

THE
CADMUS
GROUP, INC.

Ameren Residential Evaluation: an Overview

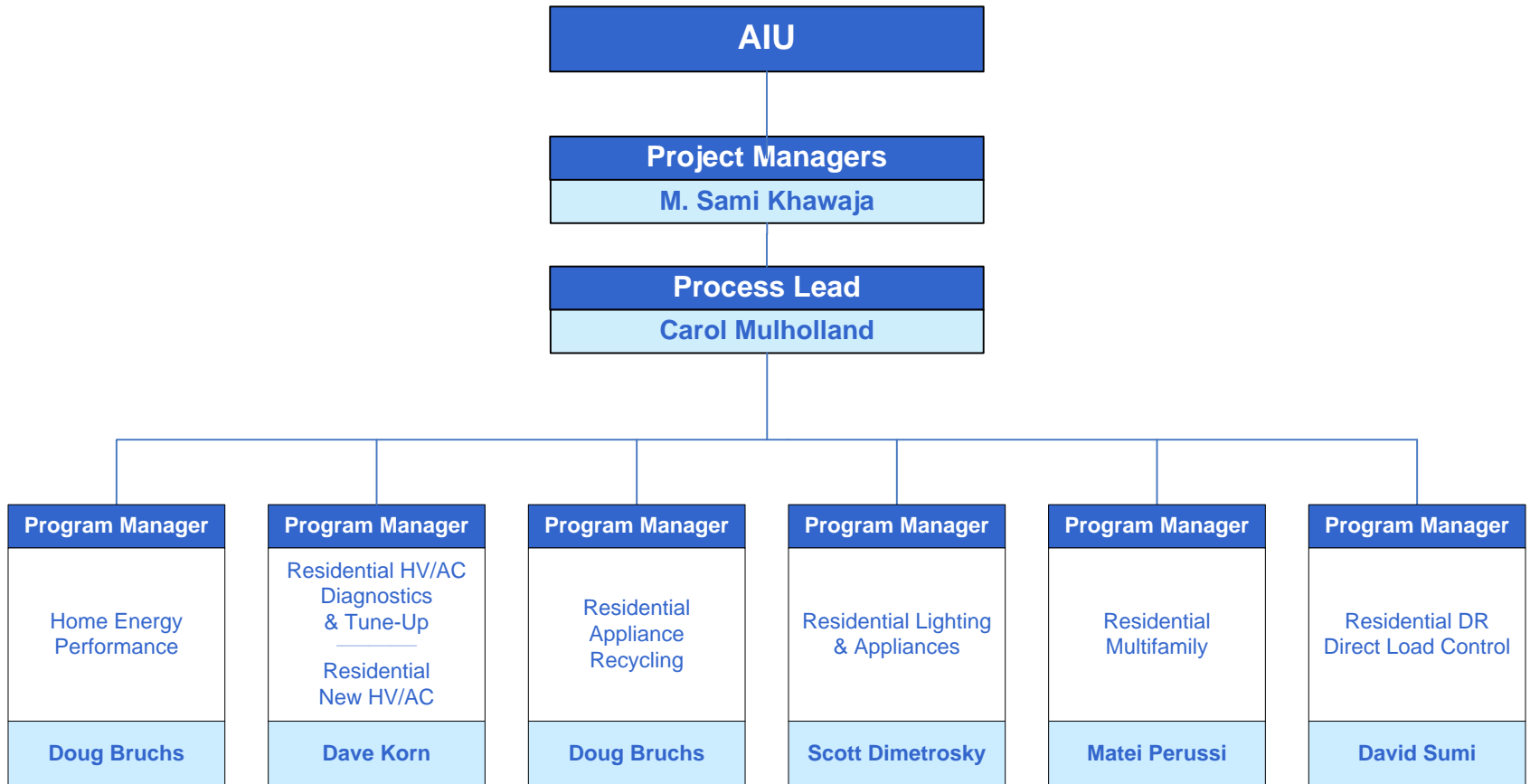
M. Sami Khawaja

February 3, 2009

Overview of Presentation

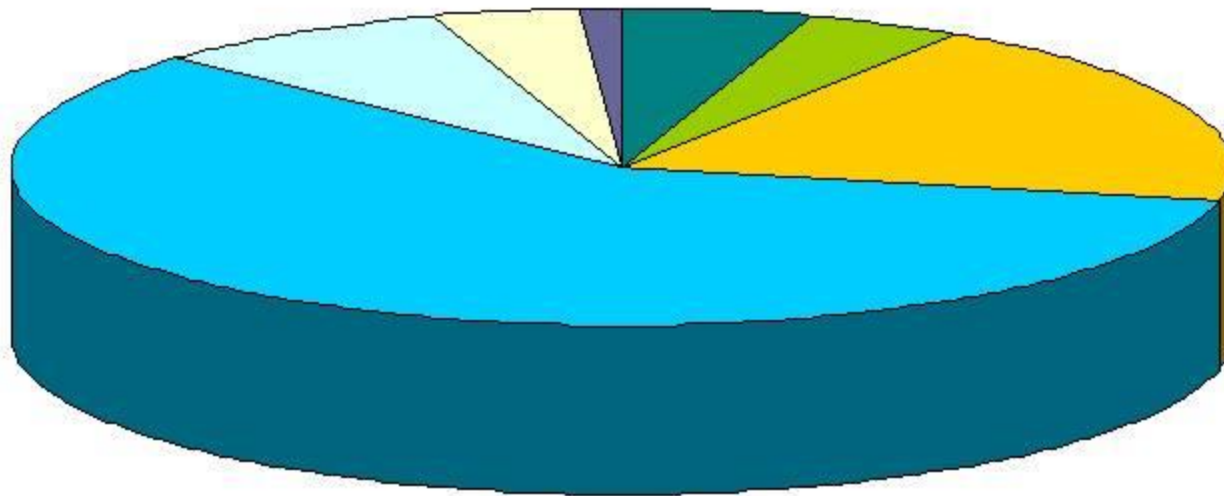
- Introducing our team
- Brief Description of Programs and Expected Impacts
- Resource Allocation
- Evaluation Approaches
- Coordination Across the Evaluation Effort

Introducing Our Team



Projected Program Impacts, Proportionally

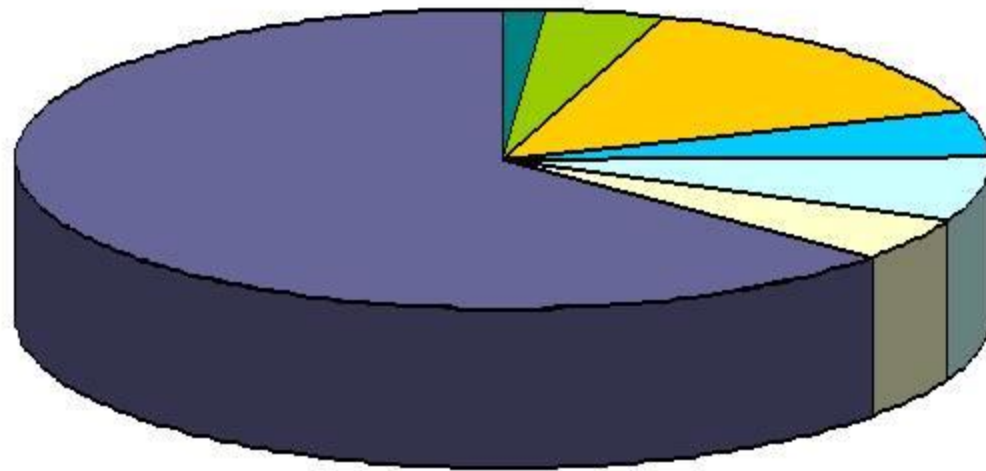
AIU's Total Energy Efficiency and Demand Response Portfolio 2008-2010 in kWh



- Home Energy Performance
- Residential Appliance Recycling
- Residential Multifamily
- Residential DR - Direct Load Control
- Residential HVAC Diagnostics & Tune-Up
- Residential Lighting & Appliances
- Residential New HVAC

