, various methods were devised to allocate fuel costs.

Appendix F includes a more detailed description of each of these alternate methods along with a calculation of the impact of those methods on the allocation of ERRP costs between electric and steam.

With the East River 6 method, when steam extraction results in reduction in electric production, the steam system is charged for the heat content of the steam at 1,185 Btu/Mlb. Thus, the electric system is compensated because its sale of steam has reduced electric production. The East River 6/60 method, if applied to ERRP fuel consumption, would have the most significant impact on steam rates, at 16% (on all-in rates) and 31% on fuel-only. This method is not appropriate for ERRP because steam production at ERRP does not result in a derating of electric capacity.

With the proportional method, savings from cogeneration at a given plant is shared based on the percentage fuel savings steam and electric enjoys from cogeneration, as compared to fuel usage from separate steam and electric production. The percentage difference between cogeneration and separate steam and electric is applied to this proxy generation. This method is described and illustrated in more detail in Appendix F. If this "1975-78 Method" were to be applied to the 2008 ERRP fuel costs, Figure 6.2 shows that the steam customers would incur 12% increase in all-in rates and a 23% increase in fuel costs, but electric customer would save only 1.04% of fuel costs.

Table 5.4 identifies two sets of calculations using the steam as a by-product approach. With this approach, fuel is allocated to electric based on the estimated fuel consumption of a proxy generator with the balance of the actual fuel consumption being charged to steam. In one set, the proxy generator uses a heat rate consistent with that used in the 1975 case. In the second set, ERRP's actual 2008 heat rate is used. In the latter case, the fuel costs allocation is approximately equal to that derived from the use of the Incremental Method.

Regardless of the method used, the impact from shifting costs from electric to steam will tend to have much greater impact on steam rates compared to electric rates because total electric revenues are more than ten times more than total steam revenues.<sup>28</sup>

#### **E. Discussion of 1975 and 1978 Experiences with Changes to Cost Allocation Methods**<sup>29</sup>

At the time of the 1975 rate proceeding, most summer steam demand was met from cogeneration units. Also, a substantial proportion of energy production from steam-electric boilers was delivered to steam.<sup>30</sup> In order to make up for proportionate changes to electric capacity relative to steam capacity, the Company requested transferring some plant carrying charges and fuel costs from electric to steam departments. The requested changes were intended to have no impact on the Company balance sheet.<sup>31</sup> The 1975 Steam Rate Decision

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<sup>28</sup> This fact is not intended to justify a particular allocation method based on its rate impact. It is relevant, however, because of the degree to which a rate increase in the smaller, more competitive steam business may lead to more business losses that in the longer run, would have an even greater impact on electric than the purported foregone savings from the current fuel allocation.

<sup>29</sup> Case 27276, *Consolidated Edison Company of New York, Inc. – Steam Rates*, Opinion and Order Determining Revenue Requirement, NYS PSC Opinion 78-27, (“1978 Steam Rate Order”) November 14, 1978.

<sup>30</sup> Currently, summer period steam demand has no material effect on electric production.

<sup>31</sup> At this time and prior to the divestiture of Con Edison's non-steam producing power plants, steam and electric assets were owned by Con Edison and consolidated into a single set of Company financial

proceeding changed the fuel allocation to the proportionate method identified previously and described in detail in Appendix F.<sup>32</sup> This called for steam and electric departments to share the cost savings arising from the cogeneration process on an equal percentage basis

Between 1975 and 1978, the steam business experienced an exodus of steam customers attributable to conversions from purchased steam to on-site generation. Higher steam rates resulting from adapting the proportionate method in the 1975 proceeding was a significant contributor to the conversion of steam customer to electric. Additionally, electric generation during this period from Con Edison steam/electric plants increased significantly to meet electric system requirements. This was particularly evident after the 1977 blackout. Thus, Con Edison's position in the 1978 steam rate proceeding (Case 27276) was that the expectations of 1975 were reversed and that steam should be treated as a byproduct. The PSC considered the Company's position and concluded:

The record is clear enough. There has been an exodus from the steam system attributable to conversions and it is also undisputed that lower rates would aid in stemming the tide of conversions. If the ultimate result of ever-increasing rates is the departure of all steam customers from the system, it will be disadvantageous to Con Edison's electric and gas customers. The ultimate benefit of retention of steam customers, flows, therefore, to all of Con Edison's customers and not merely to steam customers.<sup>33</sup>

The Opinion described the following additional reasons for reallocation:

- Electric dispatch data indicated circumstances changed from 1975;

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statements. The situation is quite different today, where most of the electric system is owned by independent power producers.

<sup>32</sup> Case 26794, *Consolidated Edison Company of New York, Inc. – Steam Rates*, Opinion and Order Determining Increased Revenue Requirement (November 25, 1975).

<sup>33</sup> 1978 Steam Rate Order, p. 7

- The steam system would retain responsibility for some of the cost of the joint facilities even after the re-allocation;
- Reallocation will provide incentive for steam customers to remain on the system rather than encouraging them to begin conversions at substantial cost;
- Conversions once made will never allow customers to return as steam customers; and
- Fuel required to produce electricity and exhaust steam is less than the total fuel required to produce equivalent steam and electricity in separate facilities; this benefit can not be realized in the absence of a steam business.<sup>34</sup>

As a result of these considerations, the Commission returned to treating steam as a by-product of electric generation with savings from cogeneration flowing to it, as compared to the proportional savings method that had been in place for three years back to 1975.

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<sup>34</sup> 1978 Steam Rate Order, pp. 7-8.

## 6. East River Repowering Project Benefits<sup>35</sup>

The Commission has long recognized that ERRP provides substantial benefits to both electric and steam customers. For example, in its 2004 Steam Rate Order, the Commission stated that the “electric system will receive substantial benefits from this in-City electric plant because it will serve load pockets on Manhattan’s east side and elsewhere in the borough.”<sup>36</sup> In the 2008 Steam Rate Order, the Commission stated that:

Previous decisions regarding ERRP clearly establish that the value of the plant and the allocation of its associated costs are based on a consideration of numerous factors, including the desire to “stem an unacceptable exodus of steam customers to electric and gas service” and “retain steam customers and maintain a viable steam system”; enhancing reliability in Manhattan; securing the economic and environmental benefits associated with the displacement and sale of the First Avenue Properties; and avoiding costs for electric transmission and distribution system reinforcements that would have otherwise been needed.<sup>37</sup>

This section of the Study describes the various benefits that ERRP provides.

### A. Reliability benefits to the Electric System

#### 1. Electric Reliability Needs when The East River Repowering Project was being Planned and Permitted:

During the time frame that the East River Repowering Project was planned and permitted, there was an urgent statewide and New York City need for additional

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<sup>35</sup> Quantifiable to the extent practicable.

<sup>36</sup> 2004 Steam Rate Order, p.27. See also, 1978 Steam Rate Order, pp. 7-8.

<sup>37</sup> 2008 Steam Rate Order, p.39 (footnotes omitted).

generating capacity. The 2001 NYISO Power Alert included the following recommendations:

- New York State should approve a substantial amount of new generation, in the range of 4,000 – 5,000 MW during 2001;
- New York State should also approve approximately 1,000 MW of generating capacity statewide each year for the next three to four years, with more than 50 percent of it located in New York City and Long Island;
- New York City, because it is both a major consumer of electrical power and also a “load pocket” (with limited ability to import power from outside the city over existing transmission lines) must have 2,000-3,000 MW of this additional capacity approved within its own area;<sup>38</sup>

Within one year of this 2001 report, The New York State Siting Board approved six new plants and repowerings totaling new net supply of 3,680 MW projected to be online by 2005. In addition, the New York Power Authority installed 440 MW of combustion turbines in New York City in 2001 on an emergency basis. The consensus among interested parties, regulators and generation suppliers was the extreme shortage of electrical generation in the New York City geographic area could lead to a California type issue of rolling blackouts and high prices which would hinder economic growth.

The East River Repowering Project contributed to resolving this reliability need. The project was approved by the Siting Board in May 2001 and was clearly a part of the solution to these reliability needs. The NYISO Power Alert II issued in March 2002 summarized the actions taken to meet reliability in the preceding year.<sup>39</sup>

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<sup>38</sup> NYISO Power Alert, March 2001, p. 4.

<sup>39</sup> NYISO Power Alert, March 2002, pp. 16-17.

Approved Projects

<u>Name</u>	<u>Company</u>	<u>MW</u>	<u>Expected In Service</u>
East River	Con Edison	360 Gross 160 Net	2Q 2003
Ravenswood	KeySpan	250	2003
Astoria Energy	SCS Energy	1000	3Q 2004

Application Pending Certification

<u>Name</u>	<u>Company</u>	<u>MW</u>	<u>Possible Certification Date</u>
Poletti	NYPA	500	2Q 2002

Emergency Actions

NYPA Combustion Turbines – 440 MW (6 sites)  
 Con Edison Hudson Avenue 10/100 Repowering from Retirement (66 MW)

2. Additional Studies

The New York City Energy Policy Task Force issued the New York City Energy Policy: An Electricity Resource Roadmap in January 2004, which agreed with the Con Edison approach to determining the need and placement for the East River Repowering Project. The need and placement for the East River Repowering Project as also supported by the report, Power Conundrums: Electrical Resources in the NYC Load Pocket by Michael F. Bobker of Association for Energy Affordability in 2004. These studies both concluded the need for in-City generation was valid to meet the 80% requirement in the near and intermediate term.

3. System Planning Perspective

The East River Repowering Project continues to provide important electric reliability benefits both locally and to the bulk transmission system.

The August 2003 East Coast Blackout reinforced the widely recognized fact that the regional electric system is integrated. Many technical studies that followed

this incident documented the extent of this interconnectedness. A report from the United States General Accounting Office; 2003 Blackout Identifies Crisis and Opportunity for the Electricity Sector highlighted the following:

- Electricity must be produced and consumed at almost the same time;
- A change in one area of the grid can affect other areas almost instantaneously;
- Infrastructure (such as power plants and transmission grid) has limited capacity;
- Local and regional supply and demand must be balanced to avoid blackouts; and
- Overall demand increases about 2-3% per year, but can vary widely by region.

Thus, generators and transmission lines within one neighborhood, county or region are needed to maintain supply and load balance throughout the grid. Con Edison's planning disciplines apply layers of design criteria in determining the impact that one or a collection of system elements has on reliability. The two most well known criteria which apply to generation in New York City are the 80% In-City generation rule and second contingency design. The East River Repowering Project was designed to enhance local electric reliability in general as well as to support adherence to these specific design criteria.

The documentation in the East River Repowering Project's Article X application emphasized the East River Repowering Project's contribution to electric reliability by pointing out that the East River Repowering Project are the only generating units located in southern Manhattan and are interconnected to some of the most critical electric loads in the state. Specifically, Section 2.6 of the Article X Application states that the:

...project will provide increased electric generating capacity in the lower Manhattan and overall in-City load pockets. As

described in Appendix I of the Application, the lower Manhattan load pocket would become deficient by 2005 absent the Project. The East River Generating Station is the only source of generation located within the lower Manhattan load pocket. All other generation must be "imported" from other areas of the City. The Project also provides a net increase in in-City generation of 125 MW (Project summer DMNC rating 288 MW less Waterside Station's rating of 163 MW). Absent the Project there is risk of deficiency in the in-City load pocket in 2002. Thus, the Project will help to insure reliability...

Any report related to electric reliability in New York City calls for discussion of load areas and networks.<sup>40</sup> The Company supplies electrical power to Manhattan through a grid of networks and load areas to ensure reliability. A network is one of several methods that Con Edison uses to provide power to customers. Other methods (used primarily for industrial and large commercial users) include High Tension (Direct supply from primary feeders at 13kV or 27 kV, depending on area), 460 Volt (supplied directly from primary feeders by dedicated transformers), 4kV networks, and autoloops. Networks represent the most typical infrastructure that is used to get power from the area stations (transmission and/or generation) to the customer.

The East River Repowering Project Article X application defined a load pocket as "a geographic area that, because of transmission limitations, must have internal generation resources available to ensure reliable service for the area's load under normal and contingency (equipment failure) conditions."<sup>41</sup> Although there may be a variety of definitions for a "load pocket" and while Con Edison studies the transmission system from a holistic system-wide perspective, the company utilizes the concept of transmission load pockets to illustrate the balance of generation, ties, and load within smaller areas.

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<sup>40</sup> Load pockets are also referred to as load areas.

<sup>41</sup> ERRP Article X Application, Glossary of Appendix A, p. 16.

The East River Repowering Project is located within the Manhattan electrical network which contains the East 13<sup>th</sup> Street load pocket.

The East 13<sup>th</sup> Street load pocket is the combination of the East 13<sup>th</sup> Street 138 kV and East River 69 kV stations. This includes generators East River 6, 7, 1, and 2, the loads at Leonard Street, Cherry Street, West 19th Street, Avenue A, East 29th Street and East 36th Street, as well as the ties from East 13<sup>th</sup> Street 138 kV to East 13<sup>th</sup> Street 345 kV and the tie from East River 69 kV to East 13<sup>th</sup> Street 345 kV. This load pocket encompasses all of lower Manhattan except for two areas: the areas west of Broadway and south of Thomas Street and the South Street Seaport area and its immediate vicinity. The East 13<sup>th</sup> Street area load is projected to be 1,554 MW in 2009.

Because it provides power into areas within Manhattan, the East 13<sup>th</sup> Street load pocket is considered a Second Contingency Design load areas. For reliability purposes, this load area must be able to withstand the loss of any two supply elements (i.e., a transmission tie into the load area or generation within the load area) and be able to maintain all remaining ties at or below normal ratings.

A load pocket projection was done for the East 13<sup>th</sup> Street load area as shown in Table 6.1. This shows that the load pocket contains adequate reserve of 281 MW initially, dropping to 116 MW for 2010 and to 109 MW for 2011. These are the overall changes to the reserves in the load area. The pre-contingency transmission loading is in the range of 90%, which is acceptable but nearing the upper limit. The load pocket was then re-evaluated with the East River Unit 1 and Unit 2 contribution to the network being removed. Without the support of ERRP, the reserve in the East 13<sup>th</sup> load pocket is -14 MW for 2009. Therefore, without East River Units 1 and 2, the East 13<sup>th</sup> Street load area would not meet its second contingency design criteria. The projected deficit grows to -179 MW for 2010 and -86 MW for 2011 due in part to retiring the Poletti Station. Thus,

ERRP is an essential element in satisfying electric reliability criteria for the East 13<sup>th</sup> Street load project. Reliability of the East 13<sup>th</sup> Street load area would be immediately compromised if the East River Repowering Project were not part of the present network.

