

# ComEd Energy Efficiency and Demand Response Evaluation Presentation to SAG

*Summit Blue Consulting with Subcontractors Itron, Inc.,  
Opinion Dynamics, and Michaels Engineering*



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# Overview of Presentation

- Programs Evaluated
- High-Level Results
- Program-Specific Results

# Programs Evaluated

Sector	Program	% of Planned Portfolio kWh Savings
Residential	Lighting	46
	Appliance Recycling	5
	All Electric Efficiency Upgrade	1
	AC Cycling	NA
C&I	Prescriptive	26
	Custom	11
	Small C&I CFL Intro Kit	10
	Retro-Commissioning	1

# Impact Results

	Original Planned Results		PY 1 Ex-Post Net Results	
	kW	MWh	kW †	MWh
Residential Energy Star Lighting	NA	75,809	5,700	60,789
Appliance Recycling	NA	8,159	2,454	11,478
All-Electric Efficiency Upgrade	NA	2,369	160	1,852
Business Prescriptive	NA	43,255	13,166	80,932
Business Custom	NA	18,932	322	4,761
C&I Retro-Commissioning	NA	1,090	120	1,090
Small C&I CFL Intro Kit	NA	16,816	700	2,815
Portfolio Totals		166,430	22,622	163,726
Central Air Conditioning Cycling	11,700	NA	14,400	NA
<b>Statutory Requirements</b>	11,700	148,842	11,700	148,842
<b>Comparison to Statutory Requirements</b>			<b>+2,700</b>	<b>+14,875</b>

† kW reductions are reported peak values

# Impact Results

	Ex-Ante Gross (MWh)	Realization Rate	Ex-Post Gross (MWh)	Net-to-Gross Ratio	Ex-Post Net (MWh)
Residential Energy Star Lighting	119,151	0.74	87,917	0.68	60,789
Appliance Recycling	21,570	0.73	15,698	0.73	11,478
All-Electric Efficiency Upgrade	2,568	0.90	2,315	0.80	1,852
Business Prescriptive	90,571	1.33	120,550	0.67	80,932
Business Custom	8,411	0.79	6,606	0.72	4,761
C&I Retro-Commissioning	1,509	0.90	1,363	0.80	1,090
Small C&I CFL Intro Kit	25,064	0.20	5,025	0.56	2,815
<b>ComEd Total (MWh)</b>	<b>268,844</b>	<b>0.89</b>	<b>239,474</b>	<b>0.68</b>	<b>163,717</b>

# Process Results

	Customer Satisfaction Score	Details
Residential Energy Star Lighting	86% to 90%	Satisfaction with bulbs purchased Score of 6 to 10 on a 10-point scale Higher score is for Coupon program
Appliance Recycling	96%	Score of 6 to 10 on a 10-point scale
All-Electric Efficiency Upgrade	98%	Score of 5 on a 5-point scale Self-selected response to leave-behind
Business Prescriptive	94%	Score of 7 to 10 on a 10-point scale
Business Custom	87%	Score of 7 to 10 on a 10-point scale Small sample size
C&I Retro-Commissioning	NA	Pilot program with several customers
Small C&I CFL Intro kit	86%	Score of 7 to 10 on a 10-point scale
Central Air Conditioning Cycling	NA	No process evaluation in PY1

# High Level Conclusions

- Program Tracking Systems
  - ▶ Generally well designed and populated with the information needed for program evaluation purposes
  - ▶ However, Appliance Recycling, Business Custom, and All Electric Efficiency Upgrade, demand savings values are not included in the program tracking data, or the demand savings values are often left blank
  - ▶ Appliance Recycling – amps collected but not recorded

# High Level Conclusions

- Gross Savings Estimates
  - ▶  $< 1.0$  for Residential, Appliance Recycling, Residential Lighting, Business Custom, and Small C&I Intro Kit
  - ▶  $> 1.0$  for Business Prescriptive
  - ▶  $\pm 10\%$  of 1.0 for All Electric Efficiency Upgrade, Business Recommissioning, and Central Air Conditioning Cycling



# High Level Conclusions

- Net-To-Gross Ratios
  - ▶ < ComEd's program planning assumptions, which were generally 80%.
  - ▶ However, for PY1, NTG includes free rider and not spillover for most programs.
  - ▶ In PY2 spillover rates will be estimated for most programs.