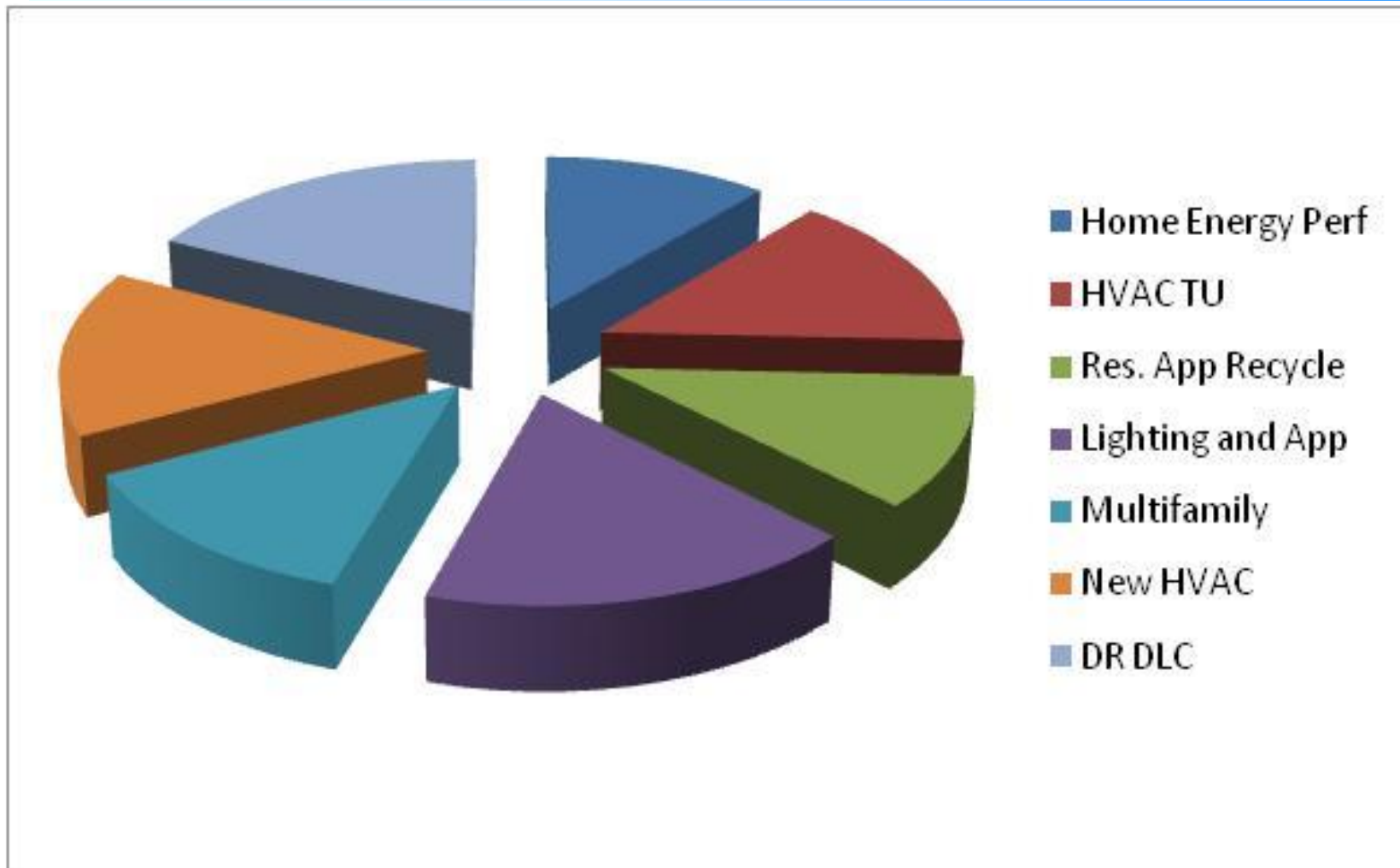
Projected Program Impacts, Proportionally

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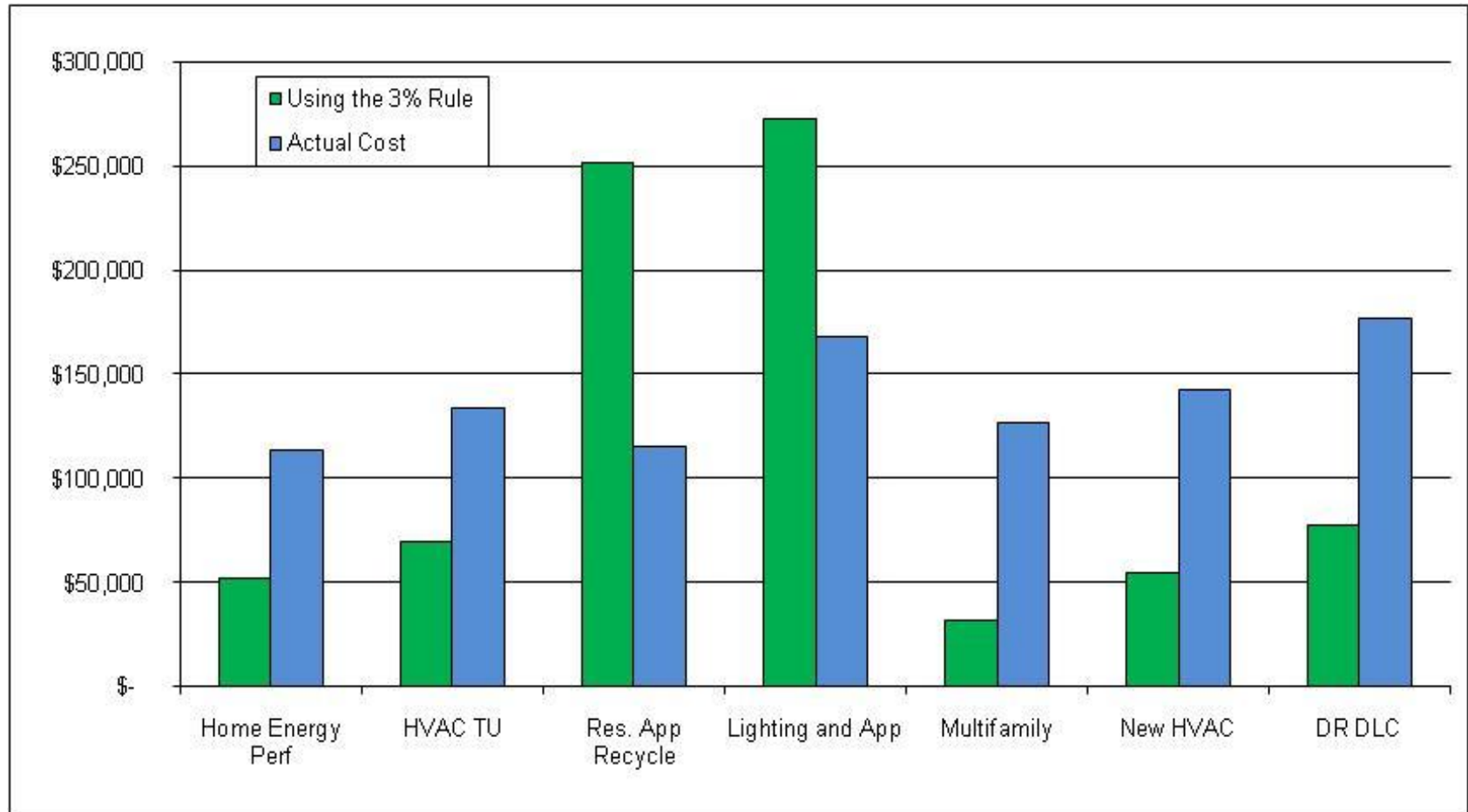


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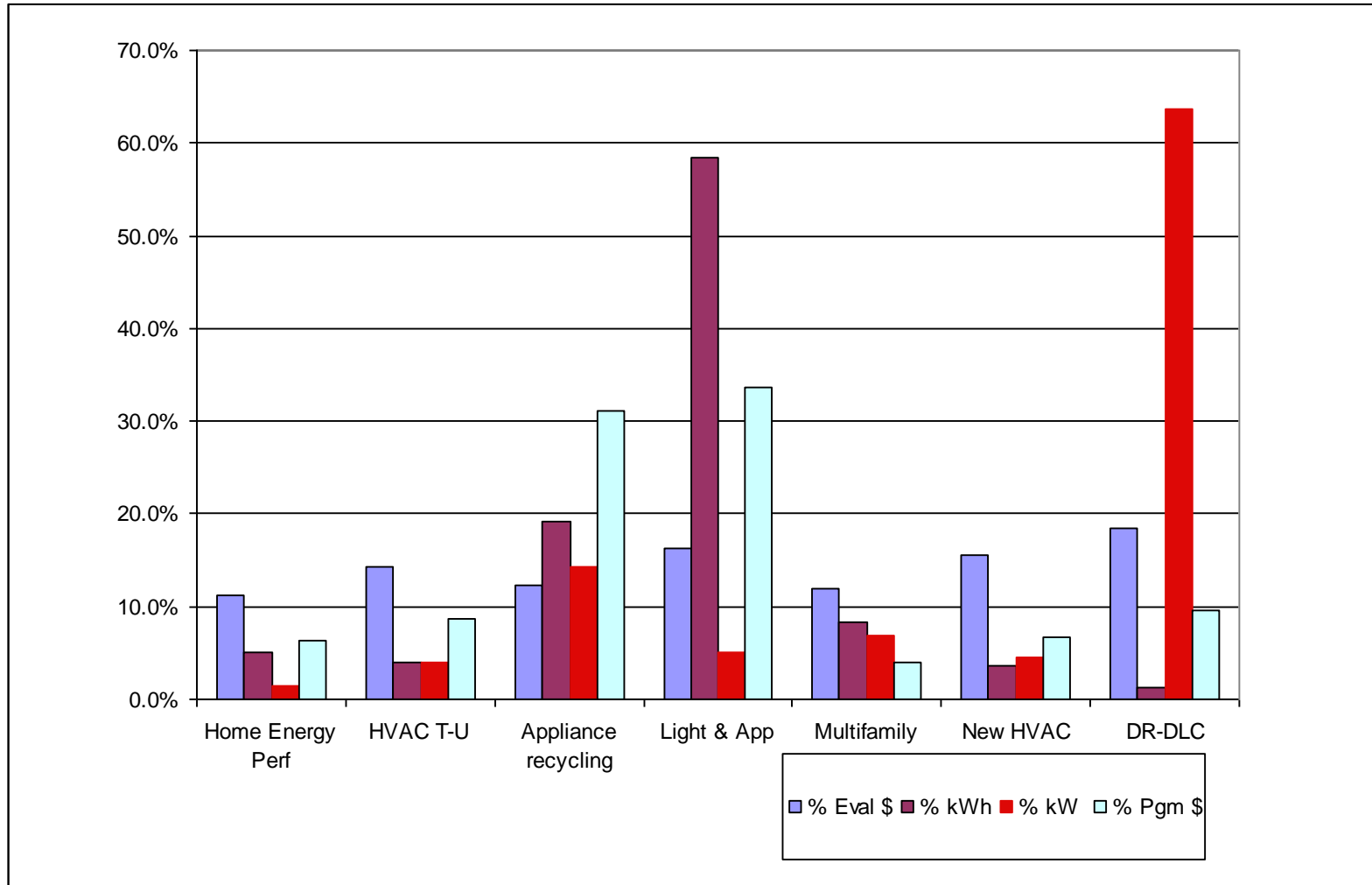
Budget by Program