**Figure 6.1**

**ERRP Load Pocket Review**

Based on the Load Forecast of September 25, 2008 with 658 MW of DSM - DSM 1,2,3,4 & 5  
 Summer Independent MW Area Peak Loads from Load Relief Program

	<u>2009</u>	<u>2010</u>	<u>2011</u>
<b>East 13th Street Area Load</b>			
Total Load (1,2)	1,554	1,500	1,507
<b>East 13th Street Area Supply</b>			
East River GT 1 (ERRP)	147	147	147
East River GT 2 (ERRP)	148	148	148
Other Generation	<u>314</u>	<u>314</u>	<u>314</u>
Generation Sub-Total:	609	609	609
Transmission Sub-Total:	<u>2,022</u>	<u>2,022</u>	<u>2,022</u>
Total Supply	2,631	2,631	2,631
<u>Design Contingency</u>			
Contingency Loss (3,4)	(796)	(1,015)	(1,015)
Area Capability	1,835	1,616	1,616
Reserve (Deficit)	281	116	109
Transmission Equipment Loading	77%	88%	89%
Reserve (Deficit) less ERRP	(14)	(179)	(186)

Notes:

- (1) Normal Rating based on R. Boggia's ratings of October 10,2001
- (2) MW ratings based on load flow studies
- (3) Loss of Tr 15 plus Tr 10 & 11
- (4) With the retirement of Poletti, the design contingency becomes the loss of 4 transformers TR 10,11,16 & 17

**B. Price Benefits to the Electric System**

Although difficult to quantify, there can be no question that the new efficient additional generating capacity provided by ERRP as compared to Waterside has resulted in lower LBMPs which provide a benefit to the retail customers of Con Edison and other LSEs throughout New York State and especially in New York City and Westchester County. Although it is difficult to precisely predict the level

of savings that accrue to New York City and Westchester County consumers by virtue of the existence of ERRP, this study provides some estimates based on certain supportable assumptions (a detailed list of those assumptions is provided in Appendix G). But clearly, the difficulty in estimating precisely how much higher the market prices would have been absent ERRP is not a reason to ignore the fact that customers receive a substantial benefit from ERRP in the form of reduced LBMPs. Thus, the value of ERRP to electric customers in both New York City and Westchester is not only the current market prices, but also the amount by which market prices decreased as a result of ERRP.

1. Impact on wholesale electric energy prices, capacity prices and ancillary services prices on system wide costs.

a. Electric Energy Price Impact:

Consistent with commitments Con Edison made as part of its Application for Certification of a Major Electric Generation Facility under Article X of the New York State Public Service Law (Case no. 99-F-1314) to construct East River Repowering Project, the Company bids its electric output into the electric market at its “to-go” cost.<sup>42</sup> Specifically, the Order approving the East River Repowering Project Article X application states “Since the Project’s operation is dictated by steam system demand, the examiners found that the applicable “to-go” cost for electric generation is likely to be zero at most times.”<sup>43</sup>

For this study, Con Edison performed an analysis of ERRP’s impact on wholesale energy prices using the year 2010 as an example. This analysis was based on the Generic Price Forecast of oil and gas prices that were provided by Con Edison to the parties in Case 09-S-0029. The analysis shows an estimated

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<sup>42</sup>East River Repowering Project Article X Application, May 2000, Volume2, pp. 2-10.

<sup>43</sup> Opinion and Order Granting Certificate of Environmental Compatibility and Public Need, Issued and Effective August 30, 2001, in Case 99-F-1314, pp. 8-9.

customer savings for 2010 of approximately \$109 Million in Zone J (NYC), approximately \$15 Million in Zone H and Zone I (Con Edison's Westchester service territory) and approximately \$206 Million statewide.<sup>44</sup> These estimated savings occur because East River Repowering Project's energy production results in reduced congestion and losses. Moreover, as this analysis indicates, the output from ERRP displaces a higher cost unit thus allowing ERRP's production to provide a benefit to electric consumers in the form of lower LBMPs. The assumptions and results of this study are shown in Appendix G, Tables 1 and 2. As indicated in Section 4.B.1, net fuel cost from East River Repowering Project's electric production was \$62.1 Million in 2008. This amount may be significantly less in 2009 due to current low gas prices. In any event, this analysis indicates that this level of net fuel costs and its associated impact on electric rates is more than offset by cost reductions to New York City and Westchester customers from ERRP electric deliveries and dispatch.

b. Capacity Price Impacts

Since the capacity from the East River units are considered to be self-supplied units, it is offered into the NYISO capacity auctions at a zero price, as is the case with self supplied capacity from other LSEs. The estimated price that all load serving entities pay for capacity procured in the auctions is effectively reduced by this self-supply. The price difference for the 300 MW of summer period self-supply is approximately \$0.90/kW/month per 100 MW or \$2.70/kW/month for this volume and approximately half of this amount for the six month winter period, based on the current capacity procurement method which utilizes a demand curve<sup>45</sup>. Although the total cost differential is subject to large estimating variation because it is difficult to quantify the amount of capacity the Company or other load serving entities buy under fixed price ("hedged") arrangements, even if only

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<sup>44</sup> Load costs are the costs paid by LSEs to purchase energy for their customers.

<sup>45</sup> Final NYISO ICAP Demand Curve Recommendations – Capability Years 2008 – 2011 in [WWW.NYISO.com](http://WWW.NYISO.com) (Products, ICAP).

50% of the Company's in-city procurement component (about 4,000 MW) were bought on the spot market, our estimates indicate that this price difference lowers in-city capacity costs by approximately \$100 Million over an annual period.<sup>46</sup>

c. Ancillary Services – Voltage Support:

A major portion of customer load is made up of transformers and motors. These devices generate magnetic fields in order to perform their function, creating "reactive" load which alters the relationship between the driving voltage and the resulting current that is seen by the utility's supply grid. If ignored, the growth in the reactive load could reach the point where electric system voltages would decline and customer loads could not be adequately supported. However, the impact of reactive load can be compensated by the utility through the utilization of capacitor banks, and through the manipulation of voltage at generation sources and transformers tap changers. The NYISO recognizes the value of this service and compensates generators accordingly. The East River Repowering Project provides this Voltage Support Service ("VSS") to the NYISO in accordance with Con Edison and NYISO guidelines.<sup>47</sup> This service enhances the voltage performance of the system supplying the East 13<sup>th</sup> Street 138 kV and East River 69 kV load areas and the bulk power transmission system by providing approximately 200 MVAR of reactive power support.

Generally, reactive compensation for load dissipates quickly over distance, and must be located within close proximity to that load. Furthermore, the effectiveness of reactive compensation varies according to the source, with generation being a robust source of reactive compensation, while capacitors or transformers tap changers are more limited in their capabilities to provide

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<sup>46</sup> The Company acknowledges that recently enacted buyer-side mitigation will require new self-supplied capacity to offer its capacity into the auctions at 75% of the Cost of New Entry under most circumstances. However, existing facilities including the East River Repowering Unit are grandfathered.

<sup>47</sup> East River Repowering Project Article X Application, Appendix I, Electric Interconnect Technical Studies, Section II.

reactive compensation. The East River Repowering Project provides an excellent source of reactive power compensation, as it satisfies both criteria. The generation is a robust source of reactive compensation, and is located close to the load for the strongest impact. The East River units are compensated at approximately \$1.4 Million per year by the NYISO for providing this service.

d. Avoided generation and transmission costs

The Commission in the 2009 Steam Rate Order stated that "...we note the record evidence that ERRP's 2007 electric fixed costs of \$93 Million are fair and reasonable with respect to estimated avoided costs totaling \$90 Million.<sup>48</sup> The electric fixed costs were \$85 Million in 2008 and are anticipated to decline moderately in the future due to plant depreciation. The Company's avoided costs were based on generation and transmission costs at the time ERRP was put into service in 2005. Therefore, there is no reason to revise this part of the Company's analysis or the Commission's findings.

### C. Analysis of Environmental Benefits

As shown below, ERRP has provided significant environmental benefits to the New York metropolitan area. Their benefits were recognized by the Commission in its recent rate orders.<sup>49</sup>

1. Emissions and Air Quality Improvements

The New York metropolitan area has experienced substantial improvements in ambient air quality since the passage of the 1963 Federal Clean Air Act. This is due to several pollution control initiatives including modernization of generating plants with newer technologies, retirement of older plants and switching to fuels

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<sup>48</sup> 2008 Steam Rate Order, p.40.

<sup>49</sup> 2008 Steam Rate Order, p. 39; 2004 Steam Rate Order, p. 27.

that emit fewer pollutants. However, the region has not achieved full compliance with certain National Air Quality Standards (“NAQS”). As a result, new large generating plants are required to comply with Nonattainment New Source Review (“NNSR”) regulations and Prevention of Significant Deterioration (“PSD”) regulations for other criteria pollutants. These regulations applied to construction of the East River Repowering Project. The project was a major step forward in achieving quality improvements sought by the public.

The PSD/NNSR regulations call for a two-fold process: 1) application of technological improvements to new emission sources combined with 2) phasing out operation of older, more polluting sources. The East River Repowering Project accomplished both objectives by retiring one of the older emission sources (Waterside) while replacing its capacity with the most fuel efficient plant in the area.

The East River Repowering Project has contributed to the improved air quality in the New York metropolitan area in several ways. To begin with ERRP phased out the following emissions sources:

- Retirement and demolition of Waterside removed an older emission source. Subsequent redevelopment of its real estate for non-industrial commercial and residential purposes improves the aesthetics in the city. The Waterside Generating Station occupied five city blocks along the East River, just south of the United Nations Building and among some of the most valuable and sought after commercial and residential real estate in the country;
- Five of the ten package boilers in East River South Steam Station (“ERSSS”) were taken out of service, thus reducing ERSSS emissions by 50%;

- As part of the project that retired Waterside and constructed the East River Repowering Project, a portion of the real estate sales was used to fund the following NOx reduction projects implemented at other plants, resulting in a significant reduction in NOx emissions:
  - East River Unit 6/ 60: Over fire air system;
  - East River Unit 7/70: Induced flue gas recirculation and over fire air systems;
  - East River South Steam Station: Gas burning capability;
  - 59<sup>th</sup> Street Station: Induced flue gas recirculation system for Boiler 118, and individual opacity meters for all boilers;
  - 60<sup>th</sup> Street Station: CO monitoring system for all boilers; and
  - 74<sup>th</sup> Street Station: Individual O2 meters and Beck drives for FD fan dampers for all package boilers, and individual opacity meters for all HP and package boilers.

In addition, the East River Repowering Project provided an indirect benefit by enabling the Company to implement the following other projects that improved the air quality:

- Prior to the construction of East River Units 1/10 and 2/20, East River Unit 5/50 was retired (with its water cooled condenser) benefiting air and river environments.

The East River Repowering Project emits significantly lower air pollutants compared to other existing steam and electric plants because this new plant was designed with modern combustion technologies that minimize the formation of air pollutants. East River Units 1/10 and 2/20 are operating with clean burning fuels, firm supply of natural gas and low sulfur distillate as emergency backup. The cogeneration process provides overall thermal efficiency requiring less fuel burn

for a given combined production of steam and electricity. Additionally, East River Units 1/10 and 2/20 are equipped with the following emission control equipment to remove pollutants from the exhaust gases:

- Selective Catalytic Reduction (“SCR”) reduces NO<sub>x</sub> generated in the combustion process;
- Oxidation Catalyst reduces CO and VOC; and
- Low sulfur content of the fuels reduces sulfur dioxide (“SO<sub>2</sub>”) that causes acid rain, and also reduces particulate matter.

2. Environmental benefits of the East River Repowering Project compared to Waterside

Following is a summary of an analysis that was submitted with the Article X permit application (2000), providing an estimate of statewide and citywide environmental benefits of the project. Two cases (before and after the project) were compared.

Case 1: Waterside was in service; East River Units 1/10 and 2/20 did not exist.

Case 2: Retired Waterside; East River Unit 1/10 and Unit 2/20 cogeneration were in service.

The Market Assessment and Portfolio Strategies (“MAPS”) program was used for determining the displaced electric production using a database of NYS electric generators recommended by NYSDPS staff. Purchases from neighboring power pools were also modeled. A computer simulation program (PROMOD) was utilized to determine the displaced steam production. These two programs are designed to approximate differences in area energy prices and production costs under varying supply and demand assumptions. In addition to prices, the programs calculate fuel costs, fuel usage and emissions.

The results of these analyses are summarized in Figure 6.2 and Figure 6.3. Figure 6.2 shows fuel usage reductions and emission reductions from running the East River Repowering Project compared with the system when Waterside was running before the East River Repowering Project. Total fuel saving was estimated at 7 Million MMBtu. To put this in perspective, this is the equivalent to eliminating the fuel consumption of a 500 MW load following conventional steam-electric generating station operating at 15-20 % annual capacity factor. This is a major fuel reduction increment.

**Figure 6.2**  
**Statewide Generation and Fuel Displacement Study - 2002**

<b>Source</b>	<b>Electric MWh</b>	<b>Steam MMib</b>	<b>Fuel* Billions Btu</b>	<b>Fuel Cost* \$Million 2002\$</b>
<b>Case 1</b>				
Waterside	593	10,700	18,800	63
In-City steam plants	-	3,100	4,400	16
In-City electric plants	280	-	2,888	8
Hudson Valley Plants	849	-	7,060	19
Other NYS plants	524	-	3,717	13
Total displaced *	2,246	13,800	36,865	119
<b>Case 2</b>				
ER1&2	2,360	13,800	29,815	100
Savings *			7,050	19

- Note: Does not include displaced energy from out of NY State.

The majority of the displaced generation from more polluting sources is expected to be from the New York City and the Hudson Valley region, and also from upstate sources. Figure 6.3 shows that the emission reduction benefits are not limited to New York City but that the entire state benefits from the East River Repowering Project. Statewide benefits include a reduction of 1,800 tons of SO<sub>2</sub>, 2,500 tons of NO<sub>x</sub> and half Million tons of CO<sub>2</sub>, excluding the emissions due to the displaced generation from out of state sources. These air quality benefits would mitigate the environmental impacts from acid rain due to SO<sub>2</sub>, respiratory health problems due to ozone formation from NO<sub>x</sub>, and global warming due to CO<sub>2</sub> emissions.

