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Developing Demand Side Resource Cost Estimates for NYISO

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June 23, 2009

Draft-in-Progress

Purpose

Using publicly available data, develop order-of-magnitude estimates of the total cost of reducing peak demand by 100 MW through a portfolio of demand response and energy efficiency programs in three regions of New York

The results of this analysis should be considered approximate and only indicative of the order of magnitude of costs that would be associated with demand side resources in New York

If the objective is a comprehensive assessment of the relative competitiveness of demand side and supply side options, further analysis is needed

Estimates are near-final and are in the final stages of internal review

Approach

- Identify utilities that are representative of three major regions in New York

  ► ConEd, Niagara Mohawk, Long Island Power Authority

- Collect recent DSM filings and reports by these utilities

- Identify total costs and impacts (peak and energy) associated with proposed and historical programs

  ► Rely on information on proposed programs when possible

- Using expected peak demand impact, scale present value of total portfolio budget to produce 100 MW peak reduction

  ► Scaling is linear due to lack of more detailed data

This approach has the advantage of being consistent with reported costs in New York and relies on a portfolio of programs that have been found to be cost effective in the state

Summary of the utility program cost review

Utility	Portfolio	NPV of Total Resource Cost (2009$ Millions)	Peak Savings (MW)	Lifetime Energy Savings (GWh)	Unit Cost ($ Millions per MW)	Unit Cost ($ Millions per GWh)	Horizon
Long Island Power Authority	EE	819	575	21,257	1.42	0.04	Projection
	DR	32	51	0	0.63	N/A	Historical
ConEd	EE	399	264	8,099	1.51	0.05	Projection
	DR	177	617	44	0.29	4.03	Projection
Niagara Mohawk	EE	149	112	4,143	1.33	0.04	Projection
	DR	<<< No utility DR program costs were identified for Niagara Mohawk >>>					

Notes:
Energy savings represent total energy savings over the lifetime of the portfolio
Peak savings represent the maximum annual peak demand reduction over the lifetime of the portfolio
Costs represent NPV of total resource cost (as determined by TRC cost-effectiveness test) over lifetime of the portfolio
LIPA DR costs are utility budget dollars rather than total resource cost, but utility appears to bear all costs associated with program.
LIPA DR costs were reported in nominal dollars and discounted using an annual discount rate of 8%.
LIPA EE and DR costs were escalated to real 2009$ using an assumed average annual inflation rate of 3%.
ConEd EE savings are only reported for first three years, so 10 year measure life is assumed
Niagara Mohawk peak savings from EE were determined using load factor implied in the LIPA EE portfolio
Niagara Mowhak EE costs are based on three years of investment and assume negligible ongoing program costs beyond the first
   three years due to lack of information

Detail behind each of these portfolios is provided in Appendix A

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Scaling the program costs

The present value of utility program costs are then each scaled linearly to represent a portfolio that produces 100 MW of peak demand reduction

Utility	Portfolio	Portfolio Size (MW)	Unit Cost ($ Millions per MW)	Total Portfolio Cost ($ Millions)
Long Island Power Authority	EE	100	1.4	142
	DR	100	0.6	63
ConEd	EE	100	1.5	151
	DR	100	0.3	29
Niagara Mohawk	EE	100	1.3	133
	DR	N/A	N/A	N/A

Purely from the perspective of reducing peak demand, DR is a cheaper option to pursue; energy efficiency provides additional energy savings

Interpreting the results

Differences in regional costs are driven by many factors

- Economic drivers such as the cost of labor
- The selected set of cost-effective measures
- Financial assumptions such as the discount rate

DR is cheaper if peak demand is the only priority

- Energy efficiency does not compete with DR when the portfolio cost is spread over the peak impact
- However, energy efficiency measures provide energy benefits that DR does not
- It will be necessary to decide whether there are any priorities other than meeting peak demand, and if there are, analyze the portfolio of demand side options against those criteria as well

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Results from other studies

A review of recent research on costs of demand-side programs allows for benchmarking the New York estimates