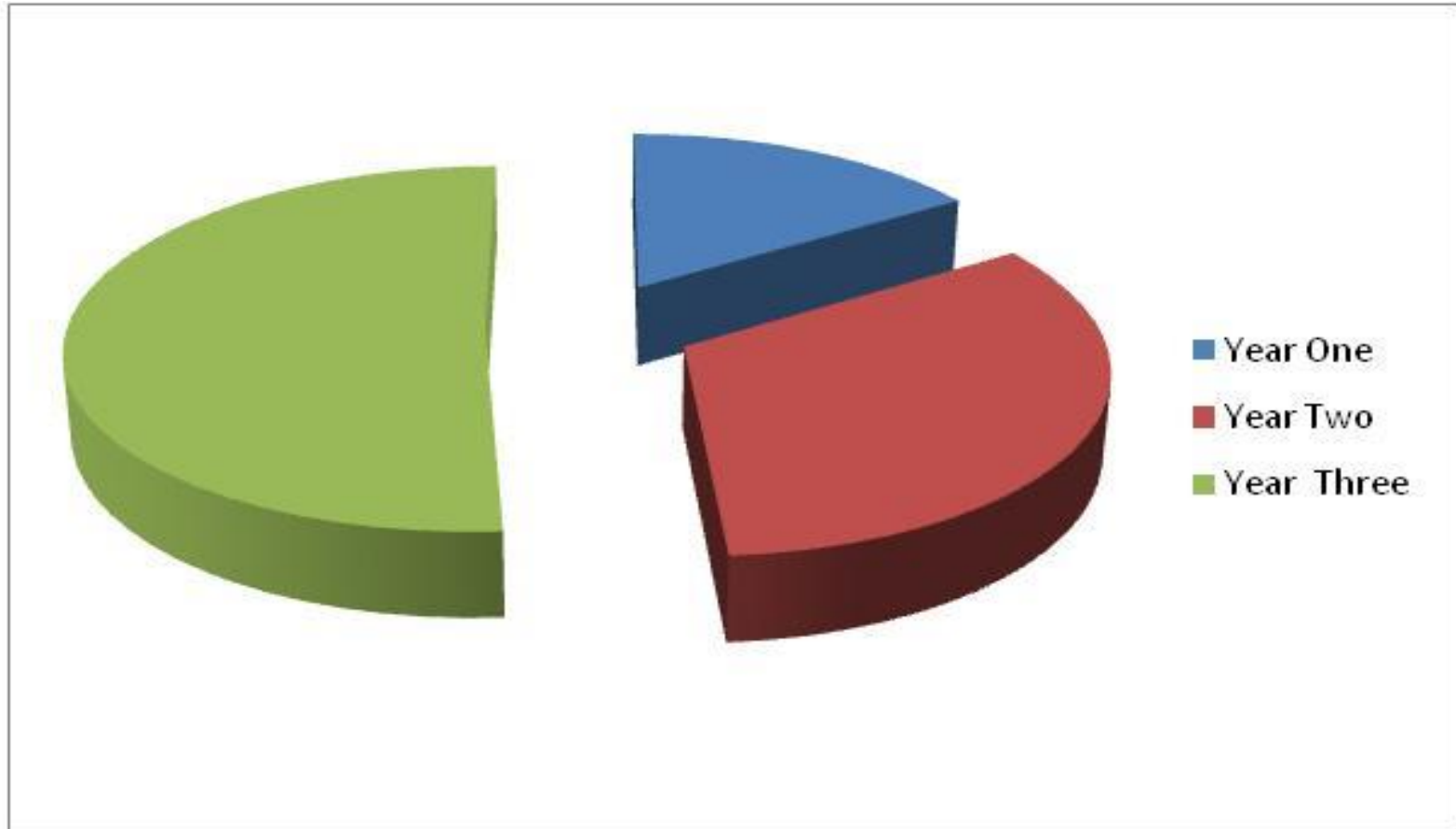
Budget Allocation by Program



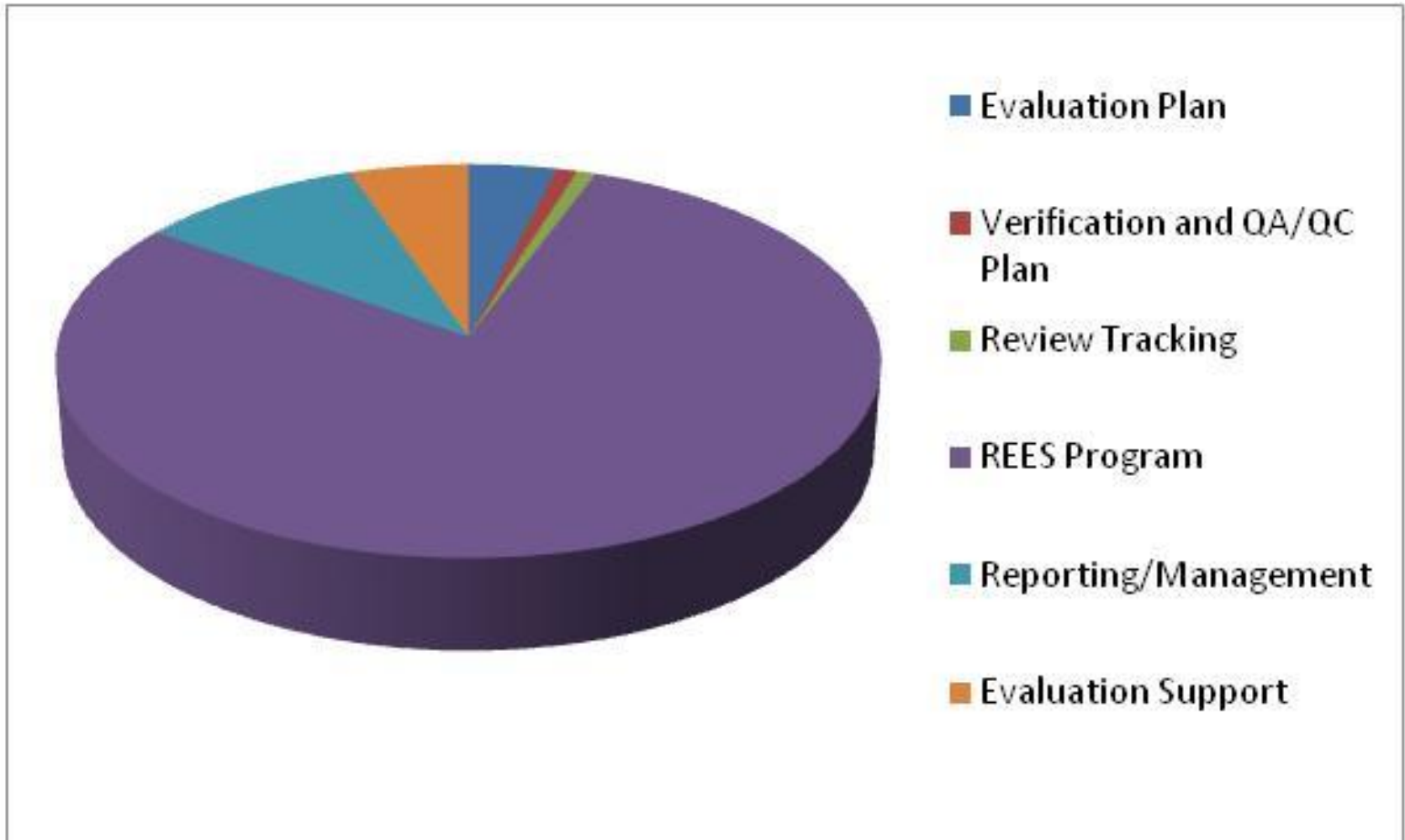
Budget Allocation by Program



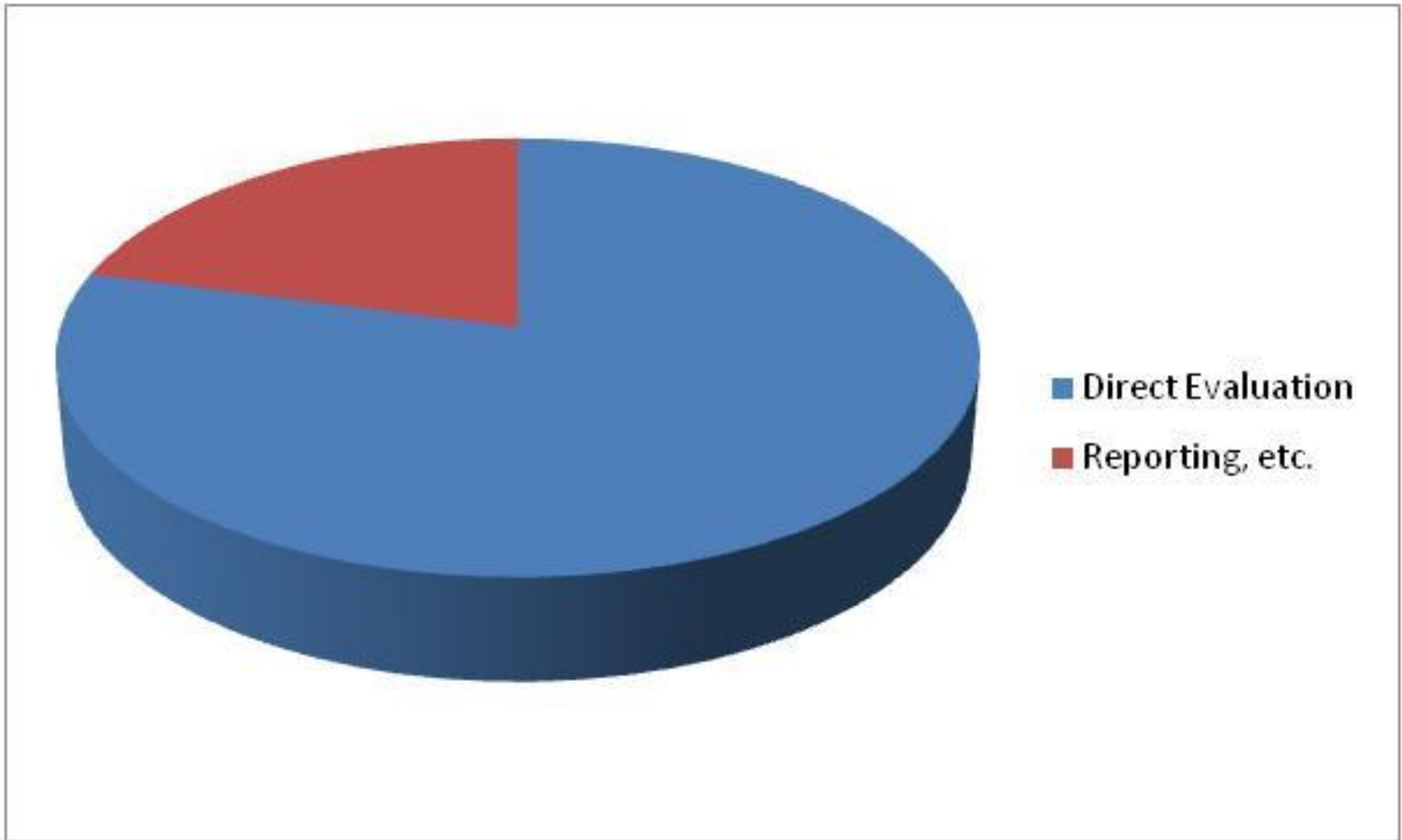
Budget Breakout by Year



Total Budget by Task



Budget: Direct Evaluation vs. Administrative Tasks



Evaluation Plan

Collaboratively Refine Proposed Plan

- Learn Programmatic Details
- Determine Key Evaluation Issues
- Evolving Statewide EM&V framework

“Living Document”

- Dynamic and Adaptable Plan
- Respond to Changes in Program Implementation
- Course corrections to program implementation, scope of work, etc.

Sample Sizes

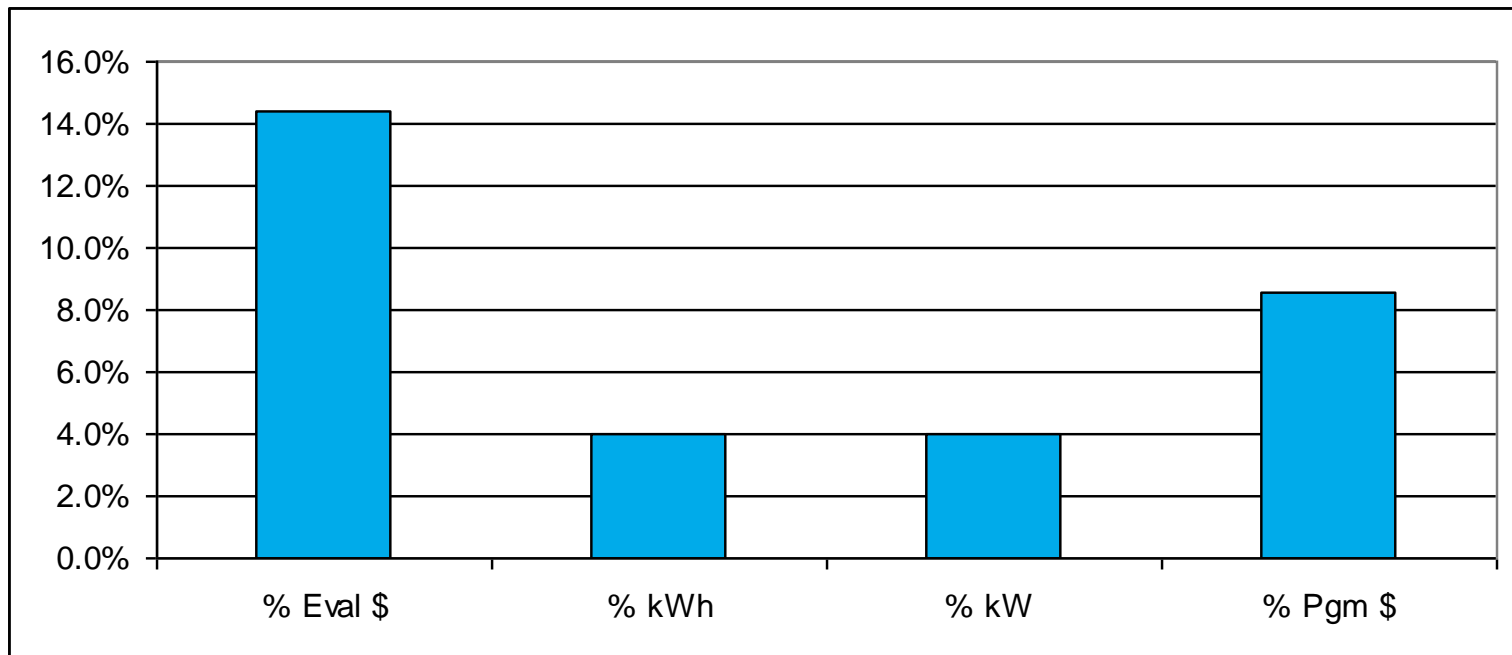
Program	Surveys	Site visits	Intercepts	interviews	Metering
Home Energy Perf	175	30	0	20	0
HVAC T-U	140	60	0	20	60
Appliance recycling	140	50	0	20	0
Light & App	175	50	6	20	50
