

# Draft 2017 Impact Evaluation Plan



March 7, 2017



# Why Evaluation

# What do we all want?



Energy efficiency programs that save customers money and energy

To be trustworthy stewards of ratepayer money

# Evaluation

What did we achieve?

How do we improve?



# Impact Evaluation



Savings reliability  
with independent  
verification



Program  
improvement  
opportunities

# QSSI Policy Refresh: Impact Evaluation

Focus on Savings Reliability, secondary program improvement

4-year planning cycle, some evaluation annually

Minimum of 80% coverage (RTF Guidelines), goal of 90% coverage, over 4 year period

Balances objectives of coverage, research needs, timely feedback and cost /effort of the evaluation

# Evaluation Progress



## Policies and Communication

- QSSI Impact and Process Evaluation Policies
- Why Evaluation Brownbag
- Internal review teams
- Embedded EER, regular updates

## Plans

- Basic evaluation approaches to custom, lighting calculators and some UES

## Recent Results

- Simple Steps Process Evaluation
- Res Lighting Impact
- Industrial SEM Impact

## In Progress

- 2016 Evaluation – Billing analysis & PTCS HVAC
- Integrated EM&V Strategy
- Process Evaluation Details

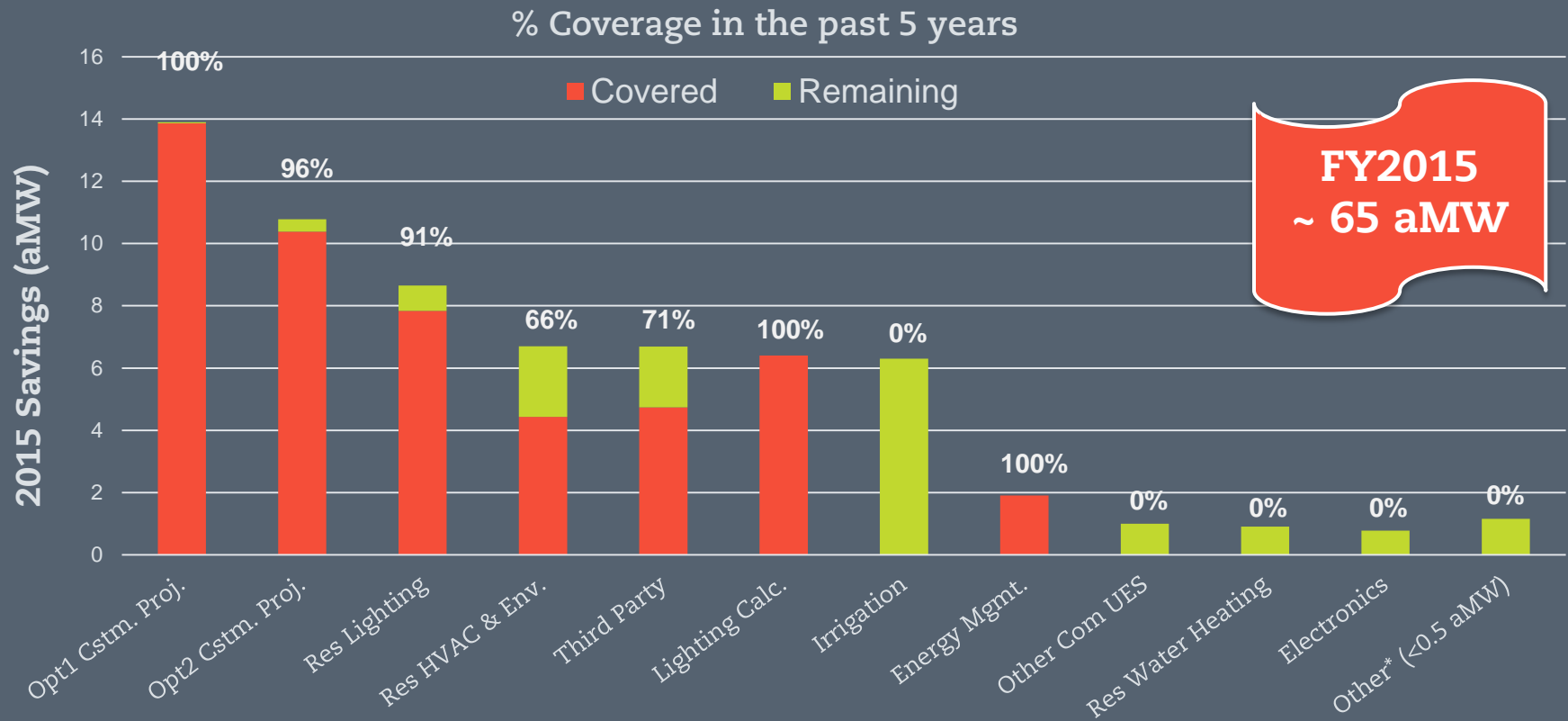


# 2017 Evaluation Strategy



# What Have We Covered?

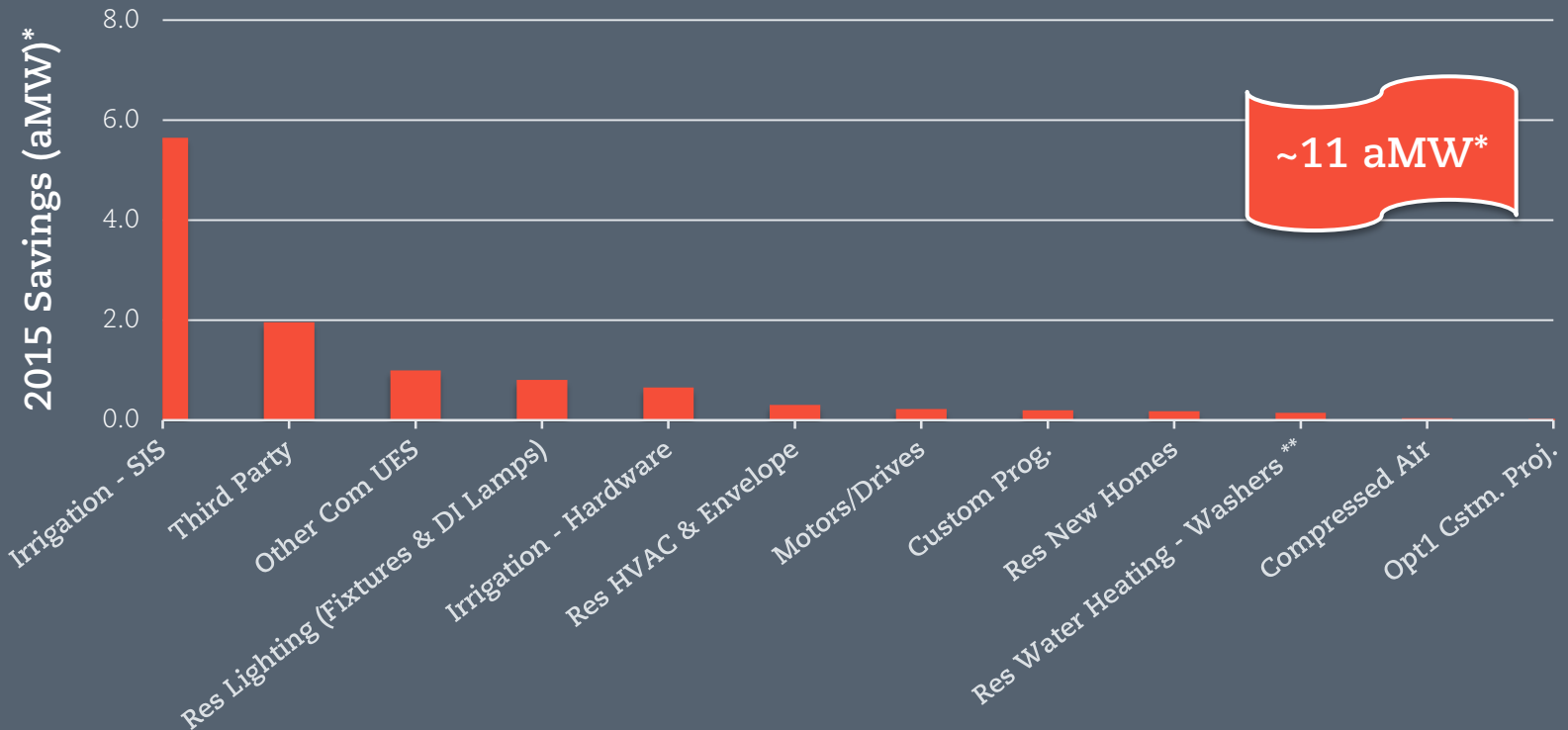
The past 5 years of impact evaluations have covered ~76% of the BPA portfolio



\*Includes all measures that contribute <0.5 aMW each of FY-2015 savings

# What Should We Hold Off On?

Considerations: Size, On-going research, program changes, customer burden



\*Using FY-2015 savings

# What Should We Look at?

Sector	Evaluation Measure Group	Measure Status	Savings (aMW)*
Residential	Phase II of CY2016 UES Residential HVAC and Envelope Billing Analysis	Proven	5.72**
	HVAC Ductless Heat Pumps - Zonal	Proven	1.70
	Power Strips	Planning	0.82
	Water Heating - Showerheads	Planning	0.77
	Water Heating – Heat Pump Water Heater	HPWP	0.19
	State Grants - Low Income Weatherization	?	0.16
Agricultural & Industrial	De-energization	?	0.20
	BPA Green Motors	Small Savers	0.11

**~ 85% Coverage**

\*Total annual savings will be revised once the FY2016 IS2.0 data is finalized.

\*\*FY2015 savings.