Demand Response

- A 2008 study by the Brattle Group and Global Energy Partners for Bonneville Power Administration identified representative costs for a wide range of DR programs

Energy Efficiency

- A 2006 study of the national potential for energy efficiency, published in The Electricity Journal, produced a supply curve of energy efficiency measures

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Benchmarking the DR program costs

DR Program Costs Established in BPA DR Assessment

NY energy efficiency
program cost range

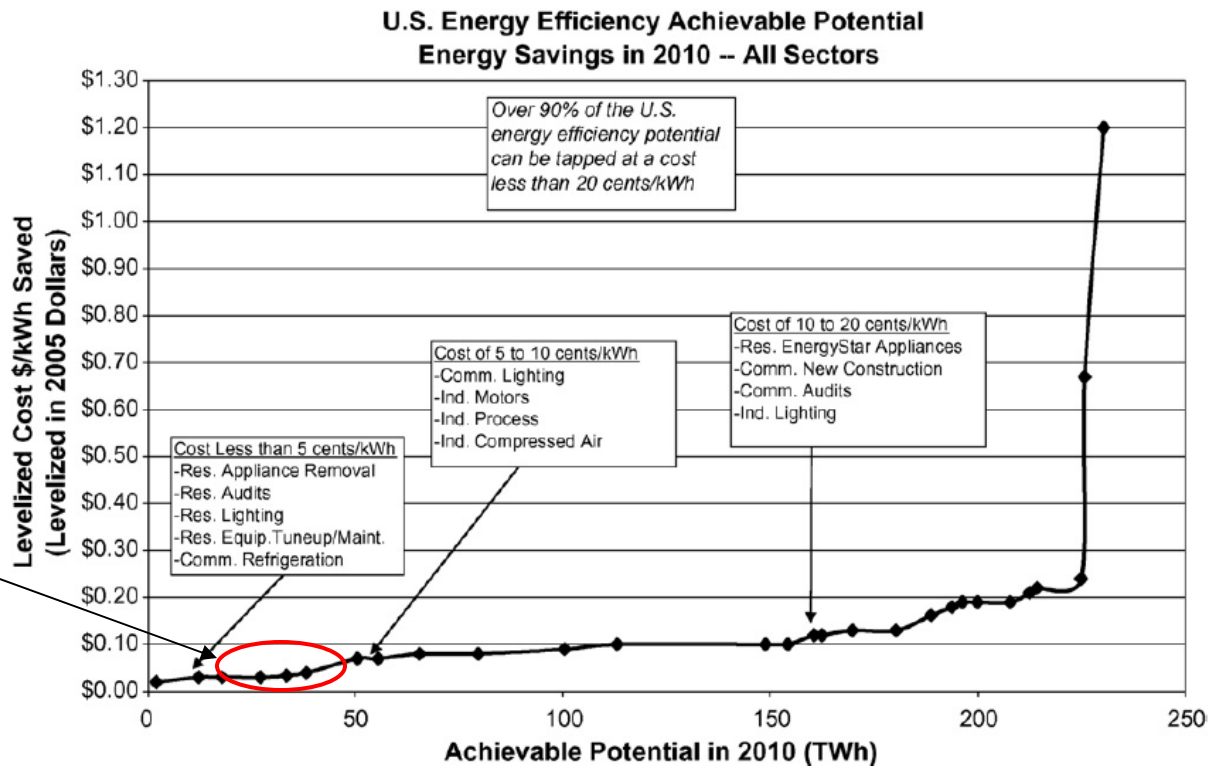($1,300/kW to $1,500/kW)