Multifamily	175	30	0	20	0
New HVAC	140	60	0	20	60
DR-DLC	140	30	0	15	30
Total	1,085	310	6	135	200
Year 1	105		6	50	
Year 2 & 3	980	310		85	200

Methods of Estimation Program Impacts

- **Energy**
 - Engineering
 - Simple Engineering
 - Simulation Models
 - Statistical
 - Simple Pre/Post (difference of means)
 - Regression (Acct for weather)
 - Comparison Group (Quasi Experimental Design)
 - Detailed Regression
- **Demand**
 - Existing Load Factors
 - Secondary Load Shapes
 - End-Use Metering
 - Simulations
- **Data Collection**
 - Surveys
 - Billing Data
 - Metering
 - Site Visits

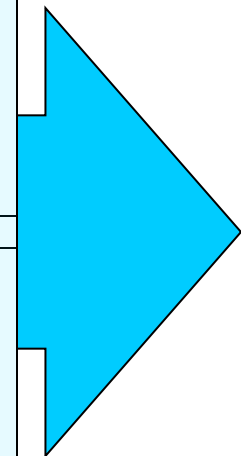
HVAC Tune-Up

Summary: HVAC contractors are trained to check refrigerant charge and airflow over the system's coils. System adjustments are encouraged w/incentives paid to the HVAC contractor per job.