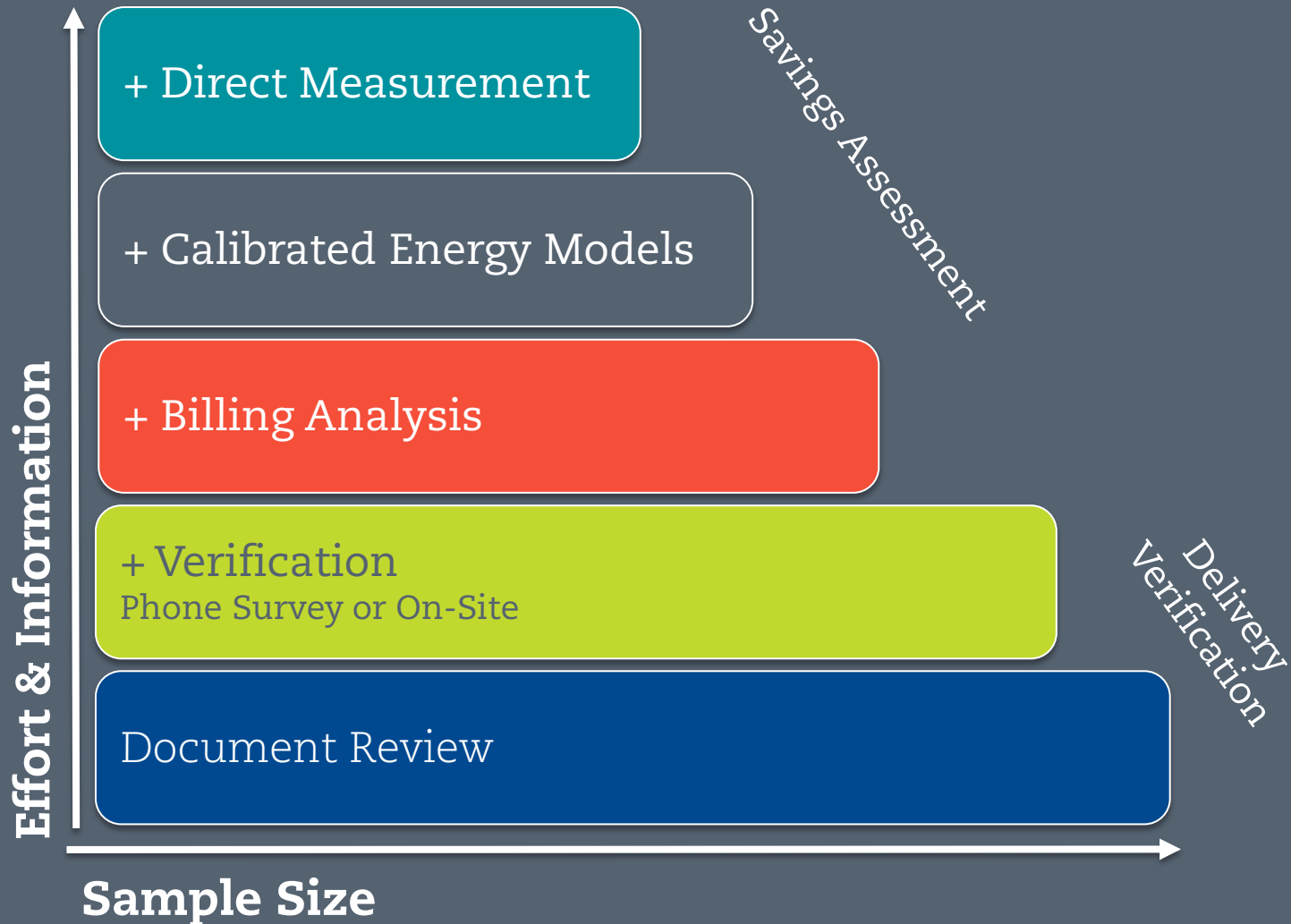
Source: Summarized from partial FY2016 data included in an extract from IS2.0 dated 10/31/2016