NY demand response
program cost range

($300/kW - $600/kW)
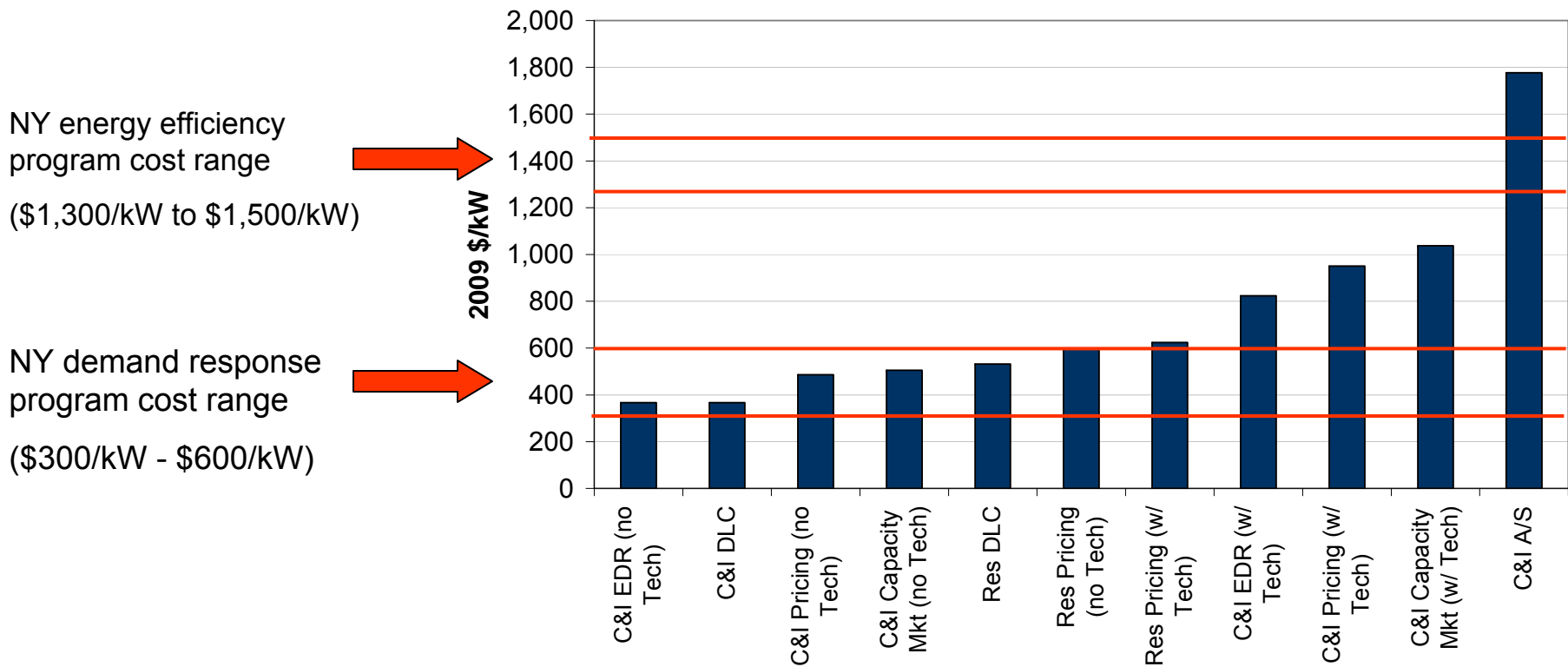
Source: Global Energy Partners and The Brattle Group, "Assessment of
DR Options for BPA," prepared for BPA, June 2009

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Benchmarking the energy efficiency program costs

At a levelized cost of 4 cents/kWh to 5 cents/kWh, the NY energy efficiency programs are less expensive than most measures in the national energy efficiency supply curve

U.S. Energy Efficiency Achievable Potential
Energy Savings in 2010 -- All Sectors

Over 90% of the U.S. energy efficiency potential can be tapped at a cost less than 20 cents/kWh

Cost of 10 to 20 cents/kWh
-Res. EnergyStar Appliances
-Comm. New Construction
-Comm. Audits
-Ind. Lighting

Cost of 5 to 10 cents/kWh
-Comm. Lighting
-Ind. Motors
-Ind. Process
-Ind. Compressed Air

Cost Less than 5 cents/kWh
-Res. Appliance Removal
-Res. Audits
-Res. Lighting
-Res. Equip.Tuneup/Maint.
-Comm. Refrigeration