# High Level Conclusions

- Customer Satisfaction
  - ▶ Quite high, usually 86% positive or higher, for all programs for which participant surveys were conducted.
  - ▶ This indicates that the programs are being well run, and no major changes are needed to address program process issues.

# High Level Conclusions

- Evaluation Funding
  - ▶ Evaluation budgets are set at 3% of program spending for each year.
  - ▶ In the first year many evaluation activities had to be fully funded to get the evaluation planned and set up data collection and analysis procedures.
  - ▶ Result: evaluation budgets were extremely tight, which limited the amount of primary data collection that could be afforded.
  - ▶ Adding flexibility to move evaluation funds across program years would go a long way to ameliorating this problem.

# ComEd - Residential

# Residential Lighting – Methods

Action	Impact	Process	Details
Manager interview	✓	✓	Program procedures, impact assumptions
Review Tracking Database	✓	✓	Quality control, meet the needs of the program
QAQC	✓	✓	Quality control, meet the needs of the program
In-depth Interviews with Program Implementers		✓	Process-related strengths and weaknesses
Phone Survey of Coupon Participants	✓	✓	Installation rate, free rider, spillover and process issues
Phone Survey of Upstream Markdown Participants and Nonparticipants	✓	✓	Installation rate, free rider, spillover and process issues

# Residential Lighting – Impacts

Gross and Net Parameter and Savings Estimates	Program Reported	Evaluation Verified		
	Overall	Coupon	Upstream	Overall
Program Bulb Sales	3,001,366	21,836	2,979,531	3,001,367
Average Displaced Watts (Delta Watts)	48.9	48.7		
Average Daily Hours of Use	2.34	2.34		
Gross kWh Impact per unit	41.8	41.6		
Installation Rate	95%	79%	70%	70%
Total First-Year Gross MWh Savings	119,151	87,917		
Net-to-Gross Ratio (1-FR)	80%	69%		
Total First-Year Net MWh Savings	95,321	60,789		

# Residential Lighting – Process

- 86-90% were satisfied with the CFLs
- Most markdown participants were unaware of the ComEd discount.
- Awareness of CFLs is not a barrier. 86% have heard of CFLs without description +10% with description.
- Lack of knowledge of the benefits of CFLs is a barrier to greater CFL use. (high cost, energy saving, waiting for incandescent bulbs to burn out.

# Residential Lighting – Process

- 44% purchased at least one incandescent bulb in the past year.
- CFL purchasers are more motivated by the money saved from using CFLs than the environmental benefits.
- Concern about mercury and CFL disposal is not widespread and does not pose a significant barrier to CFL adoption.
- Flip side: Majority of those who have already disposed of CFLs simply threw them away.



# Appliance Recycling – Methods

Action	Impact	Process	Details
Manager interview	✓	✓	Program procedures, impact assumptions
Review Tracking Database	✓	✓	Quality control, meet the needs of the program
QAQC	✓	✓	Quality control, meet the needs of the program
In-depth Interviews with Program Implementers		✓	Process-related strengths and weaknesses
Regression modeling of Unit Energy Consumption for Refrigerators and Freezers	✓		Based on secondary data for 1600 metered units applied to characteristics of collected units
Phone Survey of Participants	✓	✓	Part-use factor, free rider, and process evaluation

# Appliance Recycling – Impacts

<b>Gross and Net Impact Parameter and Savings Estimates</b>	<b>Refrigerators</b>	<b>Freezers</b>	<b>Room AC</b>	<b>Total Program</b>
Total units recycled through the Program	8,438	3,076	465	11,979
<b>Verified Annual kWh Savings Impacts</b>				
Verified annual Gross kWh savings per unit (full-load operating hours)	1,893	2,027		---
Part-Use Factor	75%	59%		---
Verified annual Gross kWh savings per unit <i>adjusted for part-use</i>	1,420	1,196	80	--
Verified Program Gross MWh	11,982	3,678	37	15,698
Net-to-Gross Ratio (1-Free Rider %)	0.70	0.83	1.00	
<b>Total First-Year Evaluation-Adjusted Net MWh Savings</b>	<b>8,388</b>	<b>3,053</b>	<b>37</b>	<b>11,478</b>