Note: Also plan to conduct review of Retail Sales Allocation Tool



# Evaluation Approaches Overview

# Evaluation Approaches



# Summary: 2017 Data Collection

## Document Review (Utility Files)

- 5 measure groups
- ~450 projects across 28 utilities

## Verification (Phone Surveys)

- DHP eFAF only
  - *Utilities or Evaluation can field calls*

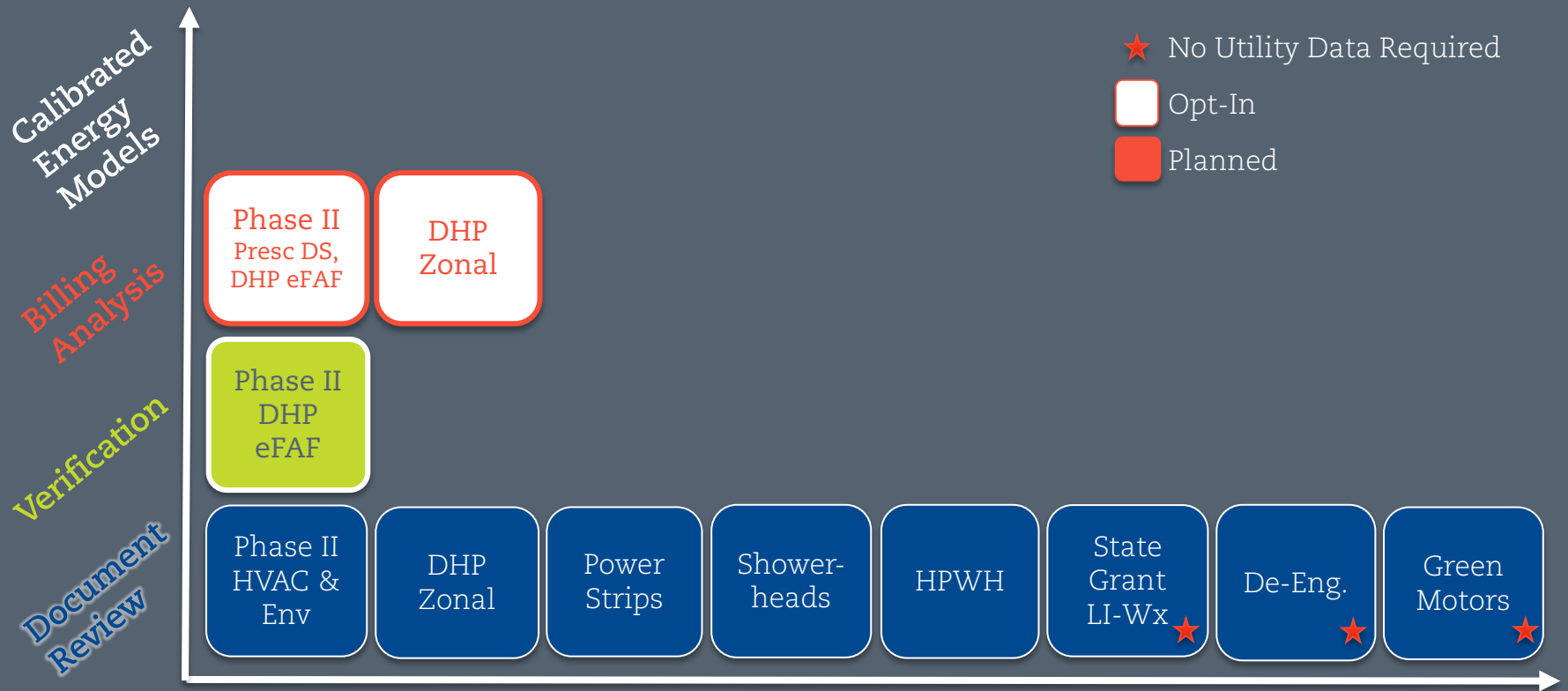
## OPTIONAL Billing Data

- DHP Zonal
- DHP eFAF
- Prescriptive DS



# Summary of Approaches

Leverage Low-Rigor Approach for Most Measures



# Why Opt-In Billing Analysis?



## DHP Zonal

- Proven measure, not under review, yet
- Utility interest in understanding savings in their territory

## DHP eFAF

- Draft results from 2016 billing analysis are low compared to RTF estimates
- Add'l sample to:
  - improve precision on results
  - east side utility representation

## Prescriptive Duct Sealing

- Draft results from 2016 billing analysis are not statistically significant
- Add'l sample to make results meaningful



# CY2017 Activities

Sector	Measure Group	Measure Status	Doc Review	Billing Analysis	Phone Surveys	Literature Review
Residential	Phase II Data Collection and Analysis for CY2016 Res HVAC and Envelope Billing Analysis*	Proven	✓ DHP eFAF	Opt-In: DHP eFAF Pres DS	✓ DHP eFAF	
	Ductless Heat Pumps replacing Zonal Heat	Proven	✓	Opt-In		
	Power Strips	Planning	✓			
	Showerheads	Planning	✓			
	Heat Pump Water Heaters	Planning	✓			
	State Grants – Low Income Weatherization	N/A				
Agricultural	De-energization	BPA Qualified	✓ ★			
	BPA Green Motors	Small Saver	✓ ★			

\*The analysis of the remaining res HVAC & envelope measure groups included in the FY2016 billing analysis will be finalized in CY2017.

★ No utility data required

+ Research the Retail Sales Allocation Tool (RSAT)

- Allocation methodologies, implementation, discounted bulbs purchased for use in programs



# Sampling

# Two-Stage Cluster Sampling

- Used for measures with similar project savings
- Minimizes number of utilities

For each measure group:

## Stage 1

Determine each utility's savings contribution

- Exclude: Tiny Contributors (<0.25%\* of FY Savings)
- Automatically Select: Large Contributors (>6% of FY Savings)
- Randomly Select: Small Contributors
  - Exclude if the utility has received FY2015 oversight

## Stage 2

Randomly sample target quantity of projects

A 'project' is a line item in IS2.0

\* 0.5% for Res HPWH

# Stratified Random Sampling

Used where project-level savings vary significantly

- Green motors
- Res Power Strips
- Res Showerheads

For each measure group:

- **Determine each project's cumulative savings contribution** (arranged from greatest to smallest savings)
  - Projects in Tiny stratum are excluded (Bottom 1%)
  - Group into stratum based on size
- **Randomly sample target quantity of projects**

# Draft Evaluation Sample - Res

Residential Measure Group	Sampling Technique	Strata	Number of Utilities	Total Number of Projects**
Phase II Billing Analysis	Nested	N/A	14	~300
HVAC DHP Zonal* (document review)	Two Stage Cluster	Large Contributors	5	~48
		Small Contributors	5	~50
		<b>Subtotal</b>	<b>10</b>	<b>98</b>
Power Strips	Stratified Random	<b>Subtotal</b>	<b>5</b>	<b>5</b>
Showerheads	Stratified Random	<b>Subtotal</b>	<b>8</b>	<b>10</b>
Heat Pump Water Heater	Two Stage Cluster	Large Contributors	5	~9
		Small Contributors	3	~22
		<b>Subtotal</b>	<b>8</b>	<b>31</b>

\*Where possible, evaluation will get project documentation directly from 3<sup>rd</sup> Party Implementer

\*\*A project is an individual line item in the IS2.0 database

Source: Navigant analysis of FY2016 IS2.0 data pull on Feb 3<sup>rd</sup> 2017.