Source: Clark Gellings, et. al, "Assessment of U.S. Electric End-Use Energy Efficiency Potential," The Electricity Journal, November 2006

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Appendix A

Detail Behind Utility Portfolios

Long Island Power Authority portfolio

Energy Efficiency Portfolio
- Based on "Efficiency Long Island" initiative
- Forward-looking ten year plan for investment in new energy efficiency initiatives
- Five proposed programs spanning all three customer classes
  - Residential new construction
  - Residential efficient products
  - Residential existing
  - C&I existing
  - C&I new construction
- Source: *LIPA Draft Electric Resource Plan*

Demand Response Portfolio
- Based on the LIPA*edge* program
- Existing direct load control with PCT (started 2001)
- Source: *Clean Energy Initiative 2007 Annual Report*

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ConEd portfolio

Energy Efficiency Portfolio

- Six proposed programs filed in response to the Commission's Energy Efficiency Portfolio requirements
  - ► Residential direct installation program
  - ► Residential room air conditioner program
  - ► Residential HVAC programs
  - ► Appliance bounty program
  - ► Commercial and industrial equipment rebate program
  - ► Small business direct installation program
  - ► Targeted DSM program
- Source: *September 2008 filing to NY PSC*

Demand Response Portfolio

- Four proposed programs filed in response to new Commission Proceeding exploring potential DR options in NYISO Zone J
  - ► Commercial System Relief Program
  - ► Residential Smart Appliance Program
  - ► Critical Peak Rebate Program (residential and commercial)
  - ► Network Relief Program
- Source: *June 2009 filing to NY PSC*

Niagara Mohawk portfolio

Energy Efficiency Portfolio

- Eight proposed programs filed in response to the Commission's Energy Efficiency Portfolio requirements
  - ► Enhanced Home Sealing Incentives Program
  - ► Residential ENERGY STAR Products and Recycling Program
  - ► Residential Internet Audit and E-Commerce Sales
  - ► Residential Building Practices and Demonstration Programs
  - ► Energy*Wise* Program
  - ► C&I Energy Efficiency Program
  - ► Commercial High-Efficiency Heating and Water Heating Program
  - ► Building Practices and Demonstrations Program
- Source: *September 2008 filing to NY PSC*

Demand Response Portfolio

- No utility-run DR programs were identified
- Niagara Mohawk appears to only offer NYISO-run programs

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Appendix B

Impact Load Profiles

Annualizing life-time energy efficiency impacts

The utility energy savings are each scaled linearly to represent a portfolio that produces 100 MW of peak demand reduction

Utility	Portfolio	Portfolio Size (MW)	Lifetime Energy Savings (GWh)	Program Lifetime (yrs)	Annual Energy Savings (GWh)
Long Island Power Authority	EE	100	3,678	20	184
	DR	100	0	20	0
ConEd	EE	100	3,062	10	306
	DR	100	17	10	2
Niagara Mohawk	EE	100	3,700	3	1,233
	DR	N/A	N/A	N/A	N/A