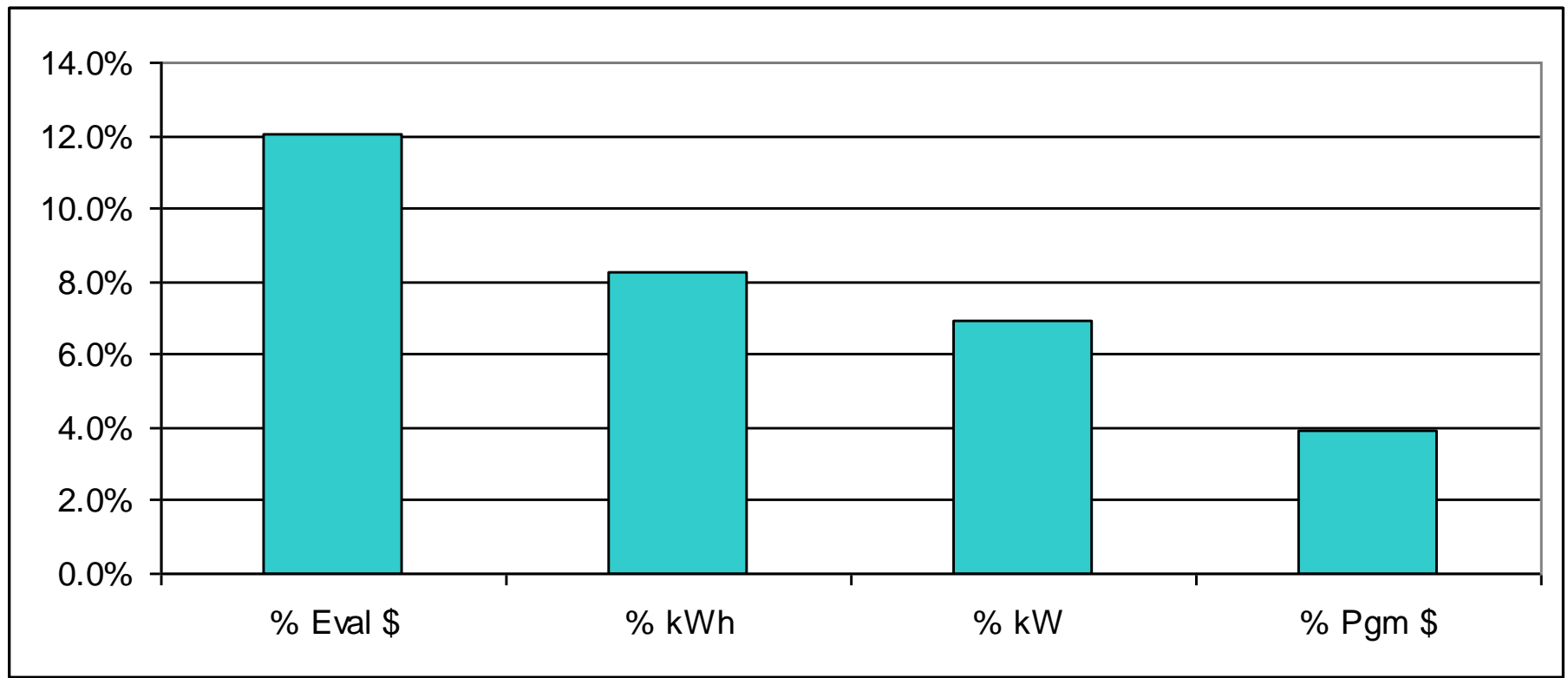
HVAC Tune Up

		2010	2011	Overall
IMPACT		<ul style="list-style-type: none"> • Site Visits (n=30) • Review Program Records (Census) • Billing Analysis (Census) • Metering (n=30) 	<ul style="list-style-type: none"> • Site Visits (n=30) • Review Program Records (Census) • Billing Analysis (Census) • Metering (n=30) 	<ul style="list-style-type: none"> • Site Visits (n=60) • Review Program Records (Census) • Billing Analysis (Census) • Metering (n=60)
PROCESS		<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=10) • Participant Surveys (n=70) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=10) • Participant Surveys (n=70) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=20) • Participant Surveys (n=140)



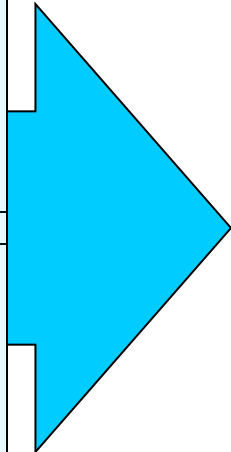
New HVAC

Summary: Lower peak demand using smart thermostats. Program provides equipment and installation free of charge to single-family homes.



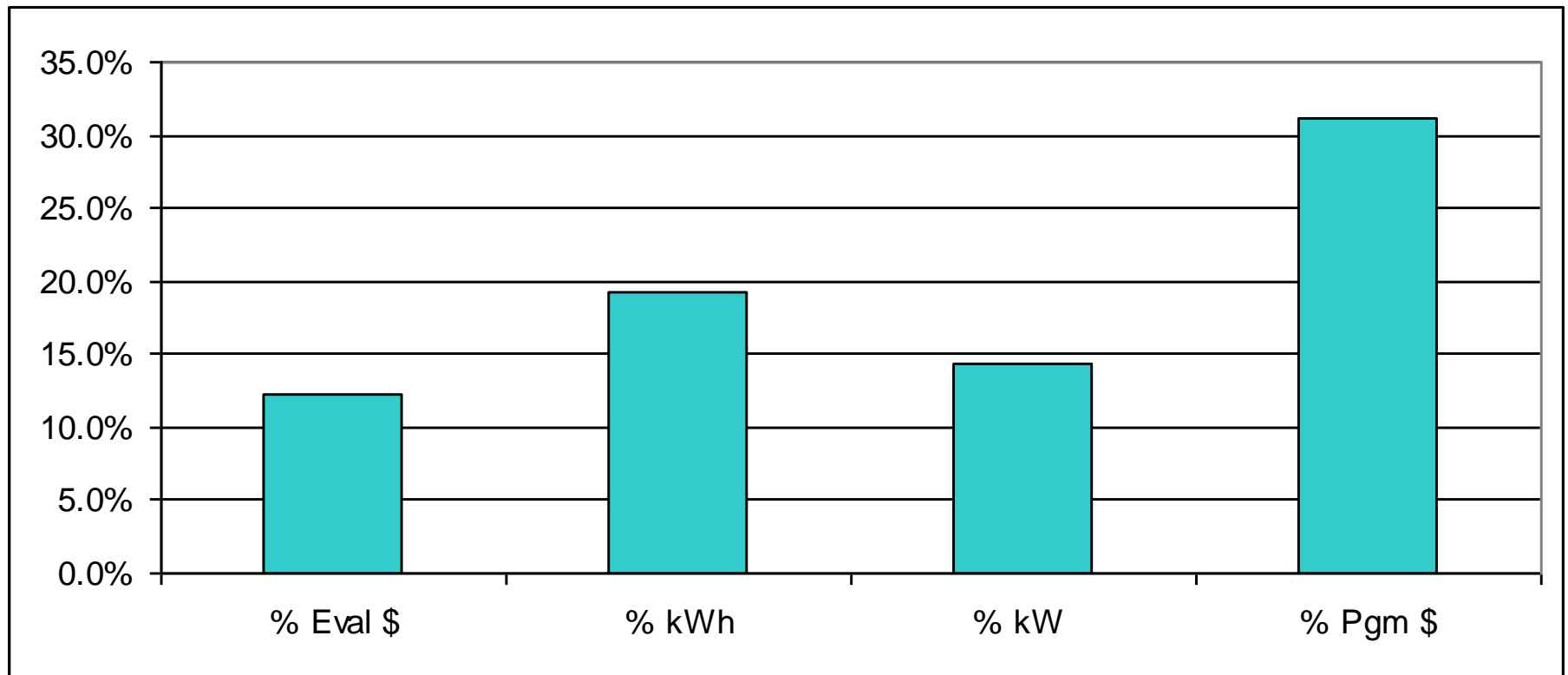
New HVAC

	2009	2010	2011	Overall
IMPACT		<ul style="list-style-type: none"> • Site Visits (n=30) • Review Program Records (Census) • Metering (n=30) • Billing Analysis (Census) 	<ul style="list-style-type: none"> • Site Visits (n=30) • Review Program Records (Census) • Metering (n=30) • Billing Analysis (Census) 	<ul style="list-style-type: none"> • Site Visits (n=60) • Review Program Records (Census) • Metering (n=60) • Billing Analysis (Census)
PROCESS		<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=10) • Participant Surveys (n=70) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=10) • Participant Surveys (n=70) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=20) • Participant Surveys (n=140)



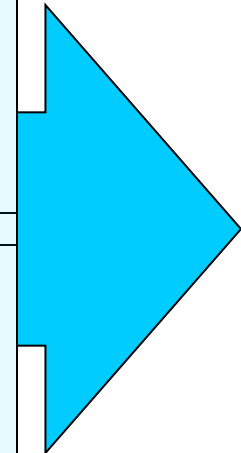
Appliance Recycling

Summary: Program designed to encourage channeled disposal of less-efficient refrigerators.