# Draft Evaluation Sample – Ag/Ind

Ag/Industrial Measure Group	Sampling Technique	Strata	Number of Utilities	Target Number of Projects
De-energization	N/A	N/A	3	3* ★
BPA Green Motors	Stratified Random Sampling	Subtotal	N/A	~9 ★

\*Census

Source: Navigant analysis of partial FY2016 IS2.0 data

No data  
needed  
from  
utilities!





# Process

# Draft 2017 Evaluation Rollout

Milestone	2016		2017											
	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Draft Evaluation Plan	x													
Feedback on Plan		↔												
Heads Up Email to Utilities				x										
Finalize Evaluation Plan & Sample					x									
Sample Notification to Utilities						x								
Brownbag for Sampled Utilities						x								
Primary Data Collection							↔							
Data Clarifications								↔						
Analysis									↔					
Reporting													↔	



# Data Security is a Priority



Secure file transfer options, with file encryption



Anonymized data, remove customer PII



NDA with evaluation contractor

# Contact Protocols

Contact protocols outlined in Appendix G of Evaluation Plan

## Project Documentation Requests

- Evaluation provides utility detailed list of sampled projects via secure transfer
  - 6-week timeline for file delivery
- Utility transmits required data to evaluation team
  - Evaluation will work with utilities individually to support data request as much as feasible: Secure and encrypted file requests via Navigant's secure FTP, mail encrypted thumb drives, provide support staff to collect data, offer timeline extension, if requested and possible

## End User Contact

- DHP in eFAF phone surveys - utilities notified 4 weeks in advance and evaluation provides support information
- Option for utilities to conduct the end-user survey

# Next Steps



Utility Review (Comments by March 21)

Finalize Evaluation Plan (March 30)

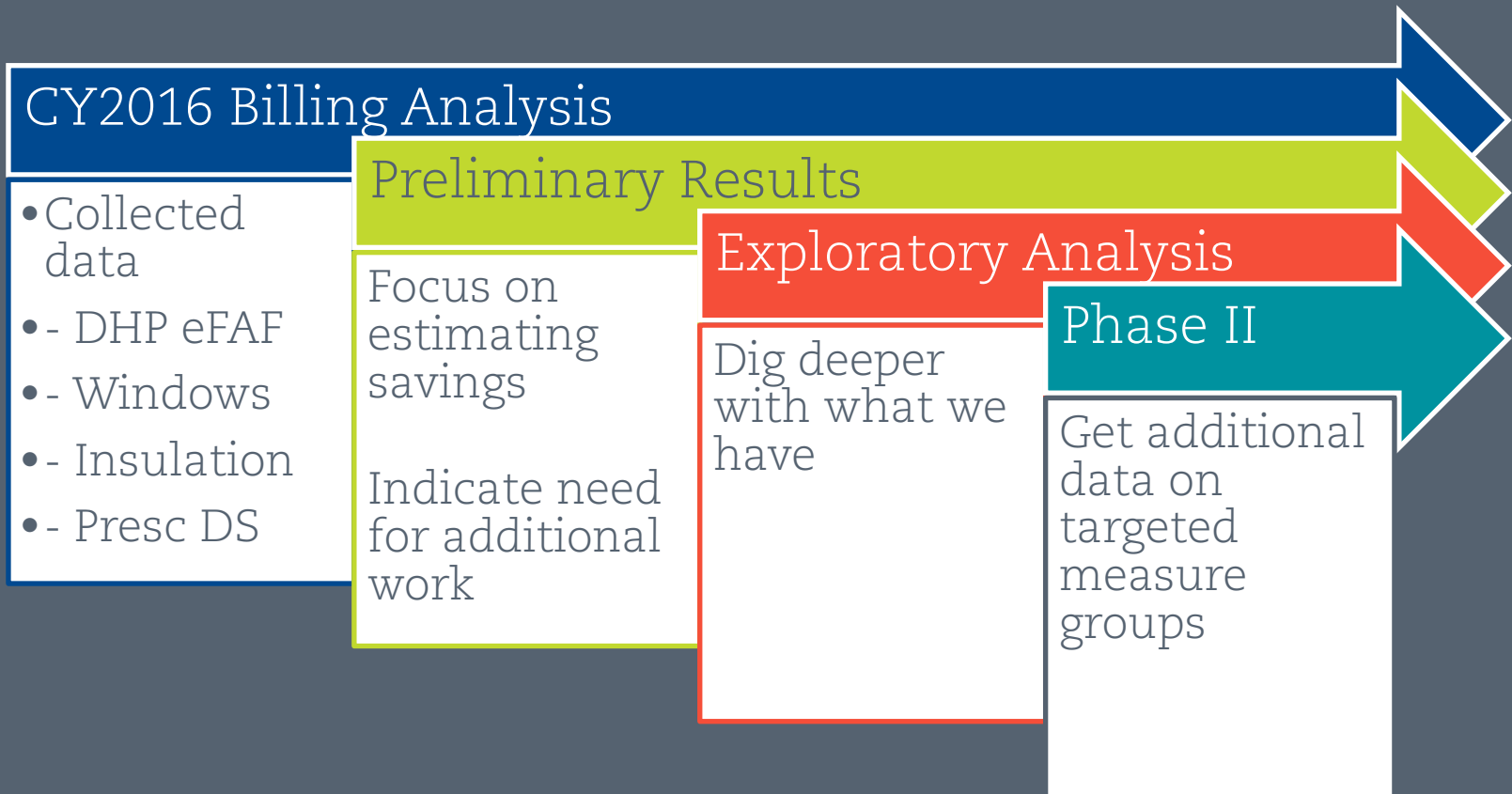
Sample Notification & Brownbag (Early April)

