



# Evaluation of Ameren Illinois' Business and Residential Electric and Gas Energy Efficiency Programs 2011-2014

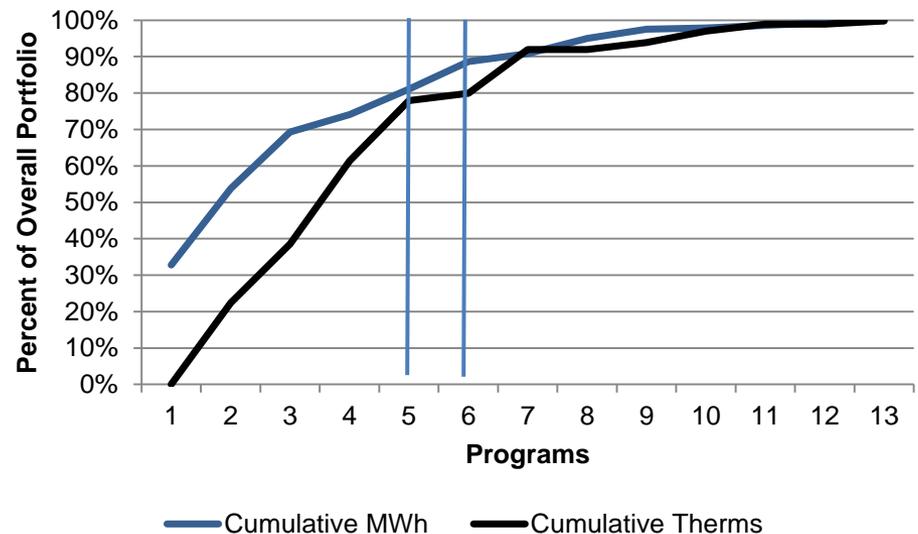
Presentation to Ameren and the ICC

February 16, 2012

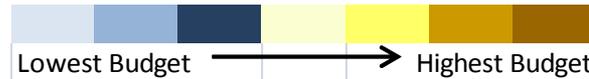


# Portfolio Evaluation

- 13 Programs – 1 Pilot
  - 9 Residential Programs
  - 1 Residential pilot
  - 4 Commercial Programs



# Portfolio Evaluation



- Budgets split between program-specific evaluation and other efforts
- Programs with higher savings have higher budgets
- PY5 and PY6 TRM budgets mostly for measure specific M&V to support Statewide TRM

Program	PY4 Budget	PY5 Budget	PY6 Budgets
Lighting	\$ 140,000	\$ 200,000	\$ 75,000
Custom Incentive	\$ 173,800	\$ 200,000	\$ 200,000
Standard Incentive	\$ 220,000	\$ 250,000	\$ 210,000
HVAC	\$ 132,500	\$ 158,500	\$ 170,000
Behavioral Modification	\$ 90,000	\$ 75,000	\$ 135,000
Retro Cx	\$ 74,000	\$ 75,000	\$ 88,000
Home Energy Performance	\$ 60,500	\$ 100,000	\$ 60,000
Appliance Recycling	\$ 68,000	\$ 16,500	\$ 63,000
Multi-family	\$ 20,000	\$ 80,000	\$ 25,000
Efficient Products	\$ 74,000	\$ 55,000	\$ 78,000
Moderate Income	\$ 50,000	\$ 20,000	\$ 50,000
RNC	\$ 10,000	\$ 10,000	\$ 20,000
NRNC	\$ -	\$ 17,500	\$ 60,000
<b>Total Program Specific Evaluation</b>	<b>\$ 1,112,800</b>	<b>\$ 1,257,500</b>	<b>\$ 1,234,000</b>
TRM	\$ 145,000	\$ 150,000	\$ 130,000
TRC	\$ 62,000	\$ 62,000	\$ 62,000
Planning	\$ 60,000	\$ 30,000	\$ 30,000
QA/QC Person	\$ 24,000	\$ 24,000	\$ 24,000
Evaluability Assessment	\$ 20,000	\$ -	\$ -
Ameren Coord / Program Design	\$ 10,000	\$ 10,000	\$ 10,000
Commission Staff	\$ 10,000	\$ 10,000	\$ 10,000
Collaborate with IL utilities on methodologies	\$ 10,000	\$ 10,000	\$ 10,000
Legal/ Docket	\$ 10,000	\$ 10,000	\$ 10,000
Project Management	\$ 10,000	\$ 10,000	\$ 10,000
SAG	\$ 10,000	\$ 10,000	\$ 10,000
<b>Total for non program specific efforts</b>	<b>\$ 371,000</b>	<b>\$ 326,000</b>	<b>\$ 306,000</b>
Total Budgets	\$ 1,483,800	\$ 1,583,500	\$ 1,540,000
Total Contract	\$ 1,517,942	\$ 1,604,102	\$ 1,562,206
Contingency Funds (held for unexpected needs)	\$ 34,142	\$ 20,602	\$ 22,206