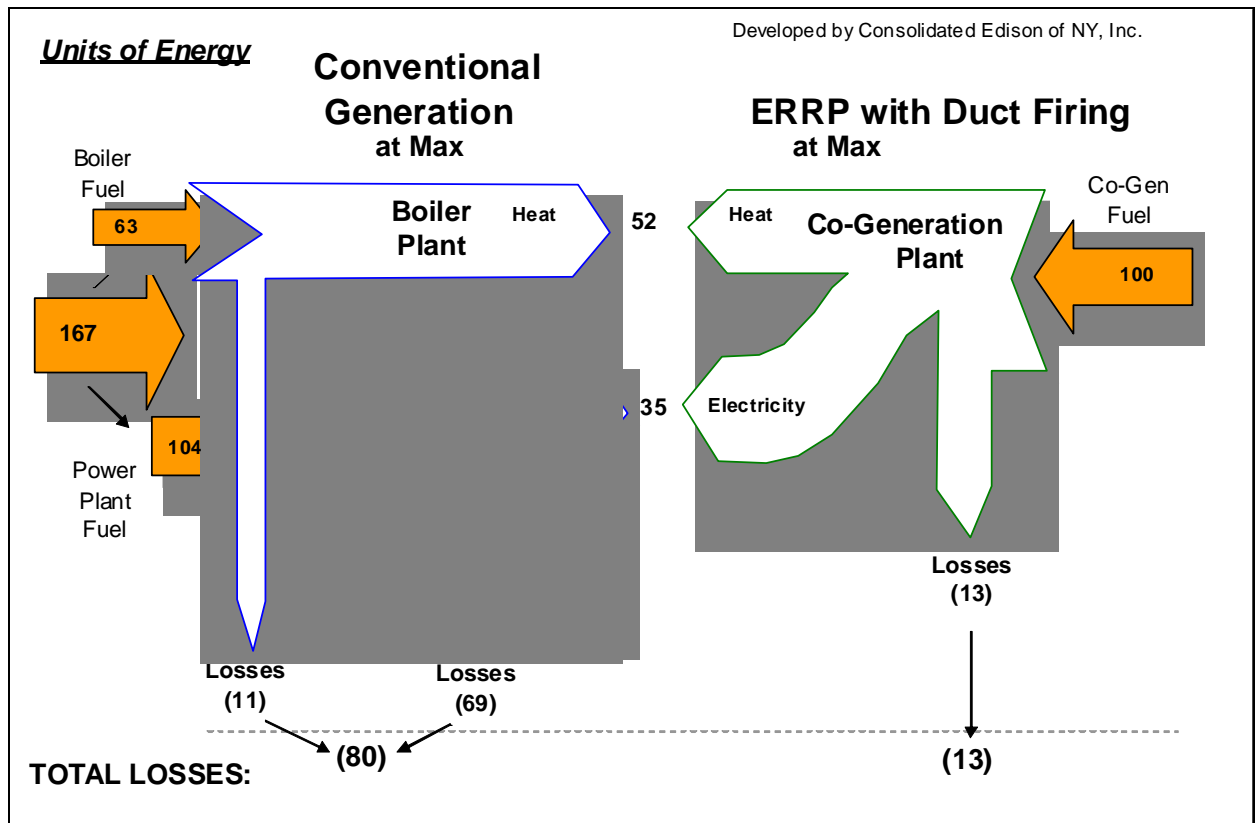
**Figure 6.3**  
**Statewide and Citywide Emissions Reduction Study (tons/Year)\***

<b>New York State:</b>	<b>Case 1 with Waterside</b>	<b>Case 2 with East River Units 1/10 &amp; 2/20</b>	<b>Benefits</b>
SO <sub>2</sub>	271,300	269,500	1,800
NO <sub>x</sub>	79,200	76,700	2,500
CO <sub>2</sub>	60,000,000	59,500,000	500,000
<b>New York City:</b>			
SO <sub>2</sub>	1,000	200	800
NO <sub>x</sub>	7,900	5,900	2,000
CO <sub>2</sub>	6,950,000	7,050,000	(100,000)

\* Reference: Case No. 99-F-1314, East River Repowering Project Article X Application Supplemental Information, S2, Amended MAPS Study (Analysis of Statewide Benefits), July 2000

3. Environmental benefits of the East River Repowering Project compared to steam-only and electric- only plants

Unlike many electric plants, there is no condenser in the East River Units 1/10 and 2/20 plants. Electric plants that do not have steam hosts emit waste heat up stacks or absorb waste heat in condensers. With the East River Repowering Project, most waste heat is used to produce steam. This design realizes the synergistic benefits of cogeneration at all load levels with less fuel burn and reduced air pollutant emissions. This results in a higher overall plant thermal efficiency (up to 87%) considering net steam and electric energy outputs. This compares to up to about 33% efficiency in a conventional boiler - steam turbine generator unit and up to 47% in a combined cycle plant with air cooled condensers and no cogeneration. The efficiency benefits are illustrated below.



Air emissions from cogeneration and non-cogeneration are compared in this analysis. In Case 1, actual data for East River Units 1/10 and 2/20 are used (annual 2007 emissions and fuel burn data). In Case 2, emissions are estimated for the same amount of steam being generated by a typical package boiler, and the same amount of electric power being generated by a combination of conventional steam turbine-generators and new combined cycle non-cogeneration plants (47% each). In this analysis, it is assumed all displaced steam and electric generation occurs in the metropolitan area, so no coal plants are included in Case 2. Heat rates and fuel mixes assumed in the analysis are shown in Figure 6.4.

Results in Figure 6.4, show that the East River Units 1/10 and 2/20 cogeneration process results in significant avoidance of air pollutant emissions in the city compared to generating steam from package boilers and electricity from existing power plants in the city. In terms of avoided allowance cost, the benefits are \$3 Million for carbon dioxide, \$0.14 Million for sulfur and \$4 Million for nitrogen oxides.

**Figure 6.4**  
**Environmental Benefit Estimate**  
**Comparison - East River Units 1/10 & 2/20 Cogeneration vs. Non-Cogeneration\***

	Generation		Emissions (tons per year)				Fuel Mix	
	Steam MMBtu	Electric GWh	CO2	SO2	NOx	PM10	Gas	Fuel Oil
<b>East River 1 &amp; 2 (Year 2007)</b>	10,012	2,221	1,477,255	8	87	71	100%	0%

<b>Proxy Boiler</b>								
Typical package boiler	10,012		1,135,224	1,417	2,236	209	40%	60%

<b>Proxy Electric Generator</b>								
50% from typical steam turbine generator		1,110	776,124	699	1,610	118	60%	40%
50% from new combined cycle plant		1,110	519,953	0	31	0	100%	0%
Total Proxy for ER 1 & 2	10,012	2,221	2,431,301	2,116	3,877	326		
Allowance Cost Avoided per year (\$1000)			\$3,435	\$138	\$4,074			

Allowance cost (2009 vintage) per ton from April 2009 market prices                      \$3.60      \$65.50      \$1,075.00

Heat Rate Assumptions:

East River Units 1/10 and 2/20: Actual fuel data for 2007, burning 100% gas;

Proxy Boiler: 1.5 MMBtu / Mlb burning 60% residual oil and 40% gas

STG: 10 MMBtu / MWh, burning 40% residual oil and 60% gas and

Case 2 CC: 8 MMBtu / MWh, fuel and emission factors same as East River Units 1/10 and 2/20

Emission Factors: Based on annual emission statements or EPA's AP-42 emission factors.

**4. Environmental Benefits to Water Resources**

Conventional electric plants use water cooled condensers that cause thermal pollution in the rivers and pose certain risk of killing fish in the service water intakes. More recent combined cycle plants are equipped with cooling towers or air cooled condensers that contribute thermal pollution in the ambient air and noise pollution to the neighborhood. By not having a condenser East River Units 1/10 and 2/20 plant design has completely eliminated these risks to air and water environments.

5. East River Repowering Project's Reliability Benefits to Steam System

The Con Edison steam system contains four geographic areas of Manhattan; Downtown (below 14<sup>th</sup> Street), Midtown (14<sup>th</sup> Street to 59<sup>th</sup> Street), Upper West Side and Upper East Side. The Hudson Avenue Station and the Brooklyn Navy Yard supply steam to the Downtown area; 74<sup>th</sup> Street Station, 60<sup>th</sup> Street Station, 59<sup>th</sup> Street Station and Ravenswood supply the Upper East and West Sides plus Midtown; and the East River Station is capable of supplying all four regions.

The ability to supply steam to all areas of the steam system makes the East River Station unique to the reliability of the system. East River Units 1/10 and 2/20 are interconnected throughout the service territory via two ring headers and five supply lines. The unit is the most important provider of operating reserve which "backfills" supply in the event a steam supply unit experiences a forced outage. Therefore, in addition to providing needed capacity throughout the system, the configuration and location of these units improves operating flexibility. In particular, by utilizing these units for operating reserve, the system dispatchers can avoid running more expensive units.

Since there is no industry-wide reliability standard to follow for steam distribution systems and since this is the largest steam system in the United States, Con Edison developed its own standard. This standard is ST01-01-20 and it requires that the Company maintain a certain amount of installed and operating reserve. The East River Project provides both types of reserves.

In sum, ERRP provides unique and substantial benefits to both the electric and steam systems, a fact clearly recognized by the Commission.<sup>50</sup> Notably, in the

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<sup>50</sup> 2008 Steam Rate Order, p.39; 2006 Steam Rate Order, p.24; 2004 Steam Rate Order, pp. 27-28.

2006 Steam Rate Order, the Commission specifically stated that “ERRP also has provided valuable reliability benefits to customers in Westchester.”<sup>51</sup>

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<sup>51</sup> 2006 Steam Rate Order, p.24.

## **7. Importance of Steam Service to New York City**

### **A. Impact on Steam Customers**

Steam service provides numerous advantages for commercial and residential heating customers. The Company has highlighted these advantages in many forums and it emphasizes them in its customer attraction and retention programs.<sup>52</sup> Steam customers avoid attendant problems of on-site boilers, such as hazardous material storage, emission distributions at lower elevations, the need for high-pressure boiler operators and increased traffic congestion where fuel oil deliveries are required. Steam service for air conditioning is provided in lieu of electric air conditioning, which, if unavailable, would increase electric generation and distribution resource needs. Steam air conditioning avoids approximately 350 MW of peak summer electric load and related electric distribution and transmission infrastructure. The need for additional gas distribution and transmission infrastructure is also avoided.

Nonetheless, the Company recognizes that steam rates are the primary decision criteria for choosing between steam purchases from Con Edison or on-site boilers for many customers. As discussed in Con Edison's 2007 Steam Resource Plan, a modest growth of less than 1% per year in peak demand is forecasted over a 20 year planning horizon. In the winter of 2008-09, the Company has observed conservation behavior that has reduced temperature adjusted steam sales volume. This behavior is most likely a reaction to both increased awareness of conservation techniques, in part through the Company's educational and outreach programs, but also the very high fuel prices experienced in the third quarter of 2008. In addition, the economic downturn has reduced new building development in the near term. Overall, the Company's

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<sup>52</sup> April 27, 2009 Technical Conference Presentation Materials in Case 09-S-0029, "Value of the Steam System"; The Company's 2008 Steam Strategic Plan.

steam customer base is not expected to grow substantially over the long term but the value of the service to the existing customer base as well as new commercial buildings/customers built near the steam distribution system remains strong under current conditions. Steam remains an essential part of New York City's energy supply portfolio.

The Company closely monitors lost business and takes action as appropriate to retain existing customers and attract new customers. The Company notes that approximately 80% of steam volumes are consumed by 25% of the customers. This 25% tends to include most of the customers that have realistic options for switching to on-site steam production – the “at-risk customers.” These large customers have the wherewithal to invest in capital improvements with longer paybacks. They also tend to more closely monitor their steam monthly bills. Large increases in steam rates will be noticed by these customers. Single large increases and/or several consecutive increases may therefore be a major threat to the long term viability of the steam business.

Service Classification 2 customers – Large Commercial Buildings – are the largest share of steam sales and have the most large customers. The average annual sales level for this grouping is roughly 50,000 Mlb per year. Given the approximate current annual sales level of 25,000 Mlb per year, a loss of 5 major customers reduce sales by 1%, causing a commensurate increase in steam base rates, all other things equal. There is significant risk that customer switching would accelerate from rate increases that are more frequent and of greater magnitude than has been recently exhibited. Although customer switching behavior trends have not caused net losses in sales since the 1975 to 1978 period, that experience is still illuminating. As noted above, the alternate fuel allocation methods all cause increases in cost allocations toward steam, ranging from 3% to 18% when measured against all-in rates. To the extent these increases exacerbate other non-discretionary increases associated with maintaining a safe and reliable steam service, the risk of a lost business chain

reaction are greater than the very small benefit which electric customers would yield in the form of slightly lower rates.

## **B. Impact on Electric Customers**

The benefits to electric customers from steam service have also been documented in several forums.<sup>53</sup> This report has explained electric reliability and environmental benefits that accrue to electric customers and the entire Con Edison service territories. Furthermore, steam air conditioning has been shown to reduce electric peak load, thereby reducing transmission, distribution and generation costs. Overall, the small benefits in reduced rates to electric from a change in the East River Repowering Project's allocation methods will be more than offset by the potential lost benefits that could occur if it triggers customer terminations of service and switching to competitive alternatives.

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<sup>53</sup> Id.

## 8. Recommendations

The well-established regulatory principle of the Incremental Method has been used by the Commission to allocate costs between electric and steam systems since 1978 and has been applied to ERRP costs since 2004 in recognition that the “electric system will receive substantial benefits from this in-City electric plant.”<sup>54</sup> The Commission also recognized that “ERRP also has provided valuable reliability benefits to customers in Westchester.”<sup>55</sup> This Study shows that the benefits long recognized by the Commission still exist today. Indeed, this Study demonstrates that nothing has changed that would warrant a reversal of the Commission’s decision to apply the Incremental Method of cost allocation to ERRP.

Specifically, this Study shows that the Incremental Method recognizes that ERRP provides significant benefits to electric customers and provides a just and reasonable mechanism to allocate the costs associated with those benefits. Those benefits, which have been repeatedly cited by the Commission, include both quantifiable benefits, such as the substantial proceeds from the sale of the First Avenue Properties that were made possible by the replacement of the Waterside plant by ERRP, as well as benefits that are difficult to quantify, such as regional air quality improvements, economic development, and the substantial savings to electric customers from the continued viability of the steam system. The Commission has also explicitly recognized that the existence of ERRP has avoided the need to build new generation and transmission equal to \$90 Million per year which is a reasonable offset to annual fixed costs charged to electric customers.<sup>56</sup>

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<sup>54</sup> 2004 Steam Rate Order, p. 27.

<sup>55</sup> 2004 Steam Rate Order, p. 24, fn. 22.

<sup>56</sup> 2008 Steam Rate Order, p. 39.

Beyond the past Commission rulings cited in this Study, the Company has provided herein additional information to inform the Commission of the benefits of ERRP. Specifically, the Company has provided a reasonable estimate of the savings to electric customers from ERRP's participation in the NYISO's energy and capacity markets. For example, the Company estimates that for the years 2010 ERRP's participation in the electric market could save customers approximately \$200 million statewide, of which \$109 million will accrue to NYC and \$15 million will accrue to County of Westchester. In addition, approximately \$100 Million in annual capacity savings are enjoyed by Con Edison customers from Con Edison's using ERRP as a source of self-supplied capacity.

This Study also demonstrates that the Incremental Method supports the assignment of fixed costs on a cost causation basis, and allows fuel costs to be allocated based on the reason why a quantity of fuel is being burned.

Thus, as the Commission has stated and reaffirmed on several occasions, the numerous benefits provided by ERRP to electric customers in New York City and Westchester mandates that ERRP costs be allocated using the long-standing regulatory principle of the Incremental Method.

Accordingly, for the reasons set forth herein, the current Incremental Method (including its cost causation principles) should continue to be applied to ERRP costs.

## **Appendix A**

### **Con Edison Steam Cases and Steam/Electric Cost Provisions**

**Table 1**

<b>Con Edison Steam and Steam/Electric Cost Allocation Provisions</b>			
<b>Date</b>	<b>PSC Document</b>	<b>Ruling</b>	<b>Basis</b>
November 14, 1978	Case 27276, Op. No. 78-27	Readopted "incremental" pricing for steam from steam/electric stations	The Commission concluded that the continuation of a proportional allocation of costs too the steam system would result in noncompetitive steam rates and a loss of steam customers to the detriment of all customers, including electric customers.
October 3, 1991	Case 90-S-0938, Op No.91-20	Reaffirmed "incremental" pricing with the exception of Op. no. 81-16	The basis from Case 27877 and Op. no. 81-16 remain in force
October 12, 1994	Case 93-S-0996, Op. No. 94-21	Reaffirmed "incremental" pricing with the exception of Op. no. 81-16	The basis from Case 27877 and Op. no. 81-16 remain in force
September 25, 1997	Case 96-S-1065, Case 96-S-1121, Op No. 97-15	Reaffirmed "incremental" pricing	The Commission approved the rate structure since 'the current cost allocation method - under which most costs are allocated to the production of electricity, while steam production is allocated only the incremental costs of producing steam - would continue to be justified in a fully- regulated environment, it may may not be sustainable in a competitive environment.'
April 3, 2001	Case 99-S-1621, Op. No. 00-15	Reaffirmed "incremental" pricing	The Commission approved the rate structure and requested ConEdison to conduct studies designed to determine how best to maximize efficiency and minimize steam cost, especially in the 74th, 59th and Hudson Avenue steam plant sites. R. Stanley testimony had "subsidy" at 1% to electric but 20% to steam
September 27, 2004	Case 03-S-1672	Reaffirmed "incremental" pricing	The Commission approved the rate structure and the establishment of the Steam Business Development Task Force by Consolidated Edison to coordinate, where appropriate, the company's economic development efforts related to steam service with those of New York City and the state, especially for redevelopment efforts in lower Manhattan.
September 22, 2006	Case 05-S-1376	Reaffirmed "incremental" pricing	The Commission approve the rate structure with a modification of the cost method for 59th St and 74th St stations to the square footage of the facility which supports electric or steam to be charged to that entity. The Joint Proposal reflects Con Edison's agreement to undertake numerous steam business development (SBD) initiatives and other measures in the interest of maintaining the steam customer base, rate stability, and infrastructure integrity.
September 17,2008	Case 07-S-1315	Reaffirmed "incremental" pricing	The Commission approved the current rate structure and Con Edison is required to conduct customer focus groups and customer satisfaction surveys, and prepare reports on such efforts for submission to Staff of the Department of Public Service and any interested parties who so request. Failure to conduct the surveys and submit the reports may result in revenue adjustments.