*Other input on evaluation processes or communications?*



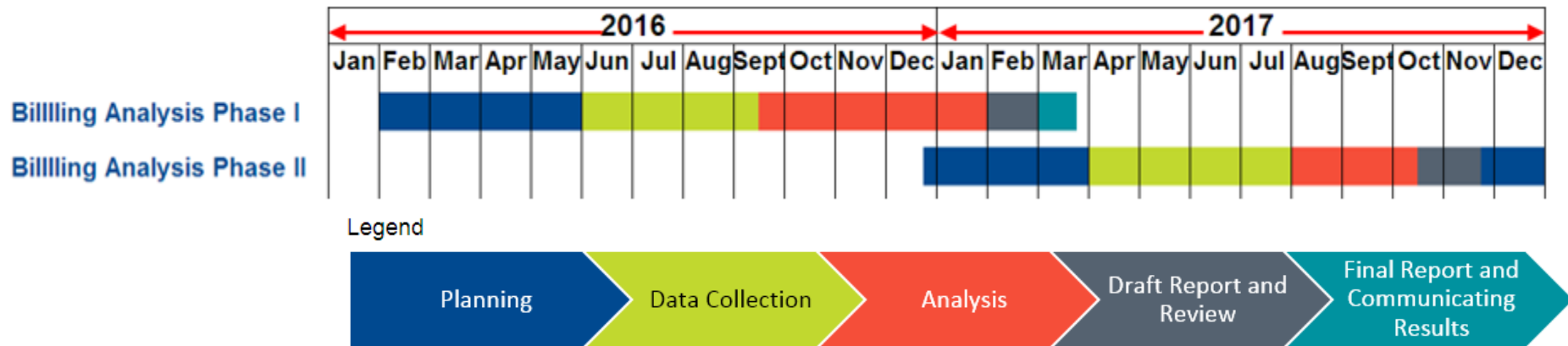
# Measure Approach Details

# CY2016 Billing Analysis



- In 2016, notified utilities that we may collect deeper data if savings are low
- Delayed due to lags in data collection

# Phase II Context



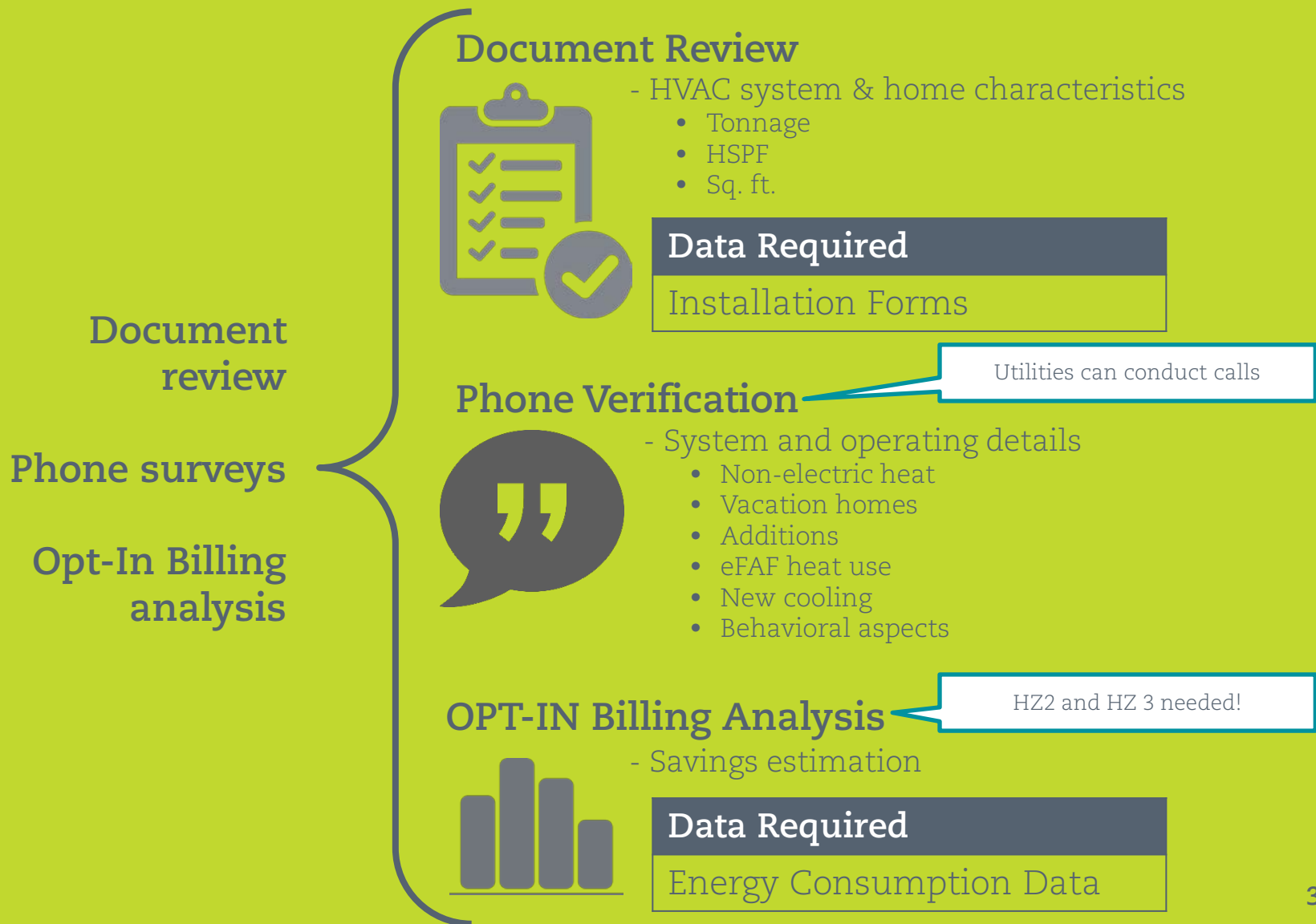
To minimize utility burden, integrating Phase II data collection with 2017 data request