# Statewide TRM

- Activities thus far:
  - 40 documents posted by VEIC and reviewed by Navigant (8 different reviewers)
  - Navigant has posted comments to 24 of 40 documents due to some overlap of review and update timing by VEIC. (All 40 docs reviewed)
  - 45 distinct technologies currently represented by High Impact Measures (HIM) draft (many more actual measures)
  - Comments to first draft of TRM Word Document HIMs posted 2/10/12
  - Significant work is required on TRM structure, framework, and introduction sections

# 17 Draft Residential Electric HIM Technologies Reviewed

- 17 Residential Electric HIM Technologies Reviewed
  - Air Sealing
  - Air Source Heat Pump
  - Basement Sidewall Insulation
  - Central AC
  - Clothes Washers
  - ES CFL
  - ES Specialty CFL
  - Existing Primary Refrigerator or Freezer
  - Furnace Blower Motor
  - Heat Pump Water Heaters
  - LED Downlight
  - Low Flow Faucet Aerators
  - Low Flow Showerheads
  - Programmable Thermostats
  - Refrigerator & Freezer Retirement
  - Secondary Refrigerator or Freezer Retirement
  - Wall and Ceiling/Attic Insulation

# 9 Draft Residential Gas HIM Technologies Reviewed

- Air Sealing
- Basement Sidewall Insulation
- Gas High Efficiency Boiler
- Gas High Efficiency Furnace
- Gas Water Heaters
- Low Flow Faucet Aerators
- Low Flow Showerheads
- Programmable Thermostats
- Wall and Ceiling/Attic Insulation

# 9 Draft C&I Electric HIM Technologies Reviewed

- T5 Fixtures – Includes T5 HO high-bay & high efficiency troffers (TOS, Retrofit)
- Commercial Standard CFL
- HP Reduced Wattage T8 Lamps (TOS, Retrofit)
- HP T8 Lighting includes high-bay and high efficiency troffers (TOS, Retrofit)
- ILED Screw Based Bulbs
- LED Traffic & Pedestrian Signals
- Lighting Controls
- Lighting Power Density Reduction (NC)
- VSD for HVAC Applications

# 8 Draft C&I Gas HIM Technologies Reviewed

- Boiler Tune Up
- Boiler Lockout/Reset Controls
- Commercial Gas Steamer
- Gas High Efficiency Boiler
- Gas High Efficiency Furnace
- High Efficiency Pre-Rinse Spray Valve
- Steam Trap Replacement or Repair
- Tankless Water Heater

# Concerns with TRM process

- The upcoming first “Final” version of the TRM should be considered a working document that will require updating (e.g. v1.0 or even v0.9).
- High pace of developing the TRM is going to lead to some errors and misrepresentations.
- Some things will be missed.
- We look to see major updates to the framework and structure in the next draft release.
- VEIC’s plan of releasing weekly early versions of a measure has led to some unnecessary rework.
- We don’t know in advance how many documents will be released next, or in what order. This is challenging to plan staffing for.

# Upcoming TRM Work

- **Late February/Early March:** first Low Impact Measures (LIM) Excel spreadsheets to be released?
- **Mid March:** Initial LIM TRM Draft Word Document & updated HIM measures
  - We expect some significant structural changes in this draft
- **Late March:** final draft of HIM TRM Word document
- **Mid April:** Updated LIM TRM Draft
- **Early/mid May:** Final Complete TRM

# Two Important Evaluation Items based on Commission Orders

- Use of per-unit values and annual participant verification to calculate Gross Impacts
- Use of Stakeholder Advisory Group (SAG) Net-to-Gross Framework

# Gross Impacts from Per-Unit Values and Participant Verification

- Per-Unit values provided in two Excel sheets
  - Residential has per-unit savings and NTGR in the file
  - Commercial has per-unit savings in the file and NTGR from the Staff Cross Exhibit Part 1
  - If no per-unit value, will use engineering analysis to create per-unit value
- Participation Verification
  - Level of rigor for participation verification activity depends on budget and measure
    - Program tracking DB review with check of invoices as possible on sample of measures
    - Survey self-report
    - On site audits