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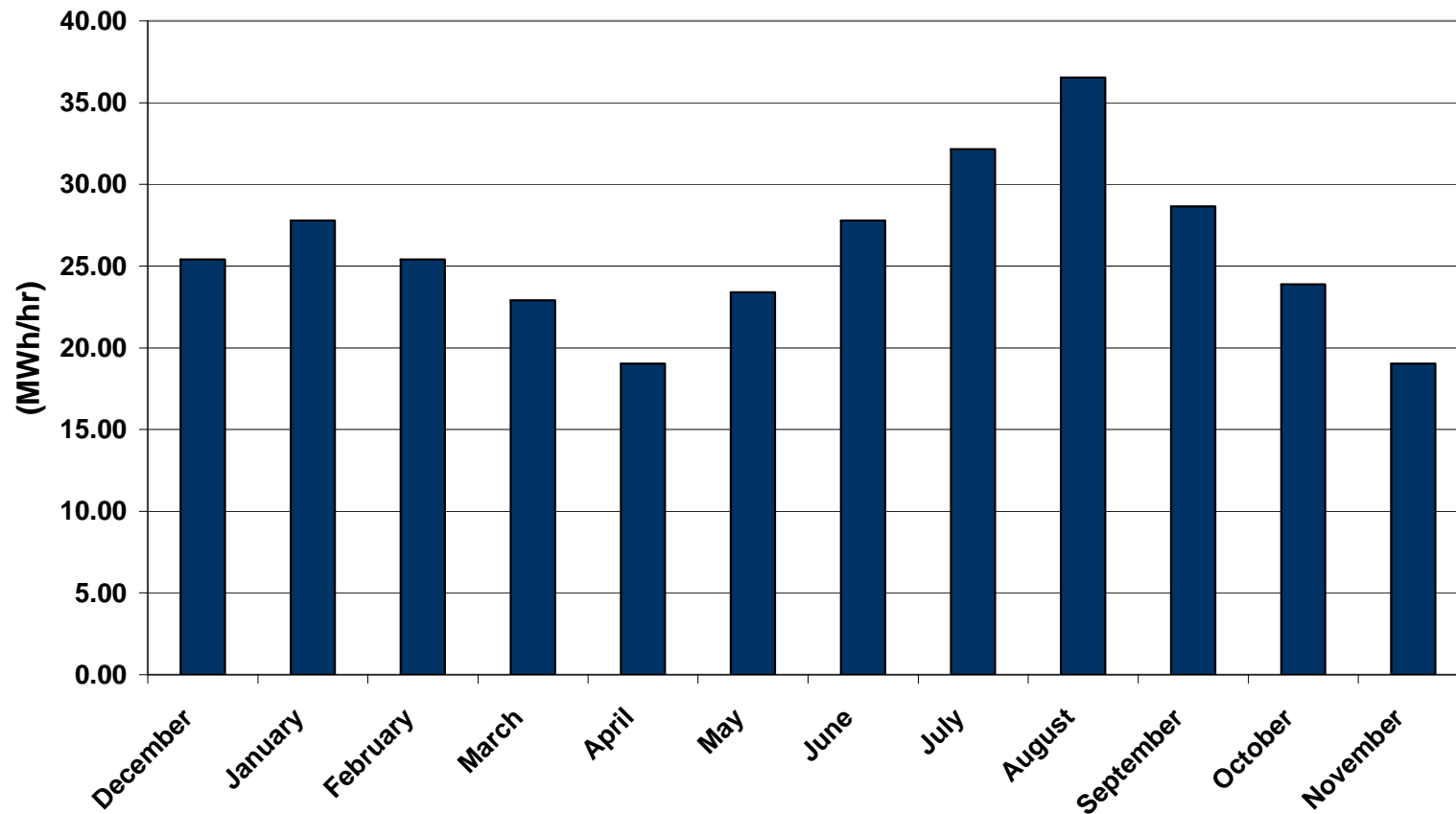
Creating monthly energy efficiency impact profiles

The profiles were created through the following steps:

- Utility savings were scaled to a 100 MW portfolio level

- Lifetime energy savings were converted to an annual level

- Total energy savings was broken down to a class level based on class share of system load (using EIA data for NY)

- Class savings were converted to an average hourly value

- These average hourly values were given a class-specific shape based on industry experience and expert judgment

  ▸ The industrial class has a flat impact load profile and the residential class has a very peaky impact load profile with the commercial class falling in between the two

