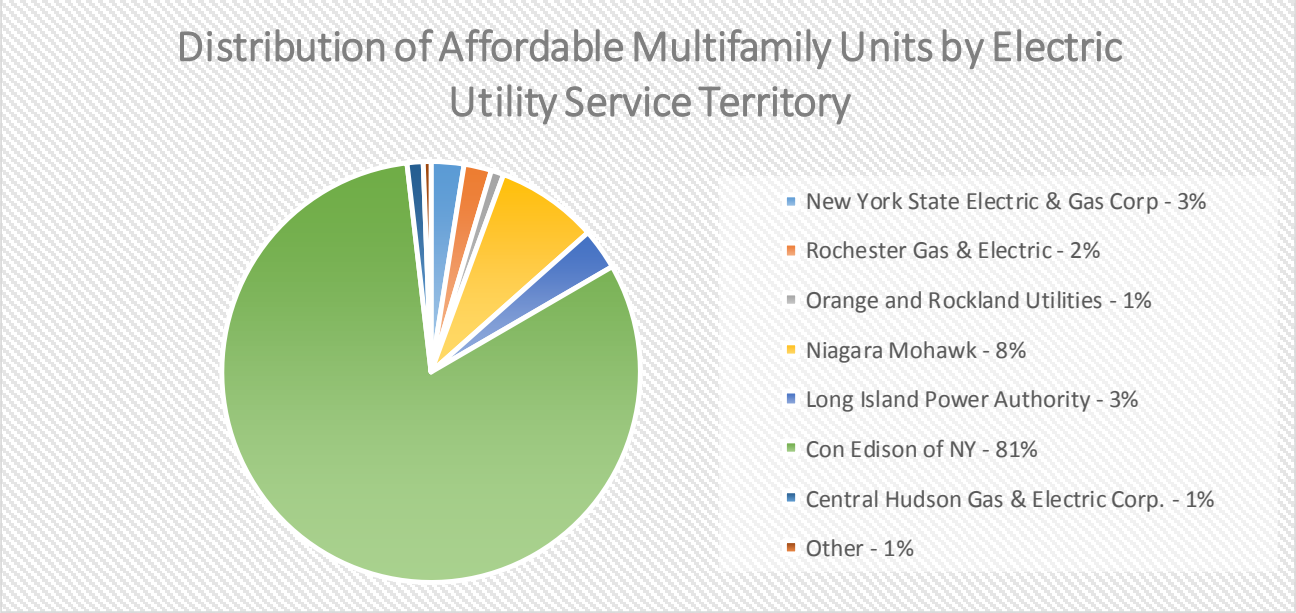
Potential for Energy Savings in New York's Affordable Multifamily Housing Stock

ABOUT THE STUDY

A recently completed study commissioned by the Natural Resources Defense Council (NRDC) on behalf of Energy Efficiency for All estimated the potential energy savings from the implementation of efficiency measures in affordable multifamily housing in nine states – Georgia, Illinois, Maryland, Michigan, Missouri, New York, North Carolina, Pennsylvania, and Virginia.[1] The analysis estimated savings for electricity, natural gas, and fuel oil over a 20-year period, 2015 to 2034. This document summarizes the study's findings for New York.

NEW YORK'S MULTIFAMILY HOUSING STOCK

In New York there are an estimated 1.7 million affordable multifamily units representing over 60% of the total multifamily units in the state.[2] The large majority of these units – 1.4 million or 81% – are located in Con Edison's service territory.



[1] Potential for Energy Efficiency in Affordable Multifamily Housing. Prepared by Optimal Energy for the Natural Resources Defense Council. May 2015, available at: http://www.energyefficiencyforall.org/sites/default/files/EEFA%20Potential%20Study.pdf.

[2] For the purposes of this study, affordable multifamily housing is defined as households in buildings with five or more units occupied by people with household incomes at or below 80% of the area median income.

FINDINGS – ENERGY SAVINGS

There is significant energy savings potential in New York's affordable multifamily sector. In the base case analysis –which assumes no non-energy benefits (NEBs) and only the inclusion of cost-effective measures – cumulative maximum achievable potential[3] savings are:

- 1,981 GWh, or 24% of forecasted electricity sales by 2034.
- 8,019 BBtu, or 13% of forecasted gas sales by 2034.
- 5,258 BBtu, or 15% of forecasted fuel oil sales by 2034.