# Appliance Recycling – Impacts

- Verified gross savings per unit vs Planning Estimate
  - ▶ Similar for refrigerators.
  - ▶ Verified gross somewhat higher for freezers – collected more older units than anticipated (40% over 30 years old)
- NTG for Refrigerators
  - ▶  $0.70 \text{ NTG} * 0.75 \text{ part use factor} = 0.52 \text{ final NTG}$
  - ▶ Considerably higher than planned 0.35

# Appliance Recycling – Process

- Marketing was sufficient to achieve the target goal.
  - ▶ Bill inserts were effective
  - ▶ 74% recalled seeing the program in a bill insert (+11% when prompted)
  - ▶ 69% first learned of the program in bill insert
- Why participate?
  - ▶ Most common: The convenience of the home pick-up
  - ▶ The \$25 cash incentive was also a factor

# Appliance Recycling – Process

- 96% of participants were satisfied with their experience and 86% were “very satisfied”.
- High degree of satisfaction with the sign-up process and appliances were picked up and payments processed in timely fashion.
- 74% were very satisfied with the amount of the incentive payment.

# All-Electric Eff. Upgrade – Methods

Action	Impact	Process	Details
Manager interview	✓	✓	Program procedures, impact assumptions
Review Tracking Database	✓	✓	Quality control, meet the needs of the program
QAQC	✓	✓	Quality control, meet the needs of the program
In-depth Interviews with Program Implementers		✓	Process-related strengths and weaknesses
Engineering review of energy savings	✓		Impact estimates

# All-Electric Eff. Upgrade – Impacts

<b>Gross and Net Parameter and Savings Estimates</b>	
CFLs directly installed through the Program	19,428
Showerheads directly installed through the Program	3,786
Aerators directly installed through the Program	7,073
Water heater wraps directly installed through the Program	4
Program Tracking System MWh	2,568
Program Tracking System Coincident MW	<i>Not recorded</i>
<b>Total First-Year Evaluation-Adjusted Gross MWh Savings</b>	<b>2,315 MWh</b>
<b>Gross Realization Rate (MWh)</b>	<b>90%</b>
<b>Total First-Year Evaluation-Adjusted Gross Coincident MW Savings</b>	<b>0.20 MW</b>
Net-to-Gross Ratio (1-FR) ( <i>ComEd Program Assumption</i> )	80%
<b>Total First-Year Evaluation-Adjusted Net MWh Savings</b>	<b>1,852 MWh</b>
<b>Total First-Year Evaluation-Adjusted Net Coincident MW Savings</b>	<b>0.16 MW</b>

# All-Electric Eff. Upgrade – Impacts

- 90% evaluated gross realization rate  
95% used in program planning
- Planned showerheads 355 kWh savings/unit assumed each showerhead installed counts as a unit, even when multiple showerheads are installed in a single tenant apartment.
  - ▶ Need to document a greater number of occupants/unit taking showers
  - ▶ *The total reduction from tracking savings for this adjustment was 219 MWh.*
- Similarly: Planned 52 kWh savings/unit for faucet aerators, even in tenant units with multiple installations.
  - ▶ *The total reduction from tracking savings for this adjustment was 45 MWh.*



# All-Electric Eff. Upgrade – Impacts

	Planned	Evaluation
Replacement	18 Watt CFL replaces 75 watt incandescent	20 Watt CFL
Hours/day	2.34	
90% in-service rate	90% - failure to install and removal	95% - removal only
kWh/lamp savings	44 kWh	44.6 kWh

- The total increase from tracking savings for this adjustment was 12 MWh.
- We recommend the program create a technical reference manual to document the default savings values.
- We also recommend the program tracking data receive periodic data quality reviews and clean up, and that data entry include checks for values outside of limits.