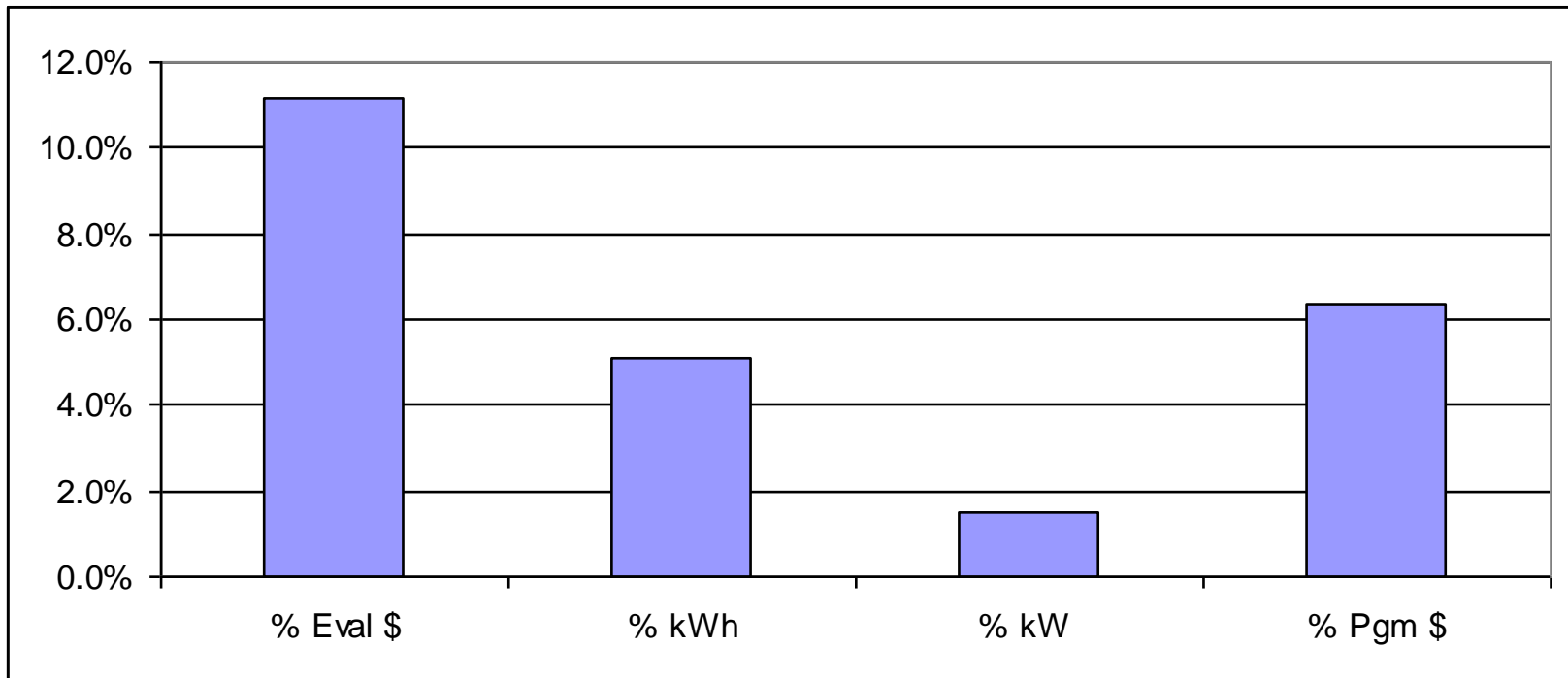
Appliance Recycling

	2009	2010	2011	Overall
IMPACT	<ul style="list-style-type: none"> • Review Program Records (Census) • Establish deemed values 	<ul style="list-style-type: none"> • Review Program Records (Census) 	<ul style="list-style-type: none"> • Review Program Records (Census) 	<ul style="list-style-type: none"> • Review Program Records (Census)
PROCESS	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=0) • Participant Surveys (n=35) • Non-participant surveys (n=35) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=10) • Participant Surveys (n=70) • Non-participant surveys (n=70) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=10) • Participant Surveys (n=35) • Non-participant surveys (n=35) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=20) • Participant Surveys (n=140) • Non-Participant Surveys (140)



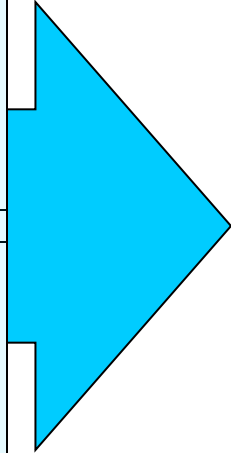
Home Energy Performance

Summary: A home diagnostic and improvement program that could evolve into a more comprehensive Home Performance with Energy Star Program.



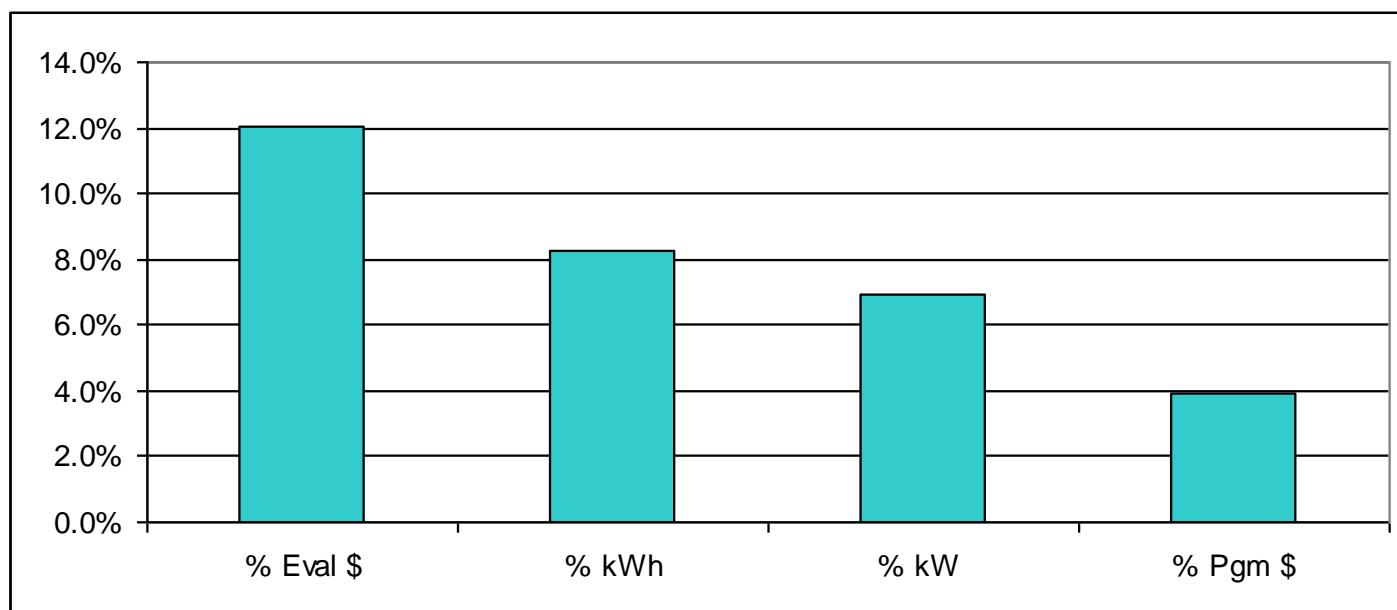
Home Energy Performance

	2009	2010	2011	Overall
IMPACT	<ul style="list-style-type: none"> • Review Program Records • Site Visits (n=0) • Billing Analysis (n=0) • Establish deemed values 	<ul style="list-style-type: none"> • Review Program Records (n= 10%) • Site Visits (n=15) • Billing Analysis (Census) 	<ul style="list-style-type: none"> • Review Program Records (n= 10%) • Site Visits (n=15) • Billing Analysis (Census) 	<ul style="list-style-type: none"> • Review Program Records (n= ~10%) • Site Visits (n=30) • Billing Analysis (Census)
PROCESS	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=10) • Participant Surveys (n=35) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=5) • Participating Household Surveys (n=70) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=5) • Participating Household Surveys (n=35-70) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=20) • Participating Household Surveys (n=140-175)



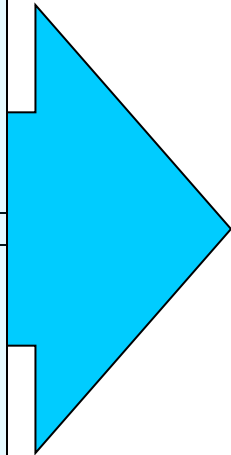
Multifamily

Summary: Engage customers & trade allies to promote the installation of EE lighting in common areas & provide energy audits, install measures in tenant spaces related to CAC diagnostics & tune-up.