# Phase II Evaluation Activities

Measure Group	Exploratory Analysis	Document Review	Phone Surveys	OPT-IN Billing Analysis
DHP eFAF	✓	✓	✓	✓
Windows	✓			
Insulation	✓			
Prescriptive DS	✓			✓

The FY2016 billing analysis of windows, insulation and performance duct sealing will be finalized in CY2017

# DHP replacing eFAF



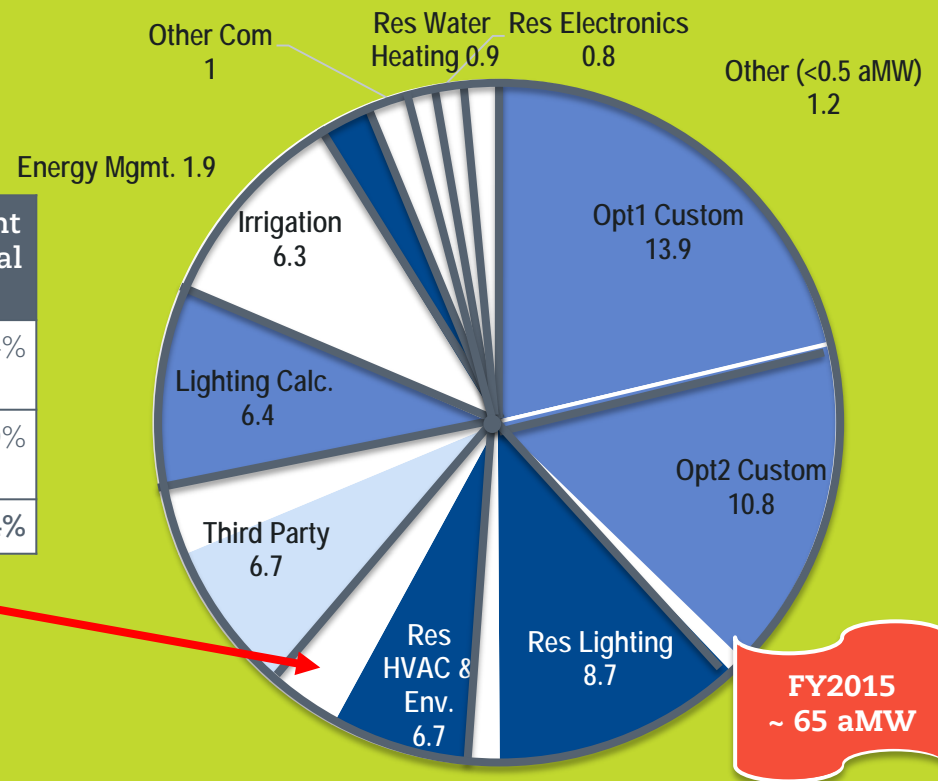


# Residential DHP - Zonal

Residence Type	Measure Status	Savings (aMW)	Percent of Savings	Percent of Res Sector	Percent of Total UES
Single Family	Proven	1.67	98%	15%	4%
Manufactured Home	BPA Qualified	0.03	2%	0%	0%
<b>Total</b>		<b>1.70</b>		<b>15%</b>	<b>4%</b>

**FY2015**

**# of Projects = 4,587**  
**# of Utilities = 92**



# Residential DHP - Zonal

## Document Review

- o Majority of measure group is Proven



### Data Required

Invoice

DHP Installation  
Form

## Verifies

- Purchased quantity
- Measure specifications

## Remaining Uncertainty

- Underlying assumptions

## OPT-IN Billing Analysis

- o Leverage existing methodology & models



### Data Required

Energy Consumption Data

## Provides

- Savings estimates

## Remaining Uncertainty

- Why estimated savings may vary from deemed savings

# Regional Data Collection

## NEEA is seeking cost data on installed DHPs

- NEEA and BPA coordination to minimize data requests
  - NEEA will request DHP rebate data from direct funders
  - BPA will summarize & anonymize the DHP zonal information for indirect funders in the evaluation sample

Please let us know if you have concerns, or let NEEA know if you would like to work directly with them to provide all data on your projects.