# Net Impacts using Net-to-Gross Framework

- Net-to-Gross Framework
  - Five points in SAG NTG framework
  - We have created a three point decision tree based on the SAG NTG Framework
    1. If the program design and delivery methods are stable over time and a previous Illinois evaluation has estimated a NTGR, that NTGR is used prospectively until a new value is calculated. When the new value is calculated, we will apply the value prospectively following a similar timeline as the per-unit values (in by March 1 for updates).
    2. For existing programs that have been evaluated previously, but are undergoing significant changes in program design or in the market served by that program, or for existing and new programs that have not yet had an evaluation, a NTGR is calculated and applied retroactively (i.e., for the year in which program participants are included in the research).
    3. If a previous Illinois evaluation has not occurred, it is possible to deem a NTGR based on secondary research showing other NTGR values from similar programs. This approach is used in two cases:
      - If the program design and market is well understood
      - If the savings of the program are not sufficient to devote evaluation resources.

# Program Specific Information

- Presented in ordered by MMBTU savings (highest to smallest) using newest information from the PY4 Program Implementation Plans (exception is custom presented before standard)
- Presented for the three year assessment period to highlight the variation by year
- Discuss methods for PY4 as needed

# Residential Lighting

- Provides 33% of PY4 portfolio MWh and 0% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews (EFI and APT)	X (n=3)	X (n=3)	X (n=3)
Retailer Interviews (Retailers: corporate buyers)		X (n=6)	
Customer Intercepts		X	
In-home Lighting Study		X	
Top line Sales	X	X	X
Gross Impact Approach	Fixed per-unit Values from Excel File Participation based on database review and storage rate from onsite audits	Fixed per-unit values from Statewide TRM Participation based on database review and storage rates from onsite audits	Fixed per-unit values from Statewide TRM Participation based on database review and storage rates from PY5 onsite audits
<b>Budget</b>	<b>\$140,000</b>	<b>\$200,000</b>	<b>\$75,000</b>

# Commercial Custom

- Provides 16% of PY4 portfolio MWh and 16% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews	X (n=4)	X (n=4)	X (n=4)
Energy Advisor Interviews or Key Account Executive	X (n=5)		X (n=5)
Program Ally Internet Survey	X (n=70)		X (n=70)
Staffing Grant Participant Interviews	X (n=10)		
Participant Survey		Process and NTG (n=70)	
Site Visits	X (n=60)	X (n=60)	X (n=60)
Custom Baseline M&V	X (n=5)	X (n=5)	X (n=5)
Gross Impact Approach	Site M&V	Site M&V	Site M&V
<b>Budget</b>	<b>\$180,000</b>	<b>\$200,000</b>	<b>\$180,000</b>

# Commercial Standard

- Provides 21% of PY4 portfolio MWh and 22% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews	X (n=4)	X (n=4)	X (n=4)
Energy Advisor or Key Account Executive Interviews	X (n=5)		X (n=5)
Program Ally Internet Survey	X (n=70)		X (n=70)
Participant Survey: Standard	Installation Verification and NTG (n=180)	Installation Verification (n=180)	Installation Verification (n=180)
Participant Survey: DI Effort	Installation Verification (n=100)	Installation Verification (n=100)	Installation Verification (n=100)
Participant Survey: Online Store	Installation Verification and NTG (n=90)	Process and Installation Verification (n=90)	Installation Verification (n=90)
Non-Participant Survey		X (n=200)	
Site Visits	X (n=40)	X (n=40)	X (n=40)
Gross Impact Approach	Fixed Values & Site Verification	Deemed Savings Application & Site M&V	Deemed Savings Application & Site M&V
<b>Budget</b>	<b>\$220,000</b>	<b>\$250,00</b>	<b>\$210,000</b>

# HVAC

- Provides 5% of PY4 portfolio MWh and 23% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews (CSG)	2 interviews CSG (n=1) Ameren (n=1)	2 interviews CSG (n=1) Ameren (n=1)	2 interviews CSG (n=1) Ameren (n=1)
Contractor Interviews			70 participants per measure type (some have multiple -- about 140), up to 70 non participants
Participant Survey	Recruiting for metering and verification only.	Telephone Survey n=150 (- 30 per measure x 5 equipment types)	Telephone Survey for verification only n=150
Metering	48meters installed 24 CAC, 12 ASHP, 12 GSHP (May 2012).	CAC meters removed, heat pump data downloaded (Oct 2012)  24 meters installed in furnaces (Oct 2012) 24 from boilers, 12 from ASHP, 12 from GSHP (Oct 2012)	Meter removals:  24 boiler meters 24 furnace meters  12 ASHP meters 12 GSHP meters
Gross Impact Approach	Fixed values from Excel File	Statewide TRM	Statewide TRM and/or PY4 metering results for cooling equipment
<b>Budget</b>	<b>\$132,500</b>	<b>\$158,500</b>	<b>\$ 170, 000</b>