## **Appendix B**

### **East River Repowering Costs with Current Allocation**

**Table 1**  
**East River Repowering Project Book Cost & Net Plant (\$)**

	<b>Book Cost</b>	<b>Plant Additions</b>	<b>Ending Plant Balance</b>	<b>Depreciation Reserve</b>	<b>Depreciation Accruals</b>	<b>Ending Reserve Balance</b>	<b>Net Plant</b>
<b>Apr-05</b>	\$0	\$707,068,979	\$707,068,979	\$0	\$2,289,750	\$2,289,750	\$704,779,229
<b>Dec-05</b>	\$744,393,991	\$3,573,242	\$747,967,233	\$18,821,596	\$2,429,424	\$21,251,020	\$726,716,213
<b>Dec-06</b>	\$765,539,431	\$3,987,920	\$769,527,351	\$47,876,739	\$2,372,054	\$50,248,793	\$719,278,558
<b>Dec-07</b>	\$778,086,078	\$574,715	\$778,660,793	\$77,120,484	\$3,241,319	\$80,361,803	\$698,298,990
<b>Dec-08</b>	\$793,041,824	\$564,000	\$793,605,824	\$107,867,327	\$2,530,802	\$110,398,128	\$683,207,696

**Table 2**  
**Electric Carrying Charges (\$)**

	<b>Pre-Tax Rate of Return</b>	<b>Book Depreciation</b>	<b>Federal Income Taxes</b>	<b>Property Taxes</b>	<b>Total</b>	<b>Allocation to Electric</b>
Apr-05	\$5,876,216	\$2,289,750	\$265,595	\$214,603	\$8,646,163	\$5,745,280
Dec-05	\$6,049,748	\$2,429,424	\$265,595	\$385,834	\$9,130,602	\$6,067,184
Dec-06	\$5,690,395	\$2,372,054	\$325,005	\$381,008	\$8,768,461	\$5,826,546
Dec-07	\$5,471,911	\$3,241,319	\$356,883	\$847,143	\$9,917,257	\$6,589,908
Dec-08	\$5,075,648	\$2,530,802	\$331,813	\$928,880	\$8,867,143	\$5,892,118

**Table 3**  
**Steam Carrying Charges (\$)**

	<b>Pre-Tax Rate of Return</b>	<b>Book Depreciation</b>	<b>Federal Income Taxes</b>	<b>Property Taxes</b>	<b>ERRP O&amp;M</b>	<b>Waterside Savings</b>	<b>Total</b>
<b>Apr-05</b>	\$1,923,726	\$706,777	\$89,110	\$72,002	\$154,799	-\$460,456	\$2,485,958
<b>Dec-05</b>	\$1,857,404	\$749,891	\$89,110	\$129,452	\$1,157,626	-\$912,000	\$3,071,483
<b>Dec-06</b>	\$1,909,190	\$795,850	\$109,043	\$127,832	\$0	\$0	\$2,941,916
<b>Dec-07</b>	\$1,835,887	\$1,087,498	\$119,738	\$284,226	\$0	\$0	\$3,327,349
<b>Dec-08</b>	\$1,702,936	\$849,112	\$111,327	\$311,650	\$0	\$0	\$2,975,024

**Table 4**  
**2008 Steam & Electric O&M**

<b>FCAT Description</b>	<b><u>Total</u></b>	<b><u>Electric</u></b>	<b><u>Steam</u></b>
Fixed Post Labor	1,870,230	1,302,714.22	567,515.61
Water Treatment	1,620,700	0	1,620,700
Water & Chemicals	7,161,936	0	7,161,936
Environmental Programs	327,296	327,296	0
Boiler Cleaning	0	0	0
Scheduled Overhauls - Major	7,503,771	7,503,771	0
Asbestos	0	0	0
Preventive Maintenance	1,317,247	1,109,973	207,273
Corrective Maintenance	3,138,867	981,862	2,157,004.66
Plant Component Upgrade	207,950	182,084.13	25,865.89
Facilities Maintenance	695,580	695,580	0
Non-direct Expense	3,479,193	3,479,193	0
<b>Total</b>	<b>27,322,769</b>	<b>15,582,474</b>	<b>11,740,295</b>

## **Appendix C**

### **East River Repowering Project Article X Tables**

Article X – Table 2.6

Table 2-6  
Avoided Steam/Electric Production and Fuel Cost  
Study Year 2002

Waterside Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Steam Production (Million lb)	1,173	1,088	1,114	1,057	757	762	876	830	519	728	812	997	10,681
Electric Generation (GWh)	65	59	62	59	42	42	49	46	29	40	45	55	593
Fuel - Billions of BTU	2,088	1,865	1,963	1,863	1,334	1,343	1,543	1,464	915	1,283	1,432	1,758	18,830
Fuel price - \$/Million BTU	\$4.44	\$4.24	\$3.41	\$2.79	\$2.75	\$2.74	\$2.71	\$2.71	\$2.77	\$2.83	\$3.51	\$4.16	\$3.34
Fuel Cost - \$/Million	9.2	7.9	6.7	5.2	3.7	3.7	4.2	4.0	2.5	3.6	5.0	7.3	63
Variable O&M (\$/.34/thousand lb)	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.4	3.8
Total Avoided Cost - \$/Million	9.6	8.3	7.1	5.6	3.9	3.9	4.5	4.3	2.7	3.9	5.3	7.7	66.7

Other Steam Plants	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Steam Production (Million lb)	243	284	254	126	270	191	186	176	352	356	308	392	3,134
Fuel - Billions of BTU	346	405	362	180	385	272	265	251	501	507	432	559	4,465
Fuel price - \$/Million BTU	\$3.67	\$3.68	\$3.68	\$3.68	\$3.68	\$3.63	\$3.64	\$3.63	\$3.58	\$3.60	\$3.68	\$3.77	\$3.66
Fuel Cost - \$/Million	1.3	1.5	1.3	0.7	1.4	1.0	1.0	0.9	1.8	1.8	1.6	2.1	16.4
Variable O&M (\$/.34/thousand lb)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.3
Total Avoided Cost - \$/Million	1.4	1.6	1.4	0.7	1.5	1.1	1.0	1.0	1.9	2.0	1.7	2.3	17.7

Electric Market Generation	Avoided Cost
GWh	1767
Market Energy Price - \$/kWh	0.029
Energy Cost - \$/Million	51
MW	125
Market Capacity Price - \$/kW	105
Capacity Cost - \$/Million	13

## Article X – Table 2.7

**Table 2.7**  
**Avoided Costs**  
**(Millions of Dollars)**

<b>Avoided Cost Components</b>	<b>2002</b>	<b>2005</b>	<b>2010</b>	<b>2020</b>	<b>Levelized</b>
Recovery of Future Investments					
Waterside Station	-	1.6	3.4	5.8	2.6
East River South	1.0	0.9	0.7	0.5	0.8
Electric T&D	-	4.2	3.5	2.3	2.9
Property Taxes	12.7	14.7	16.3	19.8	15.8
Fixed O&M (Waterside & ERS)	26.0	27.2	29.4	34.6	27.0
Variable O&M (Waterside & Steam System)	5.1	5.4	6.0	7.3	5.9
Fuel (Waterside & Steam System)	79.3	83.9	92.5	113.0	91.2
Electric Market					
Energy Cost	51.4	54.9	61.2	76.1	60.3
Capacity Cost	13.1	12.5	9.6	10.8	11.2
<b>Total Avoided Costs<sup>1</sup></b>	<b>189</b>	<b>205</b>	<b>23</b>	<b>270</b>	<b>218</b>

Notes:

1. Cost components may not add to total cost due to rounding

**Article X - Figure 2.8**

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Projection of Market Fuel and Energy Prices in ERRP Article X Application, June 2000</b>																				
ERRP Generation (GWh)	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360
Energy Price (\$ / MWh)	\$ 29.09	\$ 29.75	\$ 30.41	\$ 31.07	\$ 31.78	\$ 32.50	\$ 33.21	\$ 33.92	\$ 34.63	\$ 35.48	\$ 36.32	\$ 37.16	\$ 38.01	\$ 38.85	\$ 39.69	\$ 40.54	\$ 41.38	\$ 42.22	\$ 43.07	\$ 43.86
Total Revenue (\$ MM)	\$ 68.6	\$ 70.2	\$ 71.8	\$ 73.3	\$ 75.0	\$ 76.7	\$ 78.4	\$ 80.1	\$ 81.7	\$ 83.7	\$ 85.7	\$ 87.7	\$ 89.7	\$ 91.7	\$ 93.7	\$ 95.7	\$ 97.7	\$ 99.6	\$ 101.6	\$ 103.5
Estimated Fuel Cost (\$ MM)	\$ 107.3	\$ 109.2	\$ 111.1	\$ 113.0	\$ 115.2	\$ 117.4	\$ 119.6	\$ 121.8	\$ 124.0	\$ 126.6	\$ 129.2	\$ 131.8	\$ 134.4	\$ 137.0	\$ 139.6	\$ 142.2	\$ 144.8	\$ 147.4	\$ 150.0	\$ 153.0
Delta (\$ MM)	\$ (38.7)	\$ (39.0)	\$ (39.3)	\$ (39.7)	\$ (40.2)	\$ (40.7)	\$ (41.2)	\$ (41.7)	\$ (42.3)	\$ (42.9)	\$ (43.5)	\$ (44.1)	\$ (44.7)	\$ (45.3)	\$ (45.9)	\$ (46.5)	\$ (47.1)	\$ (47.8)	\$ (48.4)	\$ (49.5)
Levelized Revenue (\$ MM)	\$ 81.28																			
Fuel (\$ MM)	\$ 123.48																			
Delta (\$ MM)	\$ (42.20)																			