# Residential Zonal DHP

## Detailed Requirements for Delivery Verification

Specification	Component	Requirement	Proposed Data Source	Details
Measure Identifiers	Heating Zone	Check for heating zone	Installation Form	Site zip code on Installation Form can be used to look up HZ and CZ
	Cooling Zone	Check cooling zone		
Savings Baseline	Pre-Conditions	Check pre-conditions were electric resistance zonal system	Installation form	Existing Heating System Information section on Installation Form
	Pre-Conditions	Check that house does not have a heat pump, ductless heat pump, or a whole house forced air heating system	Installation form	Existing Heating System Information section on Installation Form
Implementation and Product Standards	HSPF Rating	Check inverter drive DHP with nominal 0.75 tons or more and HSPF rating of 9.0 or higher is installed	Installation form	Manufacturer and model information from Installation Form
	Installation Location	Check DHP is installed in main living area	Installation form*	Installation location

\* This requirement was present in the older DHP form, and is now absent on the new form. Phone surveys/customer contact will be required to verify installation location in the future.

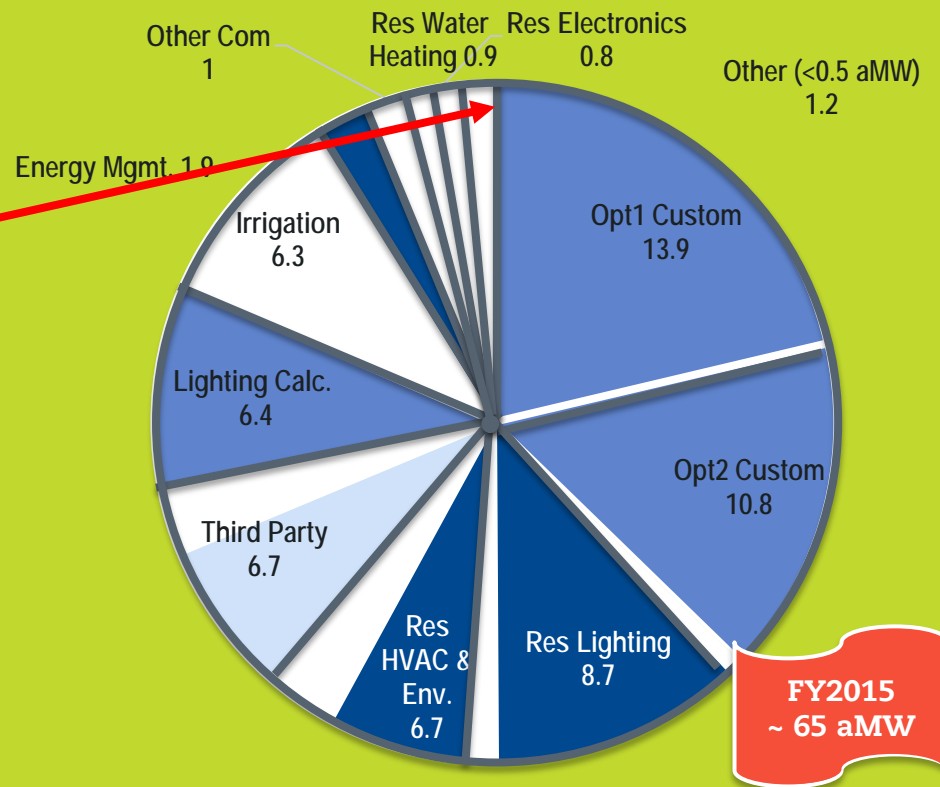
# Residential Power Strips

Measure Status	Savings (aMW)	Percent of Savings	Percent of Res Sector	Percent of Total UES
Planning	0.82	100%	7%	2%
<b>Total</b>	<b>0.82</b>		<b>7%</b>	<b>2%</b>

**FY2015**

**# of Projects = 96**

**# of Utilities = 31**



# Residential Power Strips

## Document Review

- Provide insight into growing measure



### Data Required

Invoice

Measure  
Distribution Log

### Verifies

- Purchased quantity
- Measure specifications

### Remaining Uncertainty

- Underlying assumptions

*Preliminary feedback suggests customer contact data not available for persistence research  
Planning measure → Delivery Verification won't satisfy impact evaluation  
Metering study planned in the region, BPA Tween process is involved*

# Residential Power Strips

## Detailed Requirements for Delivery Verification

Specification	Component	Requirement	Proposed Data Source	Details
Measure Identifiers	None	IR-sensing ("Tier II") installed in home entertainment setting.	Invoice	Make and Model
Savings Baseline	Pre-Conditions	N/A		
Implementation and Product Standards	IR-sensing APS, home-entertainment:	- APS unit must control television.	None	
		- Verification should take place approximately 6 to 9 months after the customer receives the APS.	None	

### Special considerations:

Largest reported projects are often captured in a single invoice for a large quantity of program units.

ReportableKWh	Sector	MeasureNm	Quantit
857,067	Residential	Power Strips Infrared Signal Sensing By-Request	2621
2,945,616	Residential	Power Strips Infrared Signal Sensing By-Request	9008

# Residential Showerheads