# CACs

- Power draw and outdoor air temperature yield seasonal energy use
- Air handler measurements support energy calculations and future fan measures
- Airflow, temperature, and humidity measurements help determine installation quality at little addition cost

# Heat Pumps

- Power draw and outdoor air temperature yield seasonal energy use – heating and cooling
- Air handler measurements support energy calculations and future fan measures
- Airflow, temperature, humidity, and backup heat measurements help determine installation quality and control settings at little addition cost

# Boilers and Furnaces

- Short term combustion efficiency logging
  - Helps support efficiency gains
- Run time and, where practical, gas use
- Set points and operating temperatures
  - Return water temperatures in boilers impact efficiencies

# Recent HVAC Evaluations

- Ameren MO Check Me
- Avista (Washington)
  - Heat pumps
  - CAC
- Massachusetts
  - Boiler controls
  - Boiler ECM pumps
  - Furnace BFM fans

# Behavioral Modification

- Provides 7% of PY4 portfolio MWh and 17% of PY4 portfolio Therms
- Database crosscheck will remove overlaps with other program savings

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews	OPOWER and Ameren Interviews (n=2)	OPOWER and Ameren Interviews (n=2)	OPOWER and Ameren Interviews (n=2)
Treatment and Control Group Survey	Random sample of 200 Treatment/200 Control participants from PY4		Random sample of 200 interrupted <sup>a</sup> group/200 treatment from Pilot Random Sample of 200 Treatment/200 Control participants (if needed)
Net Impact Approach	PY4 Billing Analysis (gas and electric)	Pilot Interrupted Experimental Design and Billing Analysis (electric and gas), interrupt in August 2012 <sup>a</sup>  PY5 Billing Analysis (gas and electric)	PY4, 5, and 6 Latent Growth Curve Analysis with Impact Estimates for each program cohort. This will also include a persistence analysis.  Billing analysis (gas/electric) for original Pilot participants in 3 <sup>rd</sup> year.
Additional Net Analysis	Database Crosscheck to understand program participation	Database Crosscheck to understand program participation	Database Crosscheck to understand program participation
<b>Budget</b>	<b>\$90,000</b>	<b>\$75,000</b>	<b>\$135,000</b>

<sup>a</sup> The evaluation team will work with the implementation team to “interrupt” or stop serving a small group of the Pilot participants. We will also conduct interviews with Pilot participants who stopped receiving Home Energy Reports after the two-year mark to study persistence.

# Retro-Commissioning

- Provides 8% of PY4 portfolio MWh and 2% of PY4 portfolio

## Terms

Activity	PY4	PY5	PY6
Program Material Review	x	x	X
Program Manager and Implementer Interviews (SAIC)	4-5	4-5	4-5
Market Actor Interviews		5-6	
Participant Survey		16	
Site Visits	Up to 4	none	Up to 6
Gross Impact Approach	Engineering desk review and M&V	Engineering desk review	Engineering desk review and M&V
<b>Budget</b>	<b>\$74,000</b>	<b>\$75,000</b>	<b>\$88,000</b>

# Additional Programs

# Home Energy Performance (and Pilot)

- Provides 3% of PY4 portfolio MWh and 12% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews (CSG)	2 to 4	2 to 4	2 to 4
Market Actor Interview	CSG Energy Advisors, HEP Program Allies n=10-15		CSG Energy Advisors, HEP Program Allies n=10-15
Participant Survey <sup>a</sup>	Process, verification, NTG n=TBD		Process, verification n=TBD
Site Visits		DHW metering for application in the Statewide TRM <sup>b</sup>	
Gross Impact Approach	HEP: Application of Deemed Savings/ Engineering Analysis	HEP: Statistically Adjusted Engineering Analysis	HEP: Application of SAE Results
	ESHP: Application of Deemed Savings/ Engineering Analysis	TBD	TBD
<b>Budget</b>	<b>\$46,500</b>	<b>\$114,000</b>	<b>\$60,000</b>

<sup>a</sup> The participant survey will also include participants from the Home Energy Performance program and the Electric Space Heat Pilot program.

<sup>b</sup> DHW metering will activities are budgeted within TRM activities.