## **Appendix D**

### **East River Repowering Project Electric Revenue & Costs**

**Table 1**  
**Electric Costs & Revenue (\$1000)**

	Electric Cost				Electric Revenue				Net Cost		
	Fuel \$1,000	O&M \$1,000	Rent \$1,000	Total \$1,000	Energy \$1,000	Capacity \$1,000	Ancillary \$1,000	Total \$1,000	Energy \$1,000	Capacity \$1,000	Net Cost \$1,000
<b>2005</b>											
May	\$10,563	\$1,167	\$6,038	\$17,768	-\$7,001	-\$3,210	\$17	-\$10,194	\$3,563	\$4,012	\$7,574
Jun	\$11,793	\$1,167	\$5,989	\$18,949	-\$10,917	-\$3,210	\$19	-\$14,108	\$876	\$3,965	\$4,841
Jul	\$16,021	\$1,167	\$8,591	\$25,779	-\$15,121	-\$3,216	\$27	-\$18,310	\$901	\$6,569	\$7,469
Aug	\$17,652	\$1,167	\$6,326	\$25,144	-\$17,604	-\$3,216	\$26	-\$20,794	\$48	\$4,302	\$4,350
Sep	\$22,710	\$1,167	\$6,641	\$30,517	-\$20,876	-\$3,216	\$24	-\$24,069	\$1,834	\$4,615	\$6,449
Oct	\$17,244	\$1,167	\$6,157	\$24,567	-\$12,312	-\$3,241	\$15	-\$15,539	\$4,932	\$4,097	\$9,029
Nov	\$30,447	\$1,167	\$7,136	\$38,749	-\$15,494	-\$1,750	\$27	-\$17,216	\$14,953	\$6,580	\$21,533
Dec	\$34,256	\$1,167	\$3,964	\$39,386	-\$26,368	-\$1,750	\$36	-\$28,081	\$7,888	\$3,417	\$11,305
	<b>\$160,686</b>	<b>\$9,333</b>	<b>\$50,841</b>	<b>\$220,860</b>	<b>-\$125,693</b>	<b>-\$22,810</b>	<b>\$191</b>	<b>-\$148,312</b>	<b>\$34,993</b>	<b>\$37,555</b>	<b>\$72,549</b>
<b>2006</b>											
Jan	\$29,109	\$1,142	\$4,406	\$34,657	-\$15,449	-\$1,750	\$30	-\$17,169	\$13,660	\$3,828	\$17,489
Feb	\$22,296	\$1,149	\$4,647	\$28,092	-\$14,324	-\$1,750	\$31	-\$16,043	\$7,973	\$4,077	\$12,049
Mar	\$22,046	\$1,129	\$4,167	\$27,343	-\$15,526	-\$1,750	\$35	-\$17,242	\$6,520	\$3,581	\$10,101
Apr	\$11,781	\$1,228	\$6,675	\$19,685	-\$8,057	-\$1,750	\$19	-\$9,787	\$3,725	\$6,172	\$9,897
May	\$15,608	\$1,169	\$7,404	\$24,182	-\$10,157	-\$3,441	-\$38	-\$13,636	\$5,452	\$5,094	\$10,546
Jun	\$15,618	\$1,152	\$6,856	\$23,627	-\$12,891	-\$3,441	-\$35	-\$16,367	\$2,727	\$4,533	\$7,260
Jul	\$15,877	\$1,287	\$5,453	\$22,617	-\$17,968	-\$3,441	-\$34	-\$21,442	-\$2,091	\$3,266	\$1,175
Aug	\$18,592	\$1,274	\$5,726	\$25,591	-\$19,230	-\$3,503	-\$33	-\$22,765	-\$638	\$3,464	\$2,826
Sep	\$16,703	\$1,082	\$6,551	\$24,336	-\$9,230	-\$3,503	-\$36	-\$12,769	\$7,473	\$4,095	\$11,567
Oct	\$7,077	\$1,153	\$7,972	\$16,202	-\$6,493	-\$3,503	-\$48	-\$10,043	\$584	\$5,574	\$6,159
Nov	\$14,011	\$1,236	\$7,465	\$22,712	-\$8,799	-\$1,999	-\$44	-\$10,842	\$5,212	\$6,658	\$11,870
Dec	\$26,306	\$1,324	\$6,519	\$34,149	-\$15,047	-\$1,999	-\$28	-\$17,074	\$11,259	\$5,817	\$17,076
	<b>\$215,025</b>	<b>\$14,325</b>	<b>\$73,843</b>	<b>\$303,193</b>	<b>-\$153,169</b>	<b>-\$31,828</b>	<b>-\$181</b>	<b>-\$185,178</b>	<b>\$61,856</b>	<b>\$56,159</b>	<b>\$118,015</b>
<b>2007</b>											
Jan	\$22,066	\$1,208	\$6,086	\$29,360	-\$16,182	-\$1,999	-\$26	-\$18,206	\$5,884	\$5,270	\$11,153
Feb	\$24,234	\$938	\$3,890	\$29,062	-\$19,107	-\$2,029	-\$31	-\$21,167	\$5,127	\$2,768	\$7,895
Mar	\$25,730	\$1,135	\$4,477	\$31,342	-\$19,180	-\$2,029	-\$26	-\$21,235	\$6,550	\$3,557	\$10,107
Apr	\$12,944	\$1,754	\$5,366	\$20,064	-\$10,566	-\$2,029	-\$44	-\$12,640	\$2,378	\$5,047	\$7,425
May	\$18,619	\$1,319	\$10,724	\$30,663	-\$13,729	-\$3,636	-\$35	-\$17,401	\$4,891	\$8,371	\$13,262
Jun	\$16,230	\$1,127	\$8,118	\$25,475	-\$12,884	-\$3,636	-\$40	-\$16,560	\$3,346	\$5,569	\$8,914
Jul	\$14,882	\$1,295	\$5,337	\$21,515	-\$11,509	-\$3,636	-\$41	-\$15,186	\$3,374	\$2,955	\$6,329
Aug	\$17,128	\$1,215	\$6,699	\$25,041	-\$15,930	-\$3,636	-\$33	-\$19,599	\$1,197	\$4,245	\$5,442
Sep	\$9,256	\$1,339	\$4,209	\$14,804	-\$7,027	-\$3,636	-\$48	-\$10,711	\$2,229	\$1,864	\$4,093
Oct	\$12,698	\$1,231	\$4,172	\$18,101	-\$9,082	-\$3,636	-\$44	-\$12,763	\$3,615	\$1,722	\$5,338
Nov	\$23,231	\$1,001	\$4,382	\$28,614	-\$15,909	-\$1,947	-\$28	-\$17,883	\$7,322	\$3,409	\$10,731
Dec	\$26,694	\$1,029	\$6,010	\$33,733	-\$23,256	-\$1,947	-\$25	-\$25,227	\$3,438	\$5,068	\$8,506
	<b>\$223,711</b>	<b>\$14,591</b>	<b>\$69,472</b>	<b>\$307,773</b>	<b>-\$174,360</b>	<b>-\$33,797</b>	<b>-\$420</b>	<b>-\$208,577</b>	<b>\$49,351</b>	<b>\$49,845</b>	<b>\$99,196</b>
<b>2008</b>											
Jan	\$29,264	\$1,156	\$5,527	\$35,947	-\$24,197	-\$1,947	-\$25	-\$26,169	\$5,067	\$4,711	\$9,778
Feb	\$24,850	\$1,199	\$5,896	\$31,945	-\$20,491	-\$1,947	-\$32	-\$22,470	\$4,359	\$5,116	\$9,476
Mar	\$20,145	\$1,366	\$5,922	\$27,433	-\$15,266	-\$1,947	-\$38	-\$17,251	\$4,879	\$5,303	\$10,182
Apr	\$14,031	\$1,608	\$6,909	\$22,548	-\$11,234	-\$1,947	-\$47	-\$13,228	\$2,798	\$6,523	\$9,320
May	\$15,533	\$2,125	\$5,945	\$23,603	-\$10,728	-\$1,858	-\$48	-\$12,634	\$4,805	\$6,164	\$10,969
Jun	\$29,413	\$833	\$5,913	\$36,159	-\$27,829	-\$1,858	-\$35	-\$29,722	\$1,584	\$4,853	\$6,437
Jul	\$32,139	\$1,194	\$5,860	\$39,193	-\$26,968	-\$1,858	-\$35	-\$28,861	\$5,171	\$5,160	\$10,332
Aug	\$25,039	\$1,189	\$5,929	\$32,157	-\$18,130	-\$1,858	-\$33	-\$20,022	\$6,909	\$5,226	\$12,136
Sep	\$14,172	\$1,331	\$5,905	\$21,407	-\$10,116	-\$1,858	-\$45	-\$12,020	\$4,055	\$5,332	\$9,387
Oct	\$17,084	\$1,247	\$5,796	\$24,127	-\$11,570	-\$1,858	-\$37	-\$13,466	\$5,513	\$5,148	\$10,661
Nov	\$21,153	\$1,115	\$4,777	\$27,045	-\$14,775	-\$997	-\$30	-\$15,802	\$6,378	\$4,865	\$11,243
Dec	\$26,825	\$1,219	\$5,643	\$33,687	-\$15,847	-\$997	-\$28	-\$16,872	\$10,979	\$5,836	\$16,815
	<b>\$269,649</b>	<b>\$15,582</b>	<b>\$70,022</b>	<b>\$355,253</b>	<b>-\$207,150</b>	<b>-\$20,932</b>	<b>-\$434</b>	<b>-\$228,516</b>	<b>\$62,499</b>	<b>\$64,239</b>	<b>\$126,737</b>
<b>2009</b>											
Jan	\$27,560	\$1,272	\$5,972	\$34,804	-\$19,213	-\$997	-\$23	-\$20,233	\$8,347	\$6,224	\$14,571
Feb	\$14,664	\$1,146	\$5,913	\$21,723	-\$9,112	-\$997	-\$37	-\$10,146	\$5,553	\$6,024	\$11,577
Mar	\$10,956	\$1,289	\$5,898	\$18,143	-\$7,243	-\$997	-\$42	-\$8,283	\$3,713	\$6,147	\$9,859

**Table 2**

**East River Repowering Project Electric Production & Fuel Consumption**

		<b>Electric (net) Generation MWh</b>	<b>Electric MMbtu</b>	<b>Steam MMbtu</b>	<b>Total MMbtu</b>
<b>2006</b>	Jan	189,197	2,103,815	34,592	2,138,407
	Feb	194,032	2,098,864	39,246	2,138,110
	Mar	219,475	2,384,052	47,518	2,431,570
	Apr	121,163	1,284,051	7,565	1,291,616
	May	163,657	1,818,030	15,753	1,833,783
	Jun	184,012	2,086,176	48,326	2,134,502
	Jul	193,507	2,177,670	53,033	2,230,703
	Aug	196,807	2,223,963	57,344	2,281,307
	Sep	178,369	2,027,322	6,474	2,033,796
	Oct	104,707	1,244,105	8,639	1,252,744
	Nov	127,172	1,488,899	1,232	1,490,131
	Dec	<u>232,816</u>	<u>2,462,702</u>	<u>36,171</u>	<u>2,498,873</u>
		<b>2,104,914</b>	<b>23,399,649</b>	<b>355,893</b>	<b>23,755,542</b>
<b>2007</b>	Jan	237,872	2,541,152	65,704	2,606,856
	Feb	210,455	2,242,105	66,521	2,308,626
	Mar	240,215	2,541,578	46,908	2,588,486
	Apr	128,634	1,360,181	11,059	1,371,240
	May	183,151	2,024,194	29,276	2,053,470
	Jun	155,908	1,749,529	35,629	1,785,158
	Jul	149,746	1,727,689	31,714	1,759,403
	Aug	198,928	2,246,312	71,123	2,317,435
	Sep	107,282	1,284,732	18,193	1,302,925
	Oct	129,797	1,537,535	4,922	1,542,457
	Nov	229,282	2,469,238	40,343	2,509,581
	Dec	<u>249,237</u>	<u>2,647,178</u>	<u>71,322</u>	<u>2,718,500</u>
		<b>2,220,507</b>	<b>24,371,423</b>	<b>492,714</b>	<b>24,864,137</b>
<b>2008</b>	Jan	254,526	2,678,975	65,576	2,744,551
	Feb	209,492	2,222,077	58,226	2,280,303
	Mar	168,009	1,782,272	23,512	1,805,784
	Apr	109,237	1,172,204	497	1,172,701
	May	102,875	1,234,011	4,216	1,238,227
	Jun	186,428	2,143,011	23,424	2,166,435
	Jul	186,531	2,145,801	57,968	2,203,769
	Aug	198,628	2,264,163	64,748	2,328,911
	Sep	123,598	1,414,412	16,251	1,430,663
	Oct	172,436	1,928,689	3,597	1,932,286
	Nov	222,229	2,414,918	30,710	2,445,628
	Dec	234,697	2,517,026	81,476	2,598,502
		<b>2,168,686</b>	<b>23,917,559</b>	<b>430,201</b>	<b>24,347,760</b>

## **Appendix E**

### **East River Repowering Project Steam Costs**

**Table 1**  
**Cost of producing steam at other steam stations when East River Repowering Project was permitted:**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<b>2000</b>													
\$/Mlb	\$6.44	\$7.44	\$7.23	\$6.50	\$7.38	\$7.36	\$7.41	\$7.34	\$8.18	\$9.20	\$8.90	\$9.32	\$7.73
Sendout (Mlb) *	3,887,283	2,940,217	2,113,997	1,715,824	1,301,383	1,778,454	1,879,951	2,069,966	1,575,023	1,544,411	2,299,360	3,651,918	26,757,787
Total Cost (\$1000)	\$25,052	\$21,888	\$15,280	\$11,158	\$9,609	\$13,098	\$13,934	\$15,203	\$12,889	\$14,210	\$20,461	\$34,043	\$206,823
<b>2001</b>													
\$/Mlb	\$13.51	\$9.75	\$8.46	\$8.50	\$7.57	\$6.84	\$6.70	\$6.35	\$5.96	\$5.73	\$6.52	\$7.46	\$8.28
Sendout (Mlb) *	3,449,272	2,855,223	2,836,510	1,900,791	1,381,621	1,938,250	1,860,298	2,272,446	1,420,026	1,560,248	1,635,713	2,482,224	25,592,622
Total Cost (\$1000)	\$46,616	\$27,835	\$23,993	\$16,159	\$10,601	\$13,250	\$12,458	\$14,430	\$8,470	\$8,934	\$10,660	\$18,527	\$211,932
<b>2002</b>													
\$/Mlb	\$6.41	\$5.95	\$5.16	\$5.60	\$6.30	\$6.31	\$6.34	\$7.18	\$6.03	\$7.20	\$7.29	\$8.15	\$6.57
Sendout (Mlb) *	2,729,528	2,302,615	2,315,307	1,657,708	1,414,896	1,697,220	2,127,207	2,115,672	1,673,941	1,703,738	2,205,352	3,173,589	25,116,773
Total Cost (\$1000)	\$17,496	\$13,701	\$11,947	\$9,283	\$8,914	\$10,709	\$13,486	\$15,191	\$10,094	\$12,267	\$16,077	\$25,865	\$165,017
<b>2003</b>													
\$/Mlb	\$9.67	\$11.12	\$12.04	\$9.39	\$8.71	\$9.54	\$9.69	\$8.62	\$8.88	\$9.91	\$8.46	\$8.76	\$9.65
Sendout (Mlb) *	3,951,470	3,415,355	2,560,118	1,991,423	1,459,785	1,583,598	2,040,681	1,991,019	1,492,675	1,399,811	1,867,204	3,069,866	26,823,005
Total Cost (\$1000)	\$38,211	\$37,979	\$30,824	\$18,699	\$12,715	\$15,108	\$19,774	\$17,163	\$13,255	\$12,472	\$15,797	\$26,892	\$258,842
<b>2004</b>													
\$/Mlb	\$10.04	\$9.76	\$9.04	\$8.82	\$9.30	\$9.79	\$9.64	\$8.90	\$8.89	\$9.52	\$10.48	\$10.95	\$9.70
Sendout (Mlb) *	4,413,071	3,235,748	2,423,956	1,616,994	1,366,577	1,639,875	1,849,012	1,957,427	1,615,016	1,325,475	1,794,674	2,879,589	26,147,414
Total Cost (\$1000)	\$44,307	\$31,581	\$21,913	\$14,262	\$12,988	\$16,054	\$17,824	\$17,421	\$14,357	\$12,619	\$18,808	\$31,531	\$253,630

\* *Waterside, East River, 74th Street, Hudson Ave, 59th Street, Ravenswood, 60th Street*

**Table 2**  
**Actual cost of producing steam at other station from East River Repowering Project in-**  
**service date:**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
2005													
\$/Mlb	\$13.48	\$12.00	\$12.94	\$13.61	\$16.96	\$16.68	\$16.62	\$17.47	\$15.20				
Sendout (Mlb) *	687,035	1,129,938	1,070,987	1,184,374	805,155	1,067,166	1,132,709	1,994,958	9,062,352				
Total Cost (\$1000)	\$9,261	\$13,560	\$13,859	\$16,119	\$13,655	\$17,800	\$18,826	\$34,677	\$137,757				
2006													
\$/Mlb	\$17.03	\$15.32	\$13.52	\$14.34	\$17.18	\$15.68	\$14.53	\$15.42	\$15.42	\$11.76	\$18.75	\$15.14	\$15.27
Sendout (Mlb) *	1,684,551	1,784,329	1,434,331	851,223	180,688	665,573	993,640	880,816	389,856	829,732	917,607	1,303,941	11,946,237
Total Cost (\$1000)	\$28,772	\$27,336	\$19,392	\$12,207	\$3,104	\$10,907	\$14,438	\$13,582	\$5,012	\$9,758	\$17,205	\$19,742	\$182,454
2007													
\$/Mlb	\$14.84	\$15.09	\$14.57	\$14.77	\$15.35	\$14.48	\$14.78	\$14.70	\$13.66	\$16.22	\$16.81	\$16.63	\$15.18
Sendout (Mlb) *	1,840,404	2,605,080	1,588,297	1,367,555	497,172	797,315	1,101,674	825,194	994,117	751,925	1,071,632	1,900,944	15,341,319
Total Cost (\$1000)	\$27,312	\$39,311	\$23,141	\$20,199	\$7,632	\$11,545	\$16,283	\$12,130	\$13,550	\$12,196	\$18,014	\$31,613	\$232,955
2008													
\$/Mlb	\$18.98	\$18.80	\$19.35	\$20.32	\$20.90	\$22.33	\$23.73	\$22.00	\$20.42	\$20.22	\$21.79	\$21.44	\$20.48
Sendout (Mlb) *	1,910,773	1,906,365	1,657,461	1,100,287	929,261	660,913	886,219	482,764	710,489	567,725	1,051,946	1,688,359	13,592,562
Total Cost (\$1000)	\$36,266	\$35,840	\$32,072	\$22,368	\$19,422	\$15,428	\$21,030	\$10,621	\$14,508	\$11,479	\$22,922	\$36,413	\$278,359