If NEBs – discussed in more detail below - are included then cumulative gas and electricity savings increase:

- To 27% of forecasted electricity sales by 2034 in the low NEB scenario and to 31% in the high NEB scenario.
- To 18% of forecasted gas sales by 2034 in both the low and high NEB scenarios.
- Fuel oil savings, at 15% of forecasted sales remain largely unchanged in both the low and high NEB scenarios.

FINDINGS – COSTS and BENEFITS

Similarly, there are significant dollar benefits arising from these energy savings. Total cumulative net benefits calculated using the Total Resource Cost test are $3.1 billion. In other words, for every $1.00 invested in efficiency, $2.40 is returned in energy cost reductions. The greatest amount of benefits are from electricity savings (41%) and the greatest amount of net benefits are from oil (41%). When NEBs are included in the analysis, the net benefits increase to $6.3 billion at a 3.3 benefit to cost ratio in the low NEBs scenario and to $9.6 billion in the high NEBs scenario yielding a 3.5 benefit to cost ratio.

New York Base Case: 2015-2034 Cumulative Costs and Benefits			
Fuel	**Costs**	**Benefits**	**Net Benefits**
Electric	$976	$2,169	$1,193
Gas	$586	$1,240	$654
Oil	$616	$1,884	$1,268
TOTAL	**$2,178**	**$5,293**	**$3,115**

[3] Maximum achievable potential is the amount of savings that can be realized if all cost-effective efficiency measures are implemented given existing market barriers. "Potential" here refers to the savings that would result from the adoption of energy efficient technologies that would not occur without funded programs to promote their adoption.

Given the large saturation of affordable multifamily units in the Con Edison service territory, it is not surprising that a very large majority (84%) of net benefits also occur in there.

Cumulative New Benefits by Fuel and by Electric Utility Service Territory				
Utility	**Electric Net Benefits ($Million)**	**Gas Net Benefits ($Million)**	**Oil Net Benefits ($Million)**	**Total Net Benefits ($Million)**
Con Edison of NY	$1,051	$543	$1,023	$2,617
Niagara Mohawk	$62	$47	$105	$214
Long Island Power Authority	$22	$20	$43	$85
New York State Electric & Gas Corp.	$20	$15	$33	$68
Rochester Gas & Electric	$17	$13	$29	$59
Central Hudson Gas & Electric Corp.	$9	$8	$15	$32
Orange and Rockland Utilities	$7	$6	$12	$25
Other	$4	$3	$7	$14
Total	**$1,193**	**$654**	**$1,268**	**$3,115**

METHODOLOGY

The study employed a multi-step process to estimate state and electric utility service territory level savings potential. The key steps in the analysis were:

- Estimate the number of affordable multifamily housing units by utility service territory, by building size (i.e., buildings with 5 to 49 units and buildings with 50 or more units), and by subsidy types (unsubsidized affordable, subsidized affordable, and public housing authority-owned).

- Estimate baseline energy consumption for affordable multifamily housing units for each energy type (electricity, natural gas, and fuel oil) for the period 2015-2034.[4]

- Identify and assign location-dependent parameters (see the able below) that could affect measure characterizations for each electric utility service territory. These parameters included climate, hours of use for lighting, measure cost adjustment factors, and avoided energy supply costs. For example, Con Edison was assigned a high lighting hours of use based on the 2014 Northeast Residential Lighting Hours-of-Use Study.[5]

- Assign each utility to a specific set of avoided costs. The electric and gas avoided costs used for this analysis were simplified to yield a more manageable set of avoided costs for full the nine state study. For New York two sets of electric avoided costs and two sets of gas avoided costs were used.

Location Dependent Parameter Categories by Utility Territory

State	Utility	Climate Factor	Lighting HOU	Measure Cost Factor	Electric Avoided Costs	Natural Gas Avoided Costs	Fuel Oil Avoided Cost
NY	New York State Electric & Gas Corp.	L	L	M	L	L	H
NY	Rochester Gas & Electric	L	L	M	L	L	H
NY	Orange and Rockland Utilities	L	L	H	L	H	H
NY	Niagara Mohawk	L	L	M	L	L	H
NY	Long Island Power Authority	L	L	H	L	H	H
NY	Con Edison of NY	M	H	H	H	H	H
NY	Central Hudson Gas & Electric Corp.	L	L	H	L	H	H
NY	Other	L	L	H	L	L	H

[4] These estimates, primarily based on data from the U.S. Energy Information Administration's *Residential Energy Consumption Survey (2013)*, were used both to inform measure characterizations and to report potential estimates as a percentage of total baseline usage.