# All-Electric Eff. Upgrade – Process

- 98% of participants were satisfied with their experience
- Consider targeted mailings to tenants in advance of the visit to ensure that tenants are aware of the program and its benefits.
- Coordinate with Prescriptive Program to allow building owners the opportunity to participate in the C&I programs as well.
- Collect tenant contact information.
- ComEd Ride-Alongs and follow-up calls need better targeting and documentation

# AC Cycling – Methods

Action	Impact	Process	Details
Manager interview	✓	✓	Program procedures, impact assumptions
Review Tracking Database	✓	✓	Quality control, meet the needs of the program
QAQC	✓	✓	Quality control, meet the needs of the program
In-depth Interviews with Program Implementers		✓	Process-related strengths and weaknesses
Comparison of new participant characteristics to existing participants	✓		Verify applicability of existing impact estimates from metered sample

# AC Cycling – Impacts

	MW Savings		Participation	
	Ex Ante	Ex Post	Ex Ante	Ex Post
Gross Savings	14.2	14.4	9,810	9,810
Net-to-Gross Ratio	1	1	-	-
Net Savings	14.2	14.4	9,810	9,810

- The difference in impacts comes from the fact that the 100% cycling option was chosen by 61.1% of new customers, compared to the original estimate of 59.1%.
- There is no traditional free ridership or spillover for this demand response program.

# ComEd – C&I

# Prescriptive – Methods

Action	Impact	Process	Details
Manager interview	✓	✓	Program procedures, impact assumptions
Review Tracking Database	✓	✓	Quality control, meet the needs of the program
QAQC	✓	✓	Quality control, meet the needs of the program
In-depth Interviews with Program Implementers		✓	Process-related strengths and weaknesses
Phone Survey of Participants	✓	✓	Installation rate, free rider, spillover and process issues
Project File Engineering Review	✓		Impact realization rate
On-Site Visits	✓		Impact realization rate

# Prescriptive – Impacts

End Use	Tracking Gross kWh	Verified Gross kWh	Realization Rate	Verified Net kWh	NTGR (verified gross)
Lighting	83,461,120	110,155,743	1.32	73,767,540	0.67
HVAC	6,598,992	9,851,596	1.49	6,770,708	0.69
Refrigeration	494,488	521,752	1.06	378,940	0.73
Motors	16,822	20,475	1.22	14,449	0.71
Program	90,571,422	120,549,567	1.33	80,931,636	0.67

# Prescriptive – Process

- 94% were satisfied with their experience.
- Participants represented a good range of business sectors, including warehouses, light and heavy industry, offices, and retail/service.
- Customer satisfaction with various processes and components of the program was high, and few participants reported encountering problems during their participation.
- The limited marketing that was conducted during PY1 was memorable and well received by program participants.



# Prescriptive – Process

- Trade allies were the main channel of promotion and communication.
- Approximately 160 market actors joined the trade ally network during PY1.
- Awareness of contractor affiliation with the program is low among customers, and many customers do not think that program affiliation is important.

# Custom – Methods

Action	Impact	Process	Details
Manager interview	✓	✓	Program procedures, impact assumptions
Review Tracking Database	✓	✓	Quality control, meet the needs of the program
QAQC	✓	✓	Quality control, meet the needs of the program
In-depth Interviews with Program Implementers		✓	Process-related strengths and weaknesses
Phone Survey of Participants	✓	✓	Installation rate, free rider, spillover and process issues
Project File Engineering Review	✓		Impact realization rate
On-Site Visits	✓		Impact realization rate

# Custom – Impacts

Segment	Ex Ante Gross kWh	Ex Post Gross kWh	kWh RR	Ex Post Net kWh	NTGR (ex post gross)
Other	4,226,226	2,421,841	0.57	1,708,550	0.71
Lighting	4,184,620	4,184,620	NA	3,051,976	0.73
Total	8,410,846	6,606,461	0.79	4,760,526	0.72

# Custom – Impacts

- ComEd is doing a good job of screening viable Custom energy efficiency projects.
- Some common Custom program issues were not encountered.
- The program needs to do a better job of estimating peak demand savings.
- Free-ridership levels measured are better than expected for a Custom program at roughly 30%.