\* Live steam= ER7 & pkg, 74th St, HA 50th St, Rav, 60th St

**Table 3**  
**Forecasted cost of producing steam at proposed new Hudson Avenue boiler:**

	Steam Sendout (a)	Heat Rate (b)	Fuel Burn	Gas Price (c)	Total Cost	Unit cost
	Mlbs	btu/lb	MMBtu	\$/ MMBtu	\$,000	\$/ Mlb
<b>2009</b>						
Apr	448,249	1,459	653,846	\$5.00	\$3,269	\$7.29
May	519,298	1,497	777,389	\$5.00	\$3,887	\$7.49
Jun	898,230	1,491	1,339,261	\$5.00	\$6,696	\$7.46
Jul	946,541	1,488	1,408,137	\$5.00	\$7,041	\$7.44
Aug	996,126	1,490	1,484,560	\$5.00	\$7,423	\$7.45
Sep	604,967	1,487	899,788	\$5.00	\$4,499	\$7.44
Oct	743,935	1,484	1,104,248	\$5.00	\$5,521	\$7.42
Nov	938,863	1,465	1,375,121	\$6.00	\$8,251	\$8.79
Dec	<u>978,114</u>	<u>1,473</u>	<u>1,441,088</u>	<u>\$8.00</u>	<u>\$11,529</u>	<u>\$11.79</u>
	<b>7,074,323</b>	<b>1,482</b>	<b>10,483,438</b>	<b>\$5.64</b>	<b>\$59,116</b>	<b>\$8.36</b>
<b>Year 2010</b>						
Jan	1,043,814	1,377	1,437,680	\$9.00	\$12,939	\$12.40
Feb	884,201	1,486	1,314,217	\$8.00	\$10,514	\$11.89
Mar	688,277	1,460	1,005,114	\$7.00	\$7,036	\$10.22
Apr	448,249	1,459	653,846	\$6.00	\$3,923	\$8.75
May	519,298	1,497	777,389	\$6.00	\$4,664	\$8.98
Jun	898,230	1,491	1,339,261	\$7.00	\$9,375	\$10.44
Jul	946,541	1,488	1,408,137	\$7.00	\$9,857	\$10.41
Aug	996,126	1,490	1,484,560	\$7.00	\$10,392	\$10.43
Sep	604,967	1,487	899,788	\$7.00	\$6,299	\$10.41
Oct	743,935	1,484	1,104,248	\$7.00	\$7,730	\$10.39
Nov	938,863	1,465	1,375,121	\$8.00	\$11,001	\$11.72
Dec	<u>978,114</u>	<u>1,473</u>	<u>1,441,088</u>	<u>\$9.00</u>	<u>\$12,970</u>	<u>\$13.26</u>
	<b>9,690,615</b>	<b>1,470</b>	<b>14,240,449</b>	<b>\$7.49</b>	<b>\$106,699</b>	<b>\$11.01</b>
<b>Year 2011</b>						
Jan	1,043,814	1,377	1,437,680	\$10.00	\$14,377	\$13.77
Feb	884,201	1,486	1,314,217	\$9.00	\$11,828	\$13.38
Mar	688,277	1,460	1,005,114	\$8.00	\$8,041	\$11.68
Apr	448,249	1,459	653,846	\$7.00	\$4,577	\$10.21
May	519,298	1,497	777,389	\$7.00	\$5,442	\$10.48
Jun	898,230	1,491	1,339,261	\$7.00	\$9,375	\$10.44
Jul	946,541	1,488	1,408,137	\$7.00	\$9,857	\$10.41
Aug	996,126	1,490	1,484,560	\$7.00	\$10,392	\$10.43
Sep	604,967	1,487	899,788	\$8.00	\$7,198	\$11.90
Oct	743,935	1,484	1,104,248	\$8.00	\$8,834	\$11.87
Nov	938,863	1,465	1,375,121	\$8.00	\$11,001	\$11.72
Dec	<u>978,114</u>	<u>1,473</u>	<u>1,441,088</u>	<u>\$9.00</u>	<u>\$12,970</u>	<u>\$13.26</u>
	<b>9,690,615</b>	<b>1,470</b>	<b>14,240,449</b>	<b>\$8.00</b>	<b>\$113,891</b>	<b>\$11.75</b>

(a) 2008 ER 10 & 20 steam sendout

(b) heat rates from SRP new boiler analysis

(c) generic fuel price forecast

## **Appendix F**

### **Calculation of Steam and Electric Fuel Costs using Alternative Cost Allocation Methods**

## **The Current Method**

The current Method used to allocate ERRP costs is the Incremental Method, which is based on the cost causation principle as explained in Section 3.D The following table shows the allocation of ERRP costs using the Incremental Methods.

**Table 1**  
**2008 Fuel Allocation Based on Current Method**

**2008 Fuel Allocation Based on Current Method**

	Steam						Total				Electric			
	Fuel (ER 10 & 20) \$1,000	Steam Sendout ER10&20 Mlbs	Steam Fuel Current Method MMBtu	Fuel Price \$/MMBtu	Fuel ER10&20 \$/Mib	Fuel \$1,000	System Fuel \$1,000	Steam Sendout Mlbs	Total Fuel \$/Mib	Total Fuel \$1,000	Fuel (net) Generation MWh	MMBTU	Energy Revenue \$1,000	Fuel \$/Mwh
Jan	\$714	1,043,814	65,576	\$10.92	\$0.68	\$37,471	2,954,587	\$12.68	\$29,264	254,526	2,678,975	-\$24,197	\$20	
Feb	\$648	884,201	58,226	\$11.18	\$0.73	\$36,568	2,796,369	\$13.08	\$24,850	209,492	2,222,077	-\$20,491	\$21	
Mar	\$264	688,277	23,513	\$11.30	\$0.38	\$33,061	2,399,149	\$13.78	\$20,145	168,009	1,782,272	-\$15,266	\$29	
Apr	\$6	448,249	497	\$11.97	\$0.01	\$22,845	1,582,551	\$14.44	\$14,031	109,237	1,172,204	-\$11,234	\$26	
May	\$53	519,298	4,218	\$12.59	\$0.10	\$19,607	1,455,414	\$13.47	\$15,533	102,875	1,234,011	-\$10,728	\$47	
Jun	\$321	898,230	23,424	\$13.72	\$0.36	\$16,389	1,627,274	\$10.07	\$29,413	186,428	2,143,011	-\$27,829	\$8	
Jul	\$867	946,541	57,968	\$14.98	\$0.92	\$22,936	1,890,156	\$12.13	\$32,139	186,531	2,145,801	-\$26,968	\$28	
Aug	\$716	996,126	64,748	\$11.06	\$0.72	\$12,397	1,553,037	\$7.98	\$25,039	198,628	2,264,163	-\$18,130	\$35	
Sep	\$162	604,967	16,251	\$10.02	\$0.27	\$15,147	1,351,819	\$11.21	\$14,172	123,598	1,414,412	-\$10,116	\$33	
Oct	\$32	743,935	3,597	\$8.86	\$0.04	\$11,660	1,322,148	\$8.82	\$17,084	172,436	1,928,689	-\$11,570	\$32	
Nov	\$269	938,863	30,710	\$8.76	\$0.29	\$23,269	1,995,818	\$11.66	\$21,153	222,229	2,414,918	-\$14,775	\$29	
Dec	\$866	978,114	81,478	\$10.66	\$0.89	\$37,982	2,749,986	\$13.81	\$26,825	234,697	2,517,026	-\$15,847	\$47	
<b>2008</b>	<b>\$4,916</b>	<b>9,690,615</b>	<b>430,206</b>	<b>\$11.28</b>	<b>\$0.51</b>	<b>\$289,330</b>	<b>23,678,308</b>	<b>\$12.22</b>	<b>\$269,649</b>	<b>2,168,686</b>	<b>23,917,559</b>	<b>-\$207,150</b>	<b>\$29</b>	

### **Electric Market Price Based Approach**

This approach would modify the current East River Repowering Project cost allocation method by adding to the steam customer's fuel allocation a charge for the difference between electric revenue and the cost of fuel burn in gas turbines. However, because the plant is necessary to meet steam demand, the East River Repowering Project electric production costs may frequently exceed the wholesale price of electricity paid by the NYISO because the plant is bid into the NYISO. By paying the difference between electric revenue and electric production cost, steam customers would be exposed to electric market risk. The following tables share what the allocation of ERRP costs would be using this method.

**Table 2**

**2008 Fuel Allocation Based on Above Market Method**

	Steam					Electric					
	Fuel (ER 10 & 20)	Steam Sendout (ER 10 & 20)	Fuel (ER 10 & 20)	Total Fuel	Total Steam Sendout	Total Fuel	Fuel	Electric (net) Generation	Fuel (before energy revenue)	Energy Revenue	Fuel (after energy revenue)
	\$1,000	Mlbs	\$/Mlb	\$1,000	Mlbs	\$/Mlb	\$1,000	MWh	\$/Mwh	\$1,000	\$/Mwh
Jan	\$5,781	1,043,814	\$5.54	\$42,538	2,954,587	\$14.40	\$24,197	254,526	\$95	-\$24,197	\$0
Feb	\$5,007	884,201	\$5.66	\$40,927	2,796,369	\$14.64	\$20,491	209,492	\$98	-\$20,491	\$0
Mar	\$5,143	688,277	\$7.47	\$37,940	2,399,149	\$15.81	\$15,266	168,009	\$91	-\$15,266	\$0
Apr	\$2,803	448,249	\$6.25	\$25,642	1,582,551	\$16.20	\$11,234	109,237	\$103	-\$11,234	\$0
May	\$4,857	519,298	\$9.35	\$24,412	1,455,414	\$16.77	\$10,728	102,875	\$104	-\$10,728	\$0
Jun	\$1,905	898,230	\$2.12	\$17,973	1,627,274	\$11.04	\$27,829	186,428	\$149	-\$27,829	\$0
Jul	\$6,038	946,541	\$6.38	\$28,107	1,890,156	\$14.87	\$26,968	186,531	\$145	-\$26,968	\$0
Aug	\$7,626	996,126	\$7.66	\$19,306	1,553,037	\$12.43	\$18,130	198,628	\$91	-\$18,130	\$0
Sep	\$4,217	604,967	\$6.97	\$19,202	1,351,819	\$14.20	\$10,116	123,598	\$82	-\$10,116	\$0
Oct	\$5,545	743,935	\$7.45	\$17,174	1,322,148	\$12.99	\$11,570	172,436	\$67	-\$11,570	\$0
Nov	\$6,647	938,863	\$7.08	\$29,647	1,995,818	\$14.85	\$14,775	222,229	\$66	-\$14,775	\$0
Dec	\$11,845	978,114	\$12.11	\$48,960	2,749,986	\$17.80	\$15,847	234,697	\$68	-\$15,847	\$0
<b>2008</b>	<b>\$67,415</b>	<b>9,690,615</b>	<b>\$6.96</b>	<b>\$351,829</b>	<b>23,678,308</b>	<b>\$14.86</b>	<b>\$207,150</b>	<b>2,168,686</b>	<b>\$96</b>	<b>-\$207,150</b>	<b>\$0</b>

## East River Unit 6/60 Methodology

East River Unit 6/60 is a conventional steam turbine based plant (Rankin cycle), consisting of a boiler, two steam turbines (one high and one low pressure) and a condenser, as shown in Figure 6.1.

This unit can operate in three alternate modes:

- Fully electric mode when no steam is extracted;
- Cogeneration mode when steam is extracted from the high pressure steam turbine with a corresponding de-rating of electric output; and
- “Live steam” mode when the turbines are bypassed with no electric generation and all the steam from the boiler is sent out to the steam system.

Fuel is charged entirely to the electric department during Mode 1 and entirely to steam during Mode 3 operation.

In Mode 2 cogeneration, the cost allocation methodology approved by PSC would charge the steam system for fuel at the rate of 1185 Btu/Mlb of steam and the remaining fuel is charged to electric. Additionally, steam is charged actual costs for steam processing, and incremental water treatment cost due to the increased make up water needed for steam sendout. The rate of 1185 Btu/Mlb is the heat provided by the plant for producing steam, which is the heat content (enthalpy) of steam minus that of make up water.

Unlike ERRP, this unit has only one fuel stream (either interruptible gas or residual oil) into the boiler for both electric generation and steam production. Steam production in East River Unit 6/60 requires incremental fuel consumption,

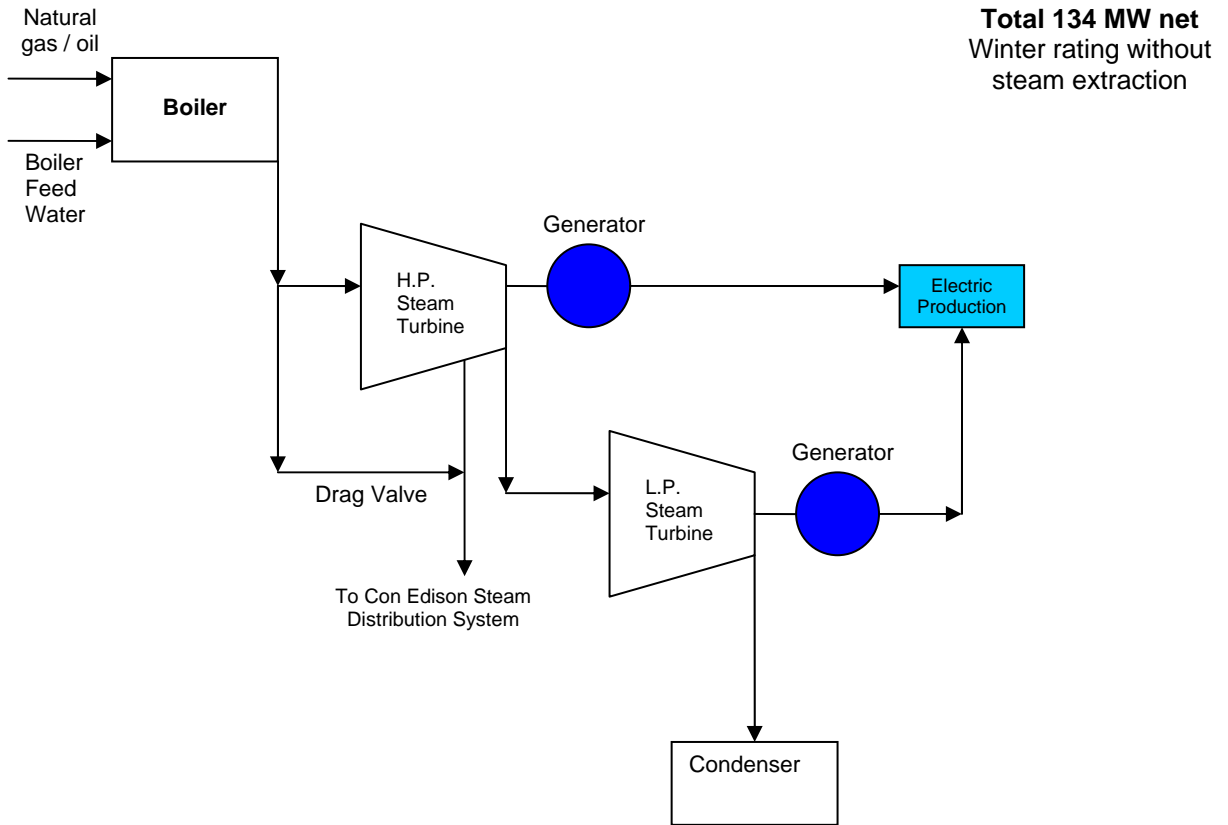
whereas ERRP steam production is based on the waste heat from combustion turbine exhaust.

Carrying charges for capital cost of the boiler, turbines, generator, condenser and balance of the plant are charged to electric department. The steam system capital cost is relatively small, and includes a portion of the water treatment plant (that is incremental to the steam sendout capability), steam conditioning equipment and steam piping.

Electric revenues (energy and capacity) belong to the electric department, so steam customers are not exposed to electric market risk and vice versa.

Table 4 shows what the allocation of ERRP costs would be, using East River 6 method.