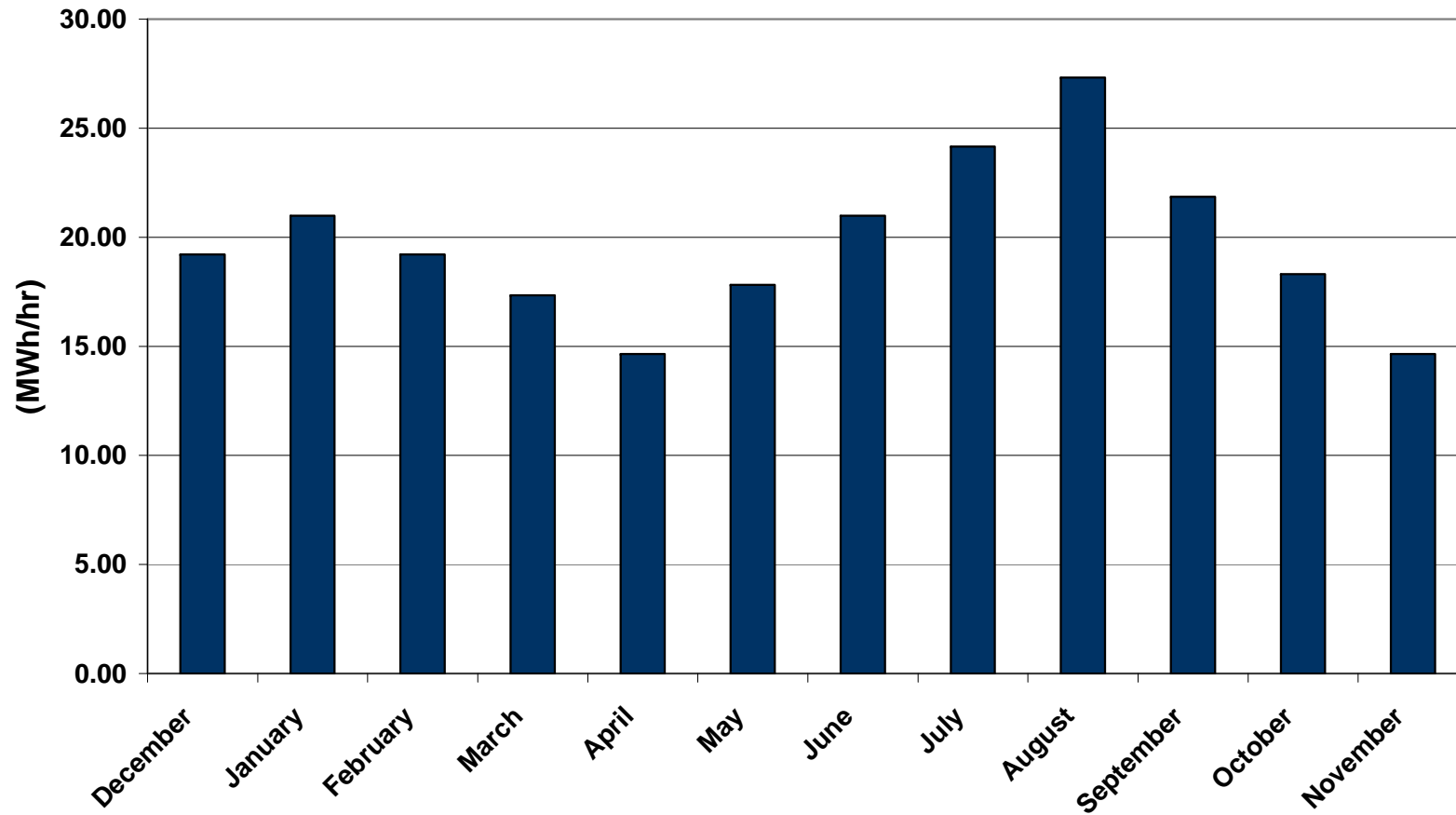- The estimates were then rolled up to the system level by utility