[5] http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-EMEP-Northeast-Residential-Lighting-A-F.pdf

- Characterize efficiency measure parameters including costs, benefits, and lifetimes. Then screen a comprehensive list of 182 measures for cost-effectiveness using the Total Resource Cost Test. All failing measures were removed from the analysis. Future costs and benefits were discounted to the present using a real discount rate of 3%. For the base scenario – no NEBs – the following cost and benefits were included.

Overview of the Total Resource Cost Test

Monetized Benefits / Costs	Total Resource Cost (TRC)
Measure cost (incremental over baseline)	Cost
Program Administrator incentives	Transfer/Excluded*
Program Administrator non-incentive program costs	Cost
Energy & electric demand savings	Benefit
Fossil fuel increased usage	Cost
Operations & Maintenance savings	Benefit
Water savings	Benefit
Deferred replacement credit**	Benefit

* Program Administrator incentives reflect a transfer payment from utilities to customers. Because incentives represent a cost to the program administrator and a benefit to participants, they effectively cancel each other out and are therefore excluded from the calculation of TRC.

** The Deferred Replacement Credit is available for early-retirement retrofit measures, measures that obviate or delay the need for the replacement of existing equipment.

- Develop for each electric utility service area, annual measure-specific penetration rates.
- Establish incentive levels and non-incentive program costs. Non-incentive costs were generally set at 20% of incentive costs.
- Adjust for measure interactions.
- Calculate annual per measure energy savings, costs, and annual and lifetime benefits. Sum these values by year and over the full 2015-2035 analysis timeframe.

NON-ENERGY BENEFITS (NEBS)

The inclusion of non-energy benefits (NEBs) can have a significant impact on maximum achievable potential, especially for the affordable multifamily housing sector. The study's authors conducted sensitivity analyses to examine the impact of NEBs on the maximum achievable potential. The table**Error! Reference source not found. Error! Reference source not found.** shows the sensitivity analyses performed.

Summary of Sensitivity Analyses Performed

Scenario	Scenario Description
Base Case	Maximum achievable potential scenario. Benefits assessed limited to reduced energy, water, and operation and maintenance costs (i.e., does not include the impact of other non-energy benefits)
Low Non-Energy Benefits	Maximum achievable potential including the impact of low non-energy benefits
High Non-Energy Benefits	Maximum achievable potential including the impact of high non-energy benefits

Several efficiency programs, though currently not those in New York, account for the impacts of additional benefits beyond reduced energy and water consumption and reduced operation and maintenance costs. Massachusetts has studied these impacts extensively in the residential sector, and has quantified NEBs specifically for low-income participants.[6] The benefits that have been quantified and applied low income programs in Massachusetts include:[7]

- Reduced arrearages
- Reduced customer calls and collection activities
- Reduced safety related emergency calls
- Higher comfort levels
- Increased housing property values
- Health related benefits

For the NEB sensitivity analyses, the study assumed NEBs values derived from the actual value of non-energy benefits claimed for low income residential programs implemented by the Massachusetts programs administrators in 2012 and 2013. The study on which the Massachusetts NEB values are based are provided on a per-housing unit basis by measure type. The authors of the *Potential for Energy Efficiency in Affordable Multifamily Housing* study simplified this approach. They applied the ratio of overall Massachusetts low-income non-energy benefits to the total energy benefits to adjust the avoided costs used in this study. These ratios were adjusted so that the resulting value of the non-energy benefits per unit of energy saved are approximately equal regardless of the assumed avoided costs used in the specific utility territory assessed. The Low NEBs scenario assumed non-energy benefits equivalent to 50% of the Massachusetts values whereas the High NEBs scenario assumes values equivalent to 100% of the Massachusetts values.

When assessing the cost-effectiveness and net benefits of efficiency measures, including the non-energy benefits is equivalent to assuming higher avoided energy costs. Given the magnitude of the non-energy benefits in the affordable multifamily housing sector, including these benefits, in many cases, changes whether individual measures pass or fail cost-effectiveness screening. Therefore, the impact on overall energy and dollar savings can be significant

[6] NMR Group. 2011. Massachusetts Special and Cross Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation

[7] The referenced Massachusetts study does not quantify all NEBs investigated. Reasons for which a given non-energy benefit was not quantified include the following: "[t]he [NEB] is too hard to quantify meaningfully, [q]uantifying the [NEB] would amount to double counting as the NEB is already accounted for, [t]here is insufficient evidence in the literature for its existence, [and] [t]he [NEB] is too intangible."