**Table 3**  
**Schematic for East River Unit 6/60 Cogeneration Unit**



**Table 4**

**2008 Fuel Allocation based on East River Unit 6 Method**

**2008 Fuel Allocation Based on East River Unit 6 Method**

	Steam										Electric			
	Fuel ER10&20 \$1,000	Steam Sendout ER10&20 Mlbs	Steam Fuel @ 1185 Btu/Mlb MMBtu	Fuel Price \$/MMBtu	Fuel ER10&20 \$/Mlb	Total System Fuel \$1,000	Total Steam Sendout Mlbs	Total Steam System \$/Mlb	Fuel \$1,000	Electric (net) Generation MWh	Elec Fuel MMBtu	Energy Revenue \$1,000	Fuel \$/Mwh	
Jan	\$13,510	1,043,814	1,236,920	\$10.92	\$12.94	\$50,268	2,954,587	\$17.01	\$16,467	254,526	1,507,631	-\$24,197	-\$30	
Feb	\$11,716	884,201	1,047,778	\$11.18	\$13.25	\$47,637	2,796,369	\$17.04	\$13,782	209,492	1,232,525	-\$20,491	-\$32	
Mar	\$9,218	688,277	815,608	\$11.30	\$13.39	\$42,015	2,399,149	\$17.51	\$11,191	188,009	990,177	-\$15,266	-\$24	
Apr	\$6,372	448,249	531,175	\$12.00	\$14.21	\$29,211	1,582,551	\$18.46	\$7,696	109,237	641,526	-\$11,234	-\$32	
May	\$7,748	519,298	615,368	\$12.59	\$14.92	\$27,302	1,455,414	\$18.76	\$7,842	102,875	622,861	-\$10,728	-\$28	
Jun	\$14,609	898,230	1,064,403	\$13.72	\$16.26	\$30,676	1,627,274	\$18.85	\$15,125	186,428	1,102,032	-\$27,829	-\$68	
Jul	\$16,799	946,541	1,121,651	\$14.98	\$17.75	\$38,868	1,890,156	\$20.56	\$16,207	186,531	1,082,118	-\$26,968	-\$58	
Aug	\$13,054	996,126	1,180,409	\$11.06	\$13.10	\$24,735	1,553,037	\$15.93	\$12,701	198,628	1,148,502	-\$18,130	-\$27	
Sep	\$7,182	604,967	716,886	\$10.02	\$11.87	\$22,168	1,351,819	\$16.40	\$7,151	123,598	713,777	-\$10,116	-\$24	
Oct	\$7,809	743,935	881,563	\$8.86	\$10.50	\$19,437	1,322,148	\$14.70	\$9,307	172,436	1,050,723	-\$11,570	-\$13	
Nov	\$9,745	938,863	1,112,553	\$8.76	\$10.38	\$32,745	1,995,818	\$16.41	\$11,677	222,229	1,333,075	-\$14,775	-\$14	
Dec	\$12,352	978,114	1,159,065	\$10.66	\$12.63	\$49,468	2,749,986	\$17.99	\$15,340	234,697	1,439,439	-\$15,847	-\$2	
<b>2008</b>	<b>\$130,114</b>	<b>9,690,615</b>	<b>11,483,379</b>	<b>\$11.28</b>	<b>\$13.43</b>	<b>\$414,528</b>	<b>23,678,308</b>	<b>\$17.51</b>	<b>\$144,486</b>	<b>2,168,686</b>	<b>12,864,386</b>	<b>-\$207,150</b>	<b>-\$29</b>	

Assumption: Steam is charged fuel at the rate of 1,185 BTU/Mlb, and remaining fuel is charged to electric.

### **Proportional Method (1975 Rate Case)**

For purpose of calculation, the method assumes steam is produced elsewhere in a proxy boiler having a heat rate equivalent to the steam system boilers, and electricity is produced in a proxy electric plant having a heat rate equivalent to the system average. Using actual data for steam and electric production, the fuel consumption in the proxy boiler and proxy electric plant are calculated assuming equivalent steam and electricity are produced separately. Of the total fuel for proxy generation, the percent of fuel for steam and electric are calculated. These percentages are then applied to the actual total fuel consumption of the cogeneration unit to determine fuel allocation for actual steam and electric production. In this approach, steam and electric departments benefit equally by having the same percentage of fuel saving compared to proxy generation. The following tables show what the allocations for ERRP costs would be using this method.

Table 5a

Fuel Allocation Worksheet Using 1975 rate Case Method

2008 Fuel Allocation Worksheet  
 Method Used from 1975-78 Based on Case 26794 - 1975

		2008 Actual data with current allocation										Case 26794 1975 method										co gen versus proxy																																																																																																																																																																												
ER 10 & 20 steam sendout	Mlbs	Fuel current allocation to steam		Electric (net) Generation	Fuel current allocation to Electric		Total actual fuel	Fuel for proxy boiler plant		Fuel for Proxy electric plant		Total proxy steam & electric plants		Fuel proxy steam		Fuel proxy electric		Fuel ER10&20 Steam		Fuel ER10&20 electric		Steam fuel savings		Electric fuel savings																																																																																																																																																																										
		MMBtu	MWh		MMBtu	MMBtu		MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	%	%	%	%																																																																																																																																																																						
Jan	1,043,814	65,576	254,526	2,678,975	2,744,551	1,565,721	3,077,219	4,642,940	33.7%	66.3%	925,534	1,819,017	40.9%	40.9%	Feb	884,201	58,226	209,492	2,222,077	2,280,303	1,326,302	2,532,753	3,859,055	34.4%	65.6%	783,707	1,496,596	40.9%	40.9%	Mar	688,277	23,513	168,009	1,782,272	1,805,785	1,032,416	2,031,230	3,063,645	33.7%	66.3%	608,530	1,197,255	41.1%	41.1%	Apr	448,249	497	109,237	1,172,204	1,172,701	672,374	1,320,679	1,993,052	33.7%	66.3%	395,621	777,080	41.2%	41.2%	May	519,298	4,218	102,875	1,234,011	1,238,229	778,947	1,243,762	2,022,709	38.5%	61.5%	476,843	761,386	38.8%	38.8%	Jun	898,230	23,424	186,428	2,143,011	2,166,435	1,347,345	2,253,912	3,601,257	37.4%	62.6%	810,532	1,355,903	39.8%	39.8%	Jul	946,541	57,968	186,531	2,145,801	2,203,769	1,419,812	2,255,161	3,674,972	38.6%	61.4%	851,418	1,352,351	40.0%	40.0%	Aug	996,126	64,748	198,628	2,264,163	2,328,911	1,494,189	2,401,412	3,895,601	38.4%	61.6%	893,272	1,435,639	40.2%	40.2%	Sep	604,967	16,251	123,598	1,414,412	1,430,663	907,451	1,494,295	2,401,746	37.8%	62.2%	540,547	890,116	40.4%	40.4%	Oct	743,935	3,597	172,436	1,928,689	1,932,286	1,115,903	2,084,752	3,200,655	34.9%	65.1%	673,888	1,258,598	39.6%	39.6%	Nov	938,863	30,710	222,229	2,414,918	2,445,628	1,408,295	2,686,752	4,095,047	34.4%	65.6%	841,056	1,604,572	40.3%	40.3%	Dec	978,114	81,478	234,697	2,517,026	2,598,504	1,467,171	2,837,490	4,304,661	34.1%	65.9%	885,656	1,712,848	39.6%	39.6%	<b>2008</b>	<b>9,690,615</b>	<b>430,206</b>	<b>2,168,686</b>	<b>23,917,559</b>	<b>24,347,765</b>	<b>14,535,923</b>	<b>26,219,417</b>	<b>40,755,339</b>			<b>8,686,406</b>	<b>15,661,359</b>	<b>40.2%</b>	<b>40.3%</b>
<b>2008</b>	<b>9,690,615</b>	<b>430,206</b>	<b>2,168,686</b>	<b>23,917,559</b>	<b>24,347,765</b>	<b>14,535,923</b>	<b>26,219,417</b>	<b>40,755,339</b>			<b>8,686,406</b>	<b>15,661,359</b>	<b>40.2%</b>	<b>40.3%</b>																																																																																																																																																																																				

Assumptions:  
 Heat Rates: 1.5 MMBtu/Mlb proxy boiler, and 12.09 MMBtu/MMWh proxy electric generator.  
 Actual cogeneration fuel is allocated by the same percentage as the calculated fuel for proxy generators.  
 See next page for cost allocation.

Table 5b

2008 Fuel Allocation Using 1975 Rate Case Method

2008 Fuel Allocation Method Used from 1975-78 Based on Case 26794 - 1975

	Steam				Total System				Electric				Fuel	
	Fuel ER10&20 \$1,000	Sendout ER10&20 Mlbs	Steam Fuel from worksheets MMBtu	Fuel Price \$/MMBtu	Fuel ER 10&20 \$/Mlb	Total System Fuel \$1,000	Total System Sendout Mlbs	Total System Fuel \$/Mlb	Fuel \$1,000	Generation (net) MWh	Elec Fuel from worksheets MMBtu	Energy Revenue \$1,000		
Jan	\$10,109	1,043,814	925,534	\$10.92	\$9.68	\$46,867	2,954,587	\$15.86	0	\$19,868	254,526	1,819,017	-\$24,197	-\$17
Feb	\$8,763	884,201	783,707	\$11.18	\$9.91	\$44,684	2,796,369	\$15.98	0	\$16,735	209,492	1,496,596	-\$20,491	-\$18
Mar	\$6,878	688,277	608,530	\$11.30	\$9.99	\$39,674	2,399,149	\$16.54	0	\$13,531	168,009	1,197,255	-\$15,266	-\$10
Apr	\$4,746	448,249	395,621	\$12.00	\$10.59	\$27,584	1,582,551	\$17.43	0	\$9,322	109,237	777,080	-\$11,234	-\$18
May	\$6,004	519,298	476,843	\$12.59	\$11.56	\$25,558	1,455,414	\$17.56	0	\$9,587	102,875	761,386	-\$10,728	-\$11
Jun	\$11,124	898,230	810,532	\$13.72	\$12.38	\$27,192	1,627,274	\$16.71	0	\$18,610	186,428	1,355,903	-\$27,829	-\$49
Jul	\$12,752	946,541	851,418	\$14.98	\$13.47	\$34,821	1,890,156	\$18.42	0	\$20,254	186,531	1,352,351	-\$26,968	-\$36
Aug	\$9,879	996,126	893,272	\$11.06	\$9.92	\$21,559	1,553,037	\$13.88	0	\$15,877	198,628	1,435,639	-\$18,130	-\$11
Sep	\$5,416	604,967	540,547	\$10.02	\$8.95	\$20,401	1,351,819	\$15.09	0	\$8,918	123,598	890,116	-\$10,116	-\$10
Oct	\$5,967	743,935	673,688	\$8.86	\$8.02	\$17,596	1,322,148	\$13.31	0	\$11,148	172,436	1,258,598	-\$11,570	-\$2
Nov	\$7,367	938,863	841,056	\$8.76	\$7.85	\$30,367	1,995,818	\$15.22	0	\$14,055	222,229	1,604,572	-\$14,775	-\$3
Dec	\$9,438	978,114	865,656	\$10.66	\$9.65	\$46,554	2,749,986	\$16.93	0	\$18,253	234,697	1,712,848	-\$15,847	\$10
<b>2008</b>	<b>98,443</b>	<b>9,690,615</b>	<b>8,686,406</b>			<b>382,857</b>	<b>23,678,308</b>	<b>\$16.17</b>	<b>#</b>	<b>176,157</b>	<b>2,168,686</b>	<b>15,661,359</b>	<b>-\$207,150</b>	<b>-\$14</b>

See previous page for worksheet.

**Steam priced as by-product (Incremental Method)**  
**(Used Pre-1975 and Post 1978)**

Prior to the 1975 rate case proceeding, steam was priced as a byproduct of electric production. This was done by assigning to the electric sendout a heat input based upon the heat required to generate the same amount of electricity elsewhere on the system at a proxy electric plant having an electric heat rate equivalent to the system average.

Fuel consumption estimated for the proxy electric station is charged to the electric department for generating electric power. The difference between actual fuel consumption and that charged to the electric department is then charged to the steam department. In this approach, fuel costs for the electric department were similar to electric production from elsewhere, and the fuel cost savings from cogeneration were passed on entirely to the steam system. Tables 6a and 6b show the allocation of ERRP costs using this method with an electric heat rate used in 1975. Tables 6c and 6d apply the same method but use an electric heat rate equal to that of ERRP based on 2008 operation.

**Table 6a**

**Fuel Allocation Worksheet Based on Pre 1975 Rate Case Method**

**2008 Fuel Allocation Worksheet  
 Method Prior to Case 26794 - 1975**

		2008 Actual data with current allocation				Method prior to Case 26794			
ER10&20 Steam Sendout	2008	Fuel current allocation to steam	Electric (net) Generation	Fuel current allocation to Electric	Total actual fuel	Fuel for Proxy electric plant	Fuel allocation to cogen electric	Fuel allocation to cogen steam	
Mlbs		MMBtu	MWh	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu
1,043,814	Jan	65,576	254,526	2,678,975	2,744,551	3,077,219	3,077,219	-332,668	
884,201	Feb	58,226	209,492	2,222,077	2,280,303	2,532,753	2,532,753	-252,450	
688,277	Mar	23,513	168,009	1,782,272	1,805,785	2,031,230	2,031,230	-225,445	
448,249	Apr	497	109,237	1,172,204	1,172,701	1,320,679	1,320,679	-147,977	
519,298	May	4,218	102,875	1,234,011	1,238,229	1,243,762	1,243,762	-5,533	
898,230	Jun	23,424	186,428	2,143,011	2,166,435	2,253,912	2,253,912	-87,477	
946,541	Jul	57,968	186,531	2,145,801	2,203,769	2,255,161	2,255,161	-51,392	
996,126	Aug	64,748	198,628	2,264,163	2,328,911	2,401,412	2,401,412	-72,501	
604,967	Sep	16,251	123,598	1,414,412	1,430,663	1,494,295	1,494,295	-63,632	
743,935	Oct	3,597	172,436	1,928,689	1,932,286	2,084,752	2,084,752	-152,466	
938,863	Nov	30,710	222,229	2,414,918	2,445,628	2,686,752	2,686,752	-241,124	
<u>978,114</u>	Dec	<u>81,478</u>	<u>234,697</u>	<u>2,517,026</u>	<u>2,598,504</u>	<u>2,837,490</u>	<u>2,837,490</u>	<u>-238,986</u>	
<b>9,690,615</b>	<b>Annual</b>	<b>430,206</b>	<b>2,168,686</b>	<b>23,917,559</b>	<b>24,347,765</b>	<b>26,219,417</b>	<b>26,219,417</b>	<b>-1,871,652</b>	

Assumptions:  
 Electric is charged the fuel calculated for a proxy electric generator having a heat rate equivalent to 1975 system average,  
 12.09 MMBtu/MWh per Case 2673 (11/25/1975) proceeding page 2236.  
 Balance of fuel charged to steam. See next page for cost allocation.