ConEd monthly energy efficiency impact profiles

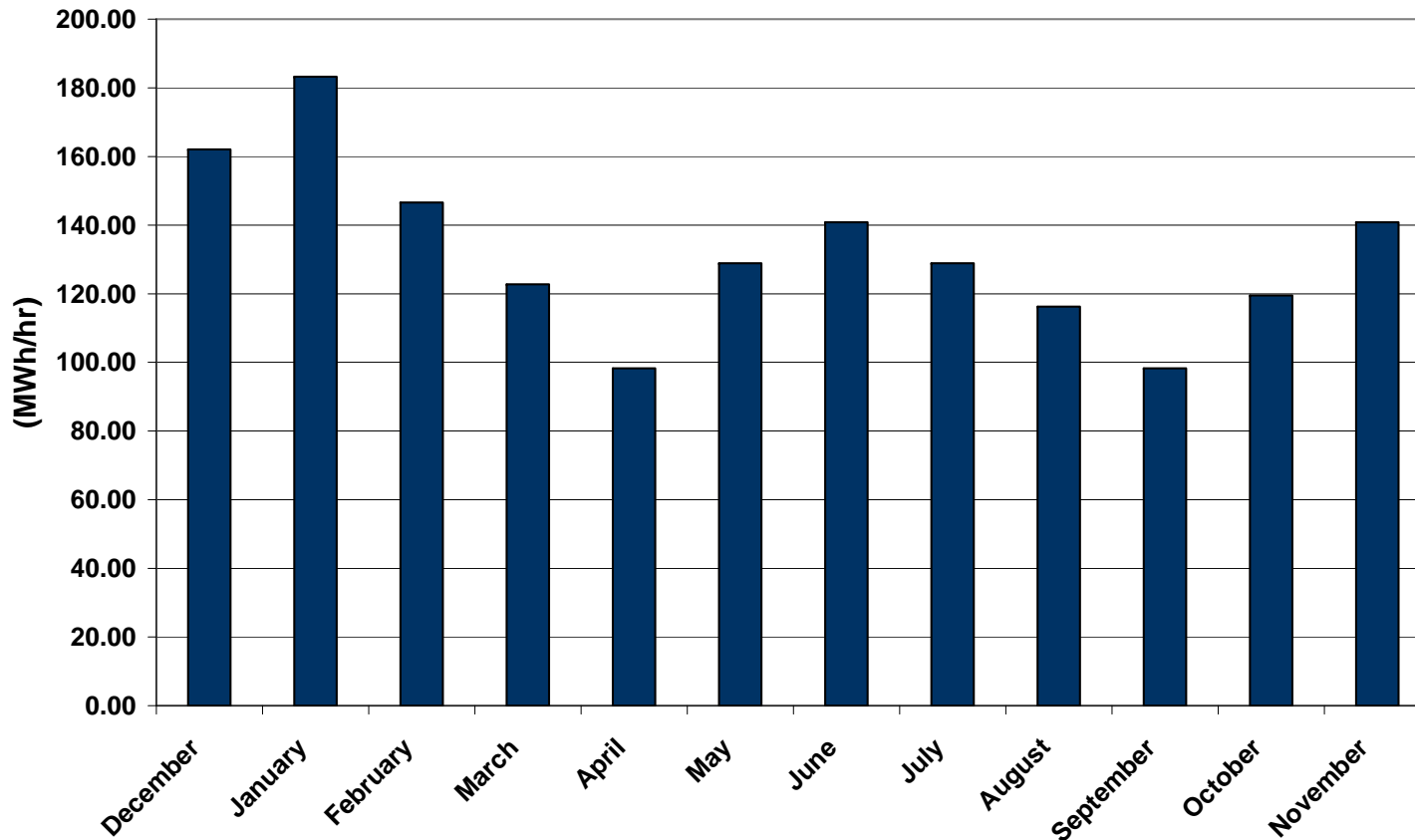**Consolidated Edison Hourly Energy Efficiency Savings by Month**

LIPA monthly energy efficiency impact profiles

Long Island Power Authority Hourly Energy Efficiency Savings by Month

NiMo monthly energy efficiency impact profiles

Niagara Mohawk Hourly Energy Efficiency Savings by Month

Niagara Mohawk is a winter peaking utility, resulting in more energy saving in these months

Demand response impact load profiles

- For all three utilities, the impact of demand response and energy efficiency programs on peak demand is assumed to be concentrated in the top 60-100 highest load hours

- The primary difference between DR and EE program impacts is that the former are dispatchable whereas the latter are not

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