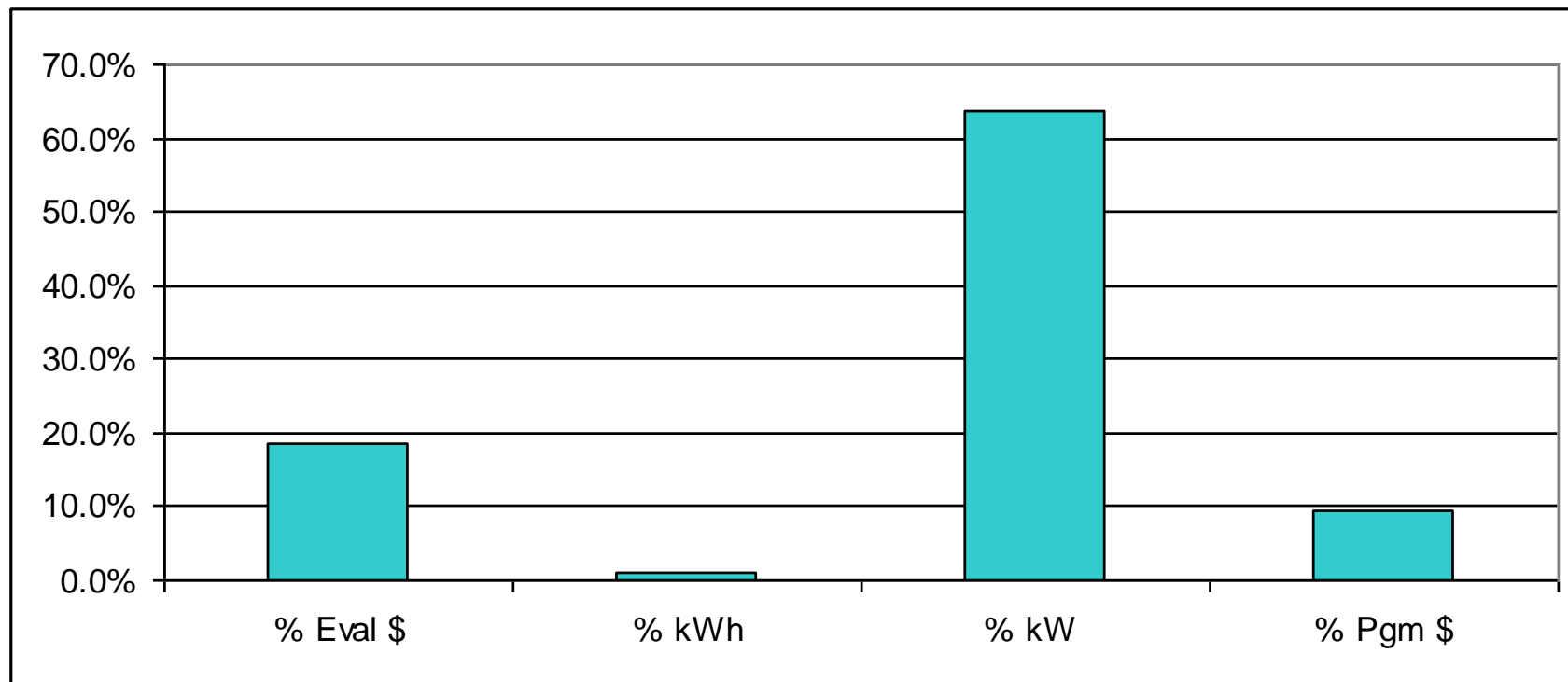
Multifamily

	2009	2010	2011	Overall
IMPACT	<ul style="list-style-type: none"> • Site Visits (n=0) • Review Program Records (Census) • Establish deemed values 	<ul style="list-style-type: none"> • Site Visits (n=15) • Billing Analysis (Census) • Review Program Records (10% total) 	<ul style="list-style-type: none"> • Site Visits (n=15) • Billing Analysis (Census) • Review Program Records (10% total) 	<ul style="list-style-type: none"> • Site Visits (n=30) • Billing Analysis (Census) • Review Program Records (10% total)
PROCESS	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=10) • Participant Surveys (n=35) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=5) • Participant Surveys (n=70) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=5) • Participant Surveys (n=35-70) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=20) • Participant Surveys (n=140-175)



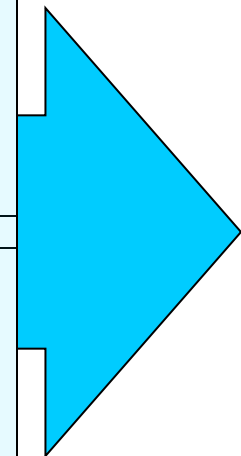
Demand Response: Direct Load Control

Summary: Lower peak demand using smart thermostats.
Program provides equipment and installation free of charge to single-family homes.



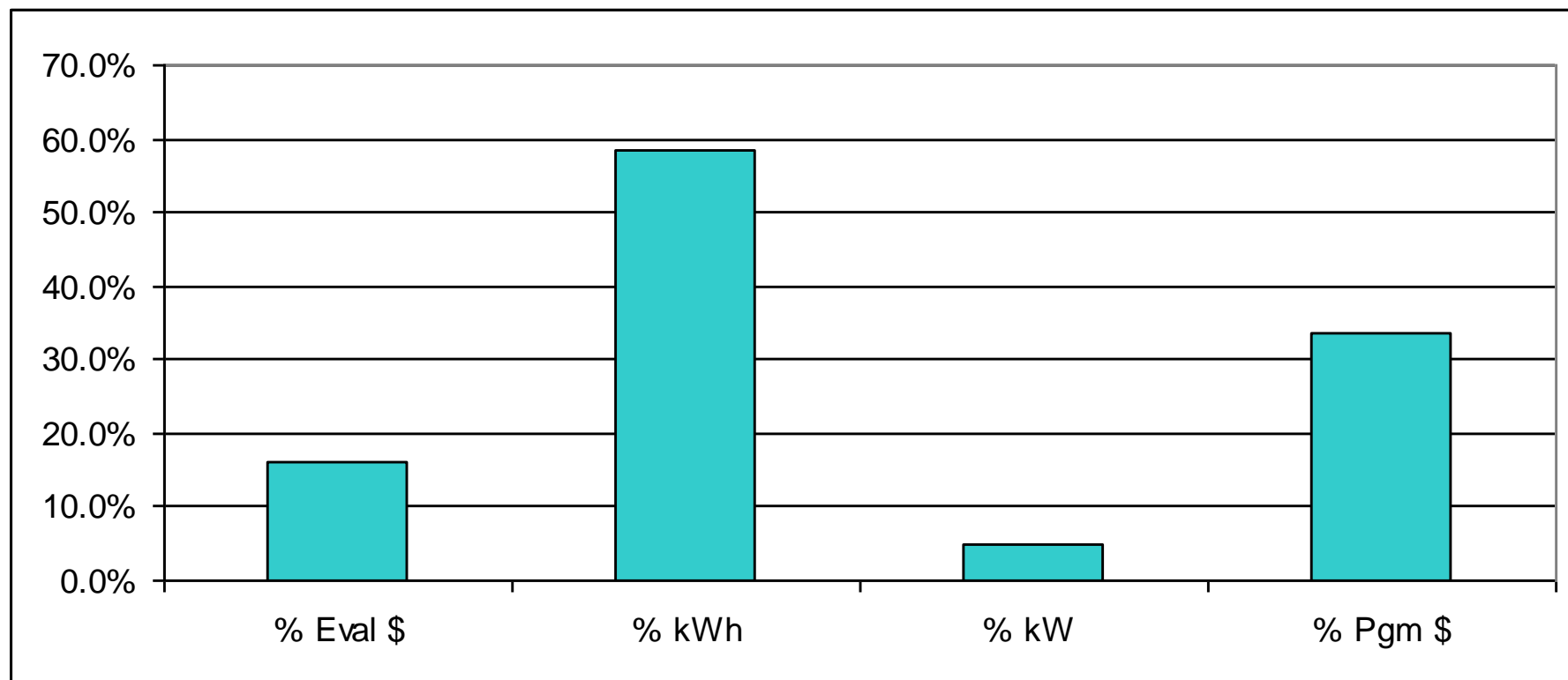
Demand Response: Direct Load Control

	2009	2010	2011	Overall
IMPACT	Simulation (n=35) Billing Analysis (N=census)	Simulation (n=35) Billing Analysis (N=census)	Simulation (n=35) Billing Analysis (N=census)	Simulation (n=105) Billing Analysis (N=census)
PROCESS	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=10) • Participant Surveys (n=35) • Non-participant surveys (n=35) • Drop-out surveys (n=0) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=3) • Participant Surveys (n=35) • Non-participant surveys (n=35) • Drop-out surveys (Census) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=2) • Participant Surveys (n=35) • Non-participant surveys (n=35) • Drop-out surveys (Census) 	<ul style="list-style-type: none"> • Program Stakeholder Interviews (n=15) • Participant Surveys (n=140) • Non-participant surveys (n=140) • Drop-out surveys (Census)