**Table 6b**  
**2008 Fuel Allocation Base on Pre 1975 Method**

**Steam Priced as byproduct (Pre-1975 Method)**  
**2008 Fuel Cost Allocation**

	Steam										Electric				
	Fuel ER10&20	Steam Sendout ER10&20	Steam Fuel from worksheet	Fuel Price	Fuel ER10&20	Total System Fuel	Total Steam Sendout	Total System Fuel	Fuel \$/Mlb	Total System Fuel	Fuel \$/Mlb	Fuel \$/Mwh	Electric (net) Generation	Elec Fuel MMBtu	Energy Revenue
Jan	\$3,634	1,043,814	-332,668	\$10.92	-\$3.48	\$33,124	2,954,587	\$11.21	\$33,611	254,526	3,077,219	254,526	3,077,219	-\$24,197	\$37
Feb	\$2,823	884,201	-252,450	\$11.18	-\$3.19	\$33,098	2,796,369	\$11.84	\$28,321	209,492	2,532,753	209,492	2,532,753	-\$20,491	\$37
Mar	\$2,548	688,277	-225,445	\$11.30	-\$3.70	\$30,249	2,399,149	\$12.61	\$22,957	168,009	2,031,230	168,009	2,031,230	-\$15,266	\$46
Apr	\$1,775	448,249	-147,977	\$12.00	-\$3.96	\$21,064	1,582,551	\$13.31	\$15,842	109,237	1,320,679	109,237	1,320,679	-\$11,234	\$42
May	\$70	519,298	-5,533	\$12.59	-\$0.13	\$19,484	1,455,414	\$13.39	\$15,660	102,875	1,243,762	102,875	1,243,762	-\$10,728	\$48
Jun	\$1,201	898,230	-87,477	\$13.72	-\$1.34	\$14,867	1,627,274	\$9.14	\$30,935	186,428	2,253,912	186,428	2,253,912	-\$27,829	\$17
Jul	\$770	946,541	-51,392	\$14.98	-\$0.81	\$21,300	1,890,156	\$11.27	\$33,775	186,531	2,255,161	186,531	2,255,161	-\$26,968	\$36
Aug	\$802	996,126	-72,501	\$11.06	-\$0.80	\$10,879	1,553,037	\$7.00	\$26,557	198,628	2,401,412	198,628	2,401,412	-\$18,130	\$42
Sep	\$638	604,967	-63,632	\$10.02	-\$1.05	\$14,348	1,351,819	\$10.61	\$14,971	123,598	1,494,295	123,598	1,494,295	-\$10,116	\$39
Oct	\$1,351	743,935	-152,466	\$8.86	-\$1.82	\$10,278	1,322,148	\$7.77	\$18,466	172,436	2,084,752	172,436	2,084,752	-\$11,570	\$40
Nov	\$2,112	938,863	-241,124	\$8.76	-\$2.25	\$20,888	1,995,818	\$10.47	\$23,534	222,229	2,686,752	222,229	2,686,752	-\$14,775	\$39
Dec	\$2,547	978,114	-238,986	\$10.66	-\$2.60	\$34,569	2,749,986	\$12.57	\$30,238	234,697	2,837,490	234,697	2,837,490	-\$15,847	\$61
<b>2008</b>	<b>-\$20,268</b>	<b>9,690,615</b>	<b>-1,871,652</b>	<b>\$11.28</b>	<b>-\$2.09</b>	<b>\$264,146</b>	<b>23,678,308</b>	<b>\$11.16</b>	<b>\$294,868</b>	<b>2,168,686</b>	<b>26,219,417</b>	<b>2,168,686</b>	<b>26,219,417</b>	<b>-\$207,150</b>	<b>\$40</b>

Note: See previous page for the worksheet allocating East River 10 & 20 fuel for steam and electric generation.

**Table 6c**

**Modified Pre-1975 Method Worksheet**

**2008 Fuel Allocation Worksheet  
Modified Pre-1975 Method (Steam as Byproduct)**

		2008 Actual data with current allocation					Method prior to Case 26794				
ER10&20 Steam Sendout	Mlbs	Fuel current allocation to steam MMBtu	Electric (net) Generation MWh	Fuel current allocation to Electric MMBtu	Total actual fuel MMBtu	ER 10&20 Heat Rate MMBtu/MWh	Proxy electric plant MMBtu	Fuel allocation to cogen electric MMBtu	Fuel allocation to cogen steam MMBtu		
2008											
Jan	1,043,814	65,576	254,526	2,678,975	2,744,551	10.525	2,678,886	2,678,886	65,665		
Feb	884,201	58,226	209,492	2,222,077	2,280,303	10.607	2,222,077	2,222,077	58,226		
Mar	688,277	23,513	168,009	1,782,272	1,805,785	10.608	1,782,240	1,782,240	23,545		
Apr	448,249	497	109,237	1,172,204	1,172,701	10.731	1,172,225	1,172,225	476		
May	519,298	4,218	102,875	1,234,011	1,238,229	12.000	1,234,451	1,234,451	3,778		
Jun	898,230	23,424	186,428	2,143,011	2,166,435	11.495	2,142,988	2,142,988	23,447		
Jul	946,541	57,968	186,531	2,145,801	2,203,769	11.504	2,145,853	2,145,853	57,916		
Aug	996,126	64,748	198,628	2,264,163	2,328,911	11.399	2,264,160	2,264,160	64,751		
Sep	604,967	16,251	123,598	1,414,412	1,430,663	11.444	1,414,451	1,414,451	16,212		
Oct	743,935	3,597	172,436	1,928,689	1,932,286	11.185	1,928,698	1,928,698	3,588		
Nov	938,863	30,710	222,229	2,414,918	2,445,628	10.867	2,414,966	2,414,966	30,662		
Dec	<u>978,114</u>	<u>81,478</u>	<u>234,697</u>	<u>2,517,026</u>	<u>2,598,504</u>	<u>10.725</u>	<u>2,517,128</u>	<u>2,517,128</u>	<u>81,376</u>		
<b>Annual</b>	<b>9,690,615</b>	<b>430,206</b>	<b>2,168,686</b>	<b>23,917,559</b>	<b>24,347,765</b>		<b>23,918,124</b>	<b>23,918,124</b>	<b>429,641</b>		

Electric is charged the fuel calculated for a proxy electric generator having a heat rate equivalent to 1975 system average.

12.09 MMBtu/MWh per Case 2673 (11/25/1975) proceeding page 2236.

Balance of fuel charged to steam. See next page for cost allocation.

**Table 6d**

**Modified Pre-1975 method**

**Modified Pre-1975 Method (Steam as Byproduct)  
 2008 Fuel Cost Allocation**

	Steam						Electric							
	Fuel ER10&20	Steam Sendout ER10&20	Steam Fuel from worksheet	Fuel Price \$/MMBtu	Fuel ER10&20 \$/Mib	Total System Fuel	Total Steam Sendout	Total System Fuel	Fuel ER10&20 \$/Mib	Fuel ER10&20 \$/Mib	Electric Generation (net)	Elec Fuel	Energy Revenue	Fuel \$/Mwh
Jan	\$717	1,043,814	65,665	\$10.92	\$0.69	\$37,475	2,954,587	\$12.68	\$29,260	254,526	2,678,886	\$1,000	-\$24,197	\$20
Feb	\$651	884,201	58,226	\$11.18	\$0.74	\$36,571	2,796,369	\$13.08	\$24,847	209,492	2,222,077	\$1,000	-\$20,491	\$21
Mar	\$266	688,277	23,545	\$11.30	\$0.39	\$33,063	2,399,149	\$13.78	\$20,143	168,009	1,782,240	\$1,000	-\$15,266	\$29
Apr	\$6	448,249	476	\$12.00	\$0.01	\$22,844	1,582,551	\$14.44	\$14,062	109,237	1,172,225	\$1,000	-\$11,234	\$26
May	\$48	519,298	3,778	\$12.59	\$0.09	\$19,602	1,455,414	\$13.47	\$15,543	102,875	1,234,451	\$1,000	-\$10,728	\$47
Jun	\$322	898,230	23,447	\$13.72	\$0.36	\$16,389	1,627,274	\$10.07	\$29,412	186,428	2,142,988	\$1,000	-\$27,829	\$8
Jul	\$867	946,541	57,916	\$14.98	\$0.92	\$22,937	1,890,156	\$12.13	\$32,138	186,531	2,145,853	\$1,000	-\$26,968	\$28
Aug	\$716	996,126	64,751	\$11.06	\$0.72	\$12,397	1,553,037	\$7.98	\$25,039	198,628	2,264,160	\$1,000	-\$18,130	\$35
Sep	\$162	604,967	16,212	\$10.02	\$0.27	\$15,148	1,351,819	\$11.21	\$14,171	123,598	1,414,451	\$1,000	-\$10,116	\$33
Oct	\$32	743,935	3,588	\$8.86	\$0.04	\$11,660	1,322,148	\$8.82	\$17,084	172,436	1,928,698	\$1,000	-\$11,570	\$32
Nov	\$269	938,863	30,662	\$8.76	\$0.29	\$23,269	1,995,818	\$11.66	\$21,153	222,229	2,414,966	\$1,000	-\$14,775	\$29
Dec	\$867	978,114	81,376	\$10.66	\$0.89	\$37,983	2,749,986	\$13.81	\$26,824	234,697	2,517,128	\$1,000	-\$15,847	\$47
<b>2008</b>	<b>\$4,923</b>	<b>9,690,615</b>	<b>429,641</b>	<b>\$11.28</b>	<b>\$0.51</b>	<b>\$289,337</b>	<b>23,678,308</b>	<b>\$12.22</b>	<b>\$269,677</b>	<b>2,168,686</b>	<b>23,918,124</b>	<b>\$1,000</b>	<b>-\$207,150</b>	<b>\$29</b>

Note: See previous page for the worksheet allocating East River 10 & 20 fuel for steam and electric generation.

## **Appendix G**

### **East River Repowering Project MAPS Review & Results**

**Table 1a**  
**MAPS Base Case Assumptions:**

1. Peak Load and Energy send-out as per 2009 NYISO Gold Book.
2. Fuel forecast as per Steam Resource Planning, March 2009.
3. Poletti retired in 2010.
4. VFT project in service in 2010.
5. M-29 project in service in 2011.
6. Con Ed / PSEG 1000 MW Wheeling Contract in service.
7. 660 MW Besicorp CC plant in service in 2010.
8. All coal-fired generation retired in Ontario in 2010.
9. SCS Astoria-2 500 MW in-city CC plant in service in 2011.
10. Susquehanna-to-Roseland line (800 MW; 500 kV) in service in PJM in 2013.
11. All NYCA transmission interface limits modeled at current ratings.

**Table 1b**  
**NYC Fuel Price Assumptions:**

	<b>Gas</b>	<b>Oil</b>	
	<b>Natural Gas</b>	<b>#2 Oil</b>	<b>0.3% #6 Oil</b>
	<b>\$/ MMBTU</b>	<b>\$/ MMBTU</b>	<b>\$/ MMBTU</b>
Jan-2010	\$ 9.00	\$ 11.60	\$ 10.00
Feb-2010	\$ 8.10	\$ 11.70	\$ 10.10
Mar-2010	\$ 7.00	\$ 11.80	\$ 10.20
Apr-2010	\$ 6.50	\$ 11.90	\$ 10.20
May-2010	\$ 6.50	\$ 12.10	\$ 10.30
Jun-2010	\$ 6.60	\$ 12.20	\$ 10.40
Jul-2010	\$ 6.80	\$ 12.30	\$ 10.50
Aug-2010	\$ 6.90	\$ 12.40	\$ 10.60
Sep-2010	\$ 6.90	\$ 12.40	\$ 10.60
Oct-2010	\$ 7.00	\$ 12.50	\$ 10.70
Nov-2010	\$ 7.70	\$ 12.60	\$ 10.80
Dec-2010	\$ 8.70	\$ 12.70	\$ 10.80
Average	\$ 7.31	\$ 12.18	\$ 10.43

**Table 2**  
**MAPS Results**

**MAPS Results: ERRP Dispatchable Case**

Case Version: 4/10/2009

Fuel Prices: Fuel prices are those provided by Steam Resource Planning for the purposes of this studies, as of Monday, March 9, 2009.

Year of Study: 2010

Load Shape: 2006

**LBMP Summary:**

Area Names	Base 2010			ERRP Dispatchable			Impact of ERRP Dispatchable		
	Average Spot Price	Weighted total cost (\$)	Average Weighted Cost	Average Spot Price	Weighted total cost (\$)	Average Weighted Cost	Average Spot Price	Weighted total cost (\$)	Average Weighted Cost
A - West	35.09	579,888,176.00	35.95	35.62	588,193,984.00	36.46	0.53	8,295,808.00	0.51
B - Genessee	38.18	388,798,368.00	39.78	38.78	394,329,088.00	40.35	0.60	5,530,720.00	0.57
C - Central	39.77	666,038,400.00	40.82	40.42	676,398,016.00	41.46	0.65	10,359,616.00	0.63
D - North	34.84	227,195,872.00	34.80	35.35	230,417,088.00	36.30	0.51	3,221,216.00	0.49
E - Mohawk Valley	39.75	315,993,504.00	41.22	40.44	321,135,424.00	41.89	0.69	5,141,920.00	0.67
F - Capital	46.00	559,463,296.00	47.90	46.67	566,766,464.00	48.52	0.67	7,303,168.00	0.63
G - Hudson Valley	48.30	535,858,368.00	50.90	49.74	551,525,376.00	52.39	1.45	15,667,008.00	1.49
H - Millwood	49.63	149,834,832.00	53.59	51.24	154,608,096.00	55.30	1.61	4,773,264.00	1.71
I - Dunwoodie	49.56	332,105,952.00	54.09	51.19	342,733,856.00	55.82	1.63	10,627,904.00	1.73
<b>J - New York City</b>	<b>54.51</b>	<b>3,189,754,112.00</b>	<b>58.80</b>	<b>56.50</b>	<b>3,298,520,576.00</b>	<b>60.80</b>	<b>1.99</b>	<b>108,766,464.00</b>	<b>2.00</b>
K - Long Island	54.31	1,337,648,640.00	59.15	55.46	1,363,686,144.00	60.30	1.15	26,037,504.00	1.15
<b>NYCA Total</b>		<b>8,282,589,520.00</b>			<b>8,488,314,112.00</b>			<b>205,724,592.00</b>	

3.41%

2.48%

## **Appendix H**

### **East River Load Area Review**

**Table 1**  
**ERRP Load Area Pocket Review**

<b>ERRP Load Area Review</b>										
<i>Based on the Load Forecast of September 25, 2008 with 658 MW of DSM - DSM 1,2,3,4 &amp; 5            Summer Independent MW Area Peak Loads from Load Relief Program</i>										
	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>
<b>East 13th Street Area Load</b>										
<b>Total Load</b>	(1,2) 1,554	1,500	1,507	1,488	1,485	1,484	1,472	1,485	1,487	1,499
<b>East 13th St Area Supply</b>										
East River GT 1 (ERRP)	147	147	147	147	147	147	147	147	147	147
East River GT 2 (ERRP)	148	148	148	148	148	148	148	148	148	148
Other Generation	314	314	314	314	314	314	314	314	314	314
Generation Sub Total	609	609	609	609	609	609	609	609	609	609
Transmission Sub Total	<u>2,022</u>	<u>2,022</u>	<u>2,022</u>	<u>2,022</u>	<u>2,022</u>	<u>2,022</u>	<u>2,022</u>	<u>2,022</u>	<u>2,022</u>	<u>2,022</u>
<b>Total Supply</b>	2,631	2,631	2,631	2,631	2,631	2,631	2,631	2,631	2,631	2,631
<b>Design Contingency</b>										
Contingency Loss	(796)	(3)	(1,015)	(4)	(1,015)	(1,015)	(1,015)	(1,015)	(1,015)	(1,015)
<b>Area Capability</b>	1,835	1,616	1,616	1,616	1,616	1,616	1,616	1,616	1,616	1,616
<b>Reserve (Deficit)</b>	281	116	109	129	132	133	145	132	130	118
Transmission Equipment Loading	77%	88%	89%	87%	87%	87%	86%	87%	87%	88%
<b>Reserve (Deficit) less ER 1 &amp; 2</b>	<b>(14)</b>	<b>(179)</b>	<b>(186)</b>	<b>(166)</b>	<b>(163)</b>	<b>(162)</b>	<b>(150)</b>	<b>(163)</b>	<b>(165)</b>	<b>(177)</b>

**Notes:**

- (1) Normal Rating based on R. Boggia's ratings of October 10, 2001
- (2) MW ratings based on load flow studies
- (3) Loss of Tr 15 plus Tr 10 & 11
- (4) With the retirement of Poletti, the design contingency becomes the loss of 4 transformers TR 10,11,16 & 17