# Appliance Recycling

- Provides 4% of PY4 portfolio MWh and 0% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	Review program from a process standpoint	Review sample of receipts for participants for verification	Review program from a process standpoint
Program Manager and Implementer Interviews (CSG)	2 interviews CSG (n=1) Ameren (n=1)	2 interviews CSG (n=1) Ameren (n=1)	2 interviews CSG (n=1) Ameren (n=1)
Market Actor Interviews	In depth interview with ARCA (n=2)		In depth interview with ARCA (n=2)
Participant Survey for Process, verification, and NTGR	Telephone survey (n=140)		Telephone survey (n=140)
Non-Participant Survey for NTGR	Telephone survey (n=140)		Telephone survey (n=140)
Gross Impact Approach	Fixed per-unit values from Excel Files	Statewide TRM values	Statewide TRM values
<b>Budget</b>	<b>\$68,000</b>	<b>\$16,500</b>	<b>\$63,000</b>

# Multi-family

- Provides 3% of PY4 portfolio MWh and 2% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews (CSG)	X (n=2)	X (n=2)	X (n=2)
Secondary Research/Other Multifamily Program Manager Interviews		X	
Property Manager Survey		Process, verify installation, includes NTG for common area lighting, measure persistence (n=~40)	
Onsite Audits		X (n=100)	
Gross Impact Approach	Fixed Values from Excel File / Engineering Analysis	Fixed Values from Excel File / Engineering Analysis	Fixed Values from Excel File / Engineering Analysis
<b>Budget</b>	<b>\$20,000</b>	<b>\$80,000</b>	<b>\$25,000</b>

# Residential Energy Efficient Products

- Provides 1% of PY4 portfolio MWh and 2% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews (CSG)	3 interviews CSG (n=1) Ameren (n=1)) and APT (n=1)	3 interviews CSG (n=1) Ameren (n=1)) and APT (n=1)	3 interviews CSG (n=1) Ameren (n=1)) and APT (n=1)
Retailer Interviews		Participation retailers (n=30)	
Participant Survey	Telephone survey n=210 (30 per product)		Telephone survey n=210 (30 per product)
Gross Impact Approach	Fixed per-unit values from Excel File	Statewide TRM values	Statewide TRM values
<b>Budget</b>	<b>\$74,500</b>	<b>\$55,000</b>	<b>\$78,000</b>

# Moderate Income

- Provides 0.4% of PY4 portfolio MWh and 3% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews	2	2	2)
Market Actor Interviews <sup>a</sup>	Energy Assistnace Foundation, HEP Energy Auditors, Program Allies n=5-7	Energy Assistnace Foundation, HEP Energy Auditors, Program Allies n=5-7	Energy Assistnace Foundation, HEP Energy Auditors, Program Allies n=5-7
Participant Survey <sup>b</sup>	Process, verification, NTG n=TBD		Process, verification n=TBD
Gross Impact Approach	Application of Excel File Values/ Engineering Analysis	Statistically Adjusted Engineering Analysis	Application of Statistically Adjusted Engineering Analysis Coefficients
<b>Budget</b>	<b>\$34,500</b>	<b>\$35,000</b>	<b>\$50,000</b>

<sup>a</sup> Notably, we will combine our market actor interview efforts with our Home Energy Performance evaluation activities.

<sup>b</sup> The participant survey will also include participants from the Home Energy Performance program and the Electric Space Heat Pilot program.

# Nonresidential New Construction

- Provides 0.5% of PY4 portfolio MWh and 1% of PY4 portfolio

Activity	PY4	PY5	PY6
Program Material Review	This program is not planned to be rolled out for PY4	X	X
Program Manager and Implementer Interviews (SAIC)		X	X
Participant Survey		X	
Site Visits			X (Up to 10)
Gross Impact Approach		Engineering desk review of sample or census of projects.  Adjust ex ante savings based on engineering review.	Engineering review, supported by site visit of sample or census of projects.  Adjust ex ante savings based on engineering review.
<b>Budget</b>	<b>\$0</b>	<b>\$17,000</b>	<b>\$60,000</b>

# Residential New Construction

- Provides 0.1% of PY4 portfolio MWh and 0.2% of PY4 portfolio Therms

Activity	PY4	PY5	PY6
Program Material Review	X	X	X
Program Manager and Implementer Interviews (CSG)	X	X	X
Market Actor Interviews			Contractor / Builders (n=15)
Gross Impact Approach	Review program records for participating homes and confirm ex-ante savings are calculated properly	Review program records for participating homes and confirm ex-ante savings are calculated properly	Review program records for participating homes and confirm ex-ante savings are calculated properly
<b>Budget</b>	<b>\$10,000</b>	<b>\$10,000</b>	<b>\$20,000</b>