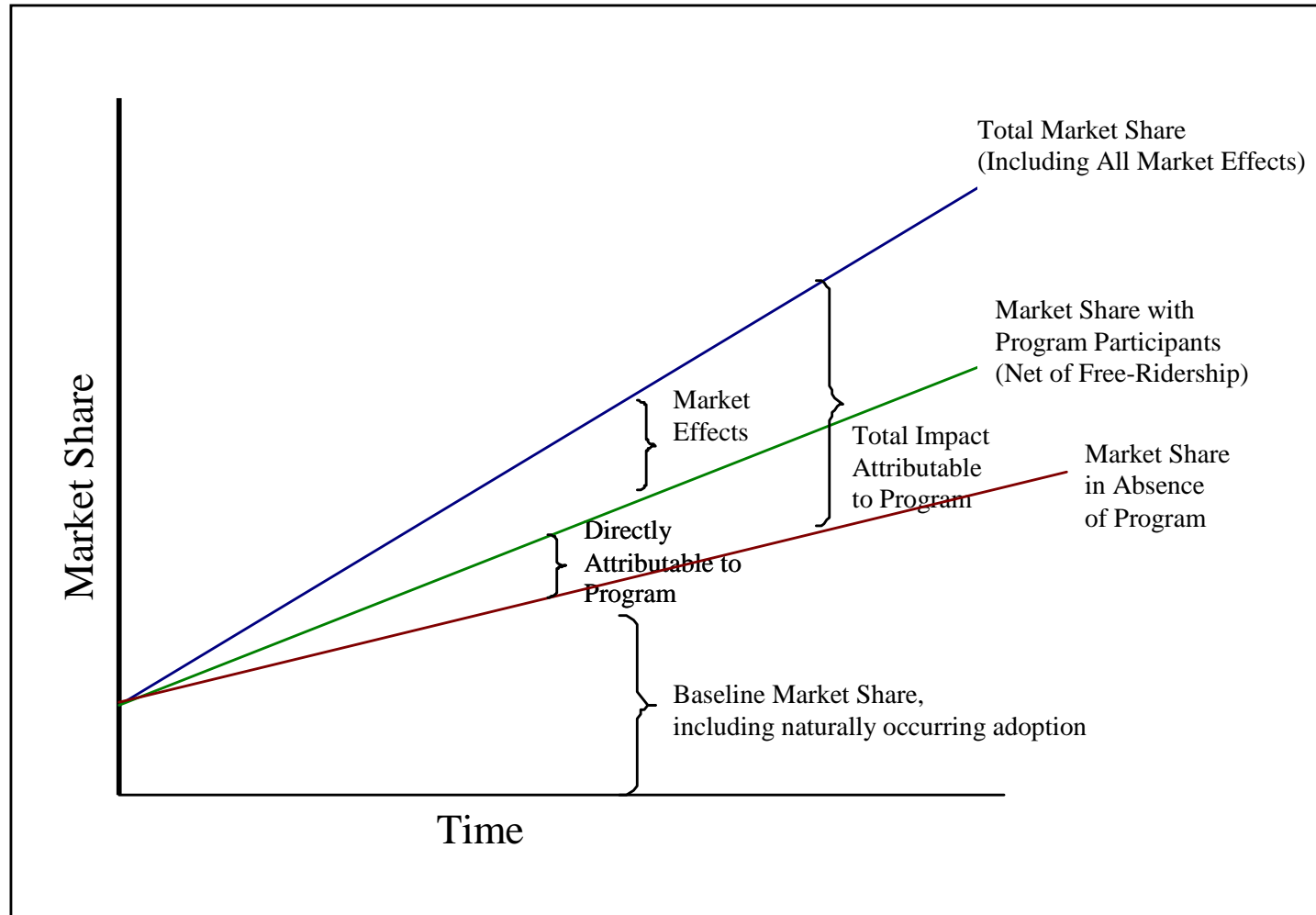


Lighting & Appliances

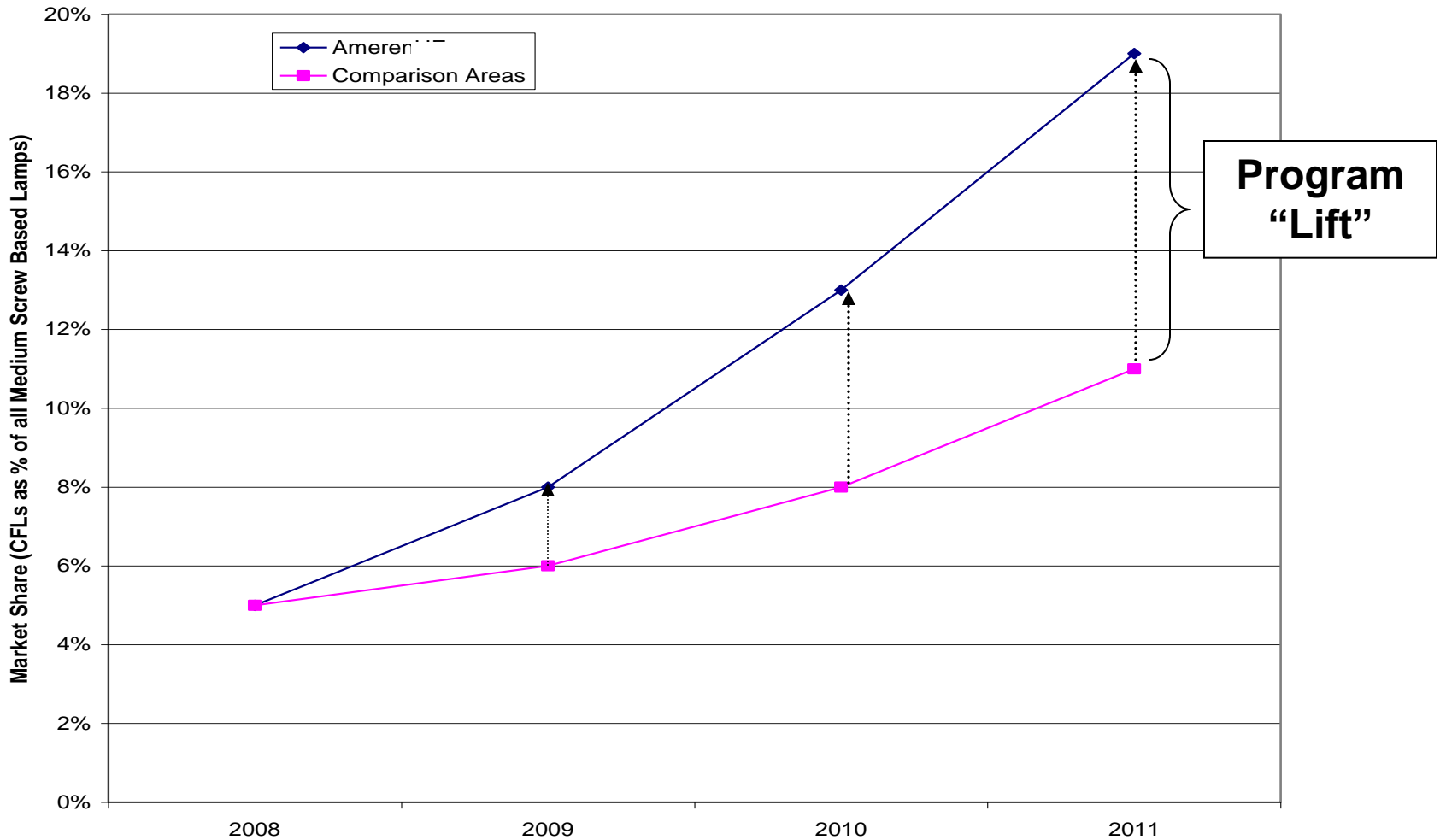
Summary: Initial focus on buying down the cost of CFL at retail level.



Residential Lighting: Net-to-Gross



Residential Lighting: Calculating Naturally Occurring Adoption



Residential Lighting Overview

Market-Based Evaluation Approach

- Compare AIU's market transformation to that of select "control" states
- Methodology used in CA, NY

Numerous Data Sources

- Participating Retailer Sales Data
- End-User Surveys
- Shelf Stocking Assessments
- National ENERGY STAR data

Statewide Coordination