# Custom – Process

- 87% were satisfied with their experience.
- Customer satisfaction with various processes and components of the program was high, and few participants reported encountering problems during their participation.
- Unexpectedly strong demand for prescriptive measures led to early reservation of all the funds leaving the Custom program short of its goals.
- The limited marketing that was conducted during PY1 was recalled and well received by program participants.
- Full supplier and trade ally support for more complex custom projects had not yet been reached.

# Small C&I CFL Intro Kit – Methods

Action	Impact	Process	Details
Manager interview	✓	✓	Program procedures, impact assumptions
Review Tracking Database	✓	✓	Quality control, meet the needs of the program
QAQC	✓	✓	Quality control, meet the needs of the program
In-depth Interviews with Program Implementers		✓	Process-related strengths and weaknesses
Phone Survey with Participants	✓	✓	Installation rate, free rider, spillover and process issues

# Small C&I CFL Intro Kit – Impacts

Gross and Net Parameter and Savings Estimates	Program Reported	Evaluation Verified	
	Small Business	Small Business	Residential
CFLs Distributed through the Program	104,160	73,593	30,567
Average Displaced Watts (Delta )	62.9 watts	48.3 watts	
Average Daily Hours of Use	10.4	10.0	2.34
Gross kWh Impact per unit	239 kWh	176 kWh	41 kWh
Installation Rate	90%	32%	
Energy Interactive Effects	1.12	1.12	1.00
Demand Interactive Effects	1.21	1.19	1.00
<b>Total First-Year Gross MWh Savings</b>	<b>25,064 MWh</b>	<b>5,025 MWh</b>	
Net-to-Gross Ratio (1-FR)	80%	56%	
<b>Total First-Year Net MWh Savings</b>	<b>20,051 MWh</b>	<b>2,815 MWh</b>	

# Small C&I CFL Intro Kit – Process

- 86% were very satisfied with the free CFL component.
- 73% were aware of CFLs before receiving the direct mail offer.
- Nearly half of program participants had previously purchased CFLs for their facilities.
- Almost all program participants who had installed at least one of the three free CFLs are “very likely” (64%) or “somewhat likely” (22%) to purchase CFLs for their business in the future.



# Small C&I CFL Intro Kit – Process

- 46% recalled the mini catalog showing that including the catalog with the free product is an effective strategy for reaching customers.
- However, only half of the customers who recalled the catalog had looked through it and none had made a purchase from the catalog.
- Only about one-third of surveyed customers are aware that ComEd has a program that offers rebates for the installation of energy efficient equipment to its business customers.

# Retrocommissioning – Methods

Action	Impact	Process	Details
Manager interview	✓	✓	Program procedures, impact assumptions
Review Tracking Database	✓	✓	Quality control, meet the needs of the program
QAQC	✓	✓	Quality control, meet the needs of the program
In-depth Interviews with Program Implementers		✓	Process-related strengths and weaknesses
Engineering Review of Savings	✓		
Free rider survey	✓	✓	

# Retrocommissioning – Impacts

Gross and Net Parameter and Savings Estimates	Evaluation Findings	Realization Rate
Evaluation-Adjusted Gross MWh Savings	1,363	90.3%
Net-to-Gross Ratio (1-FR)	0.80	
Evaluation-Adjusted Net MWh Savings	1,090	72.2%

- The reasons for a realization rate less than 100% include minor errors in engineering calculations and assumptions that affect those estimates.
- Free rider survey results consistent with program assumption.

**Questions?**

# Contact Information

## Summit Blue Consulting

**Randy Gunn**

[rgunn@summitblue.com](mailto:rgunn@summitblue.com)

**312-938-4242**

**Jeff Erickson**

[jerickson@summitblue.com](mailto:jerickson@summitblue.com)

**608-845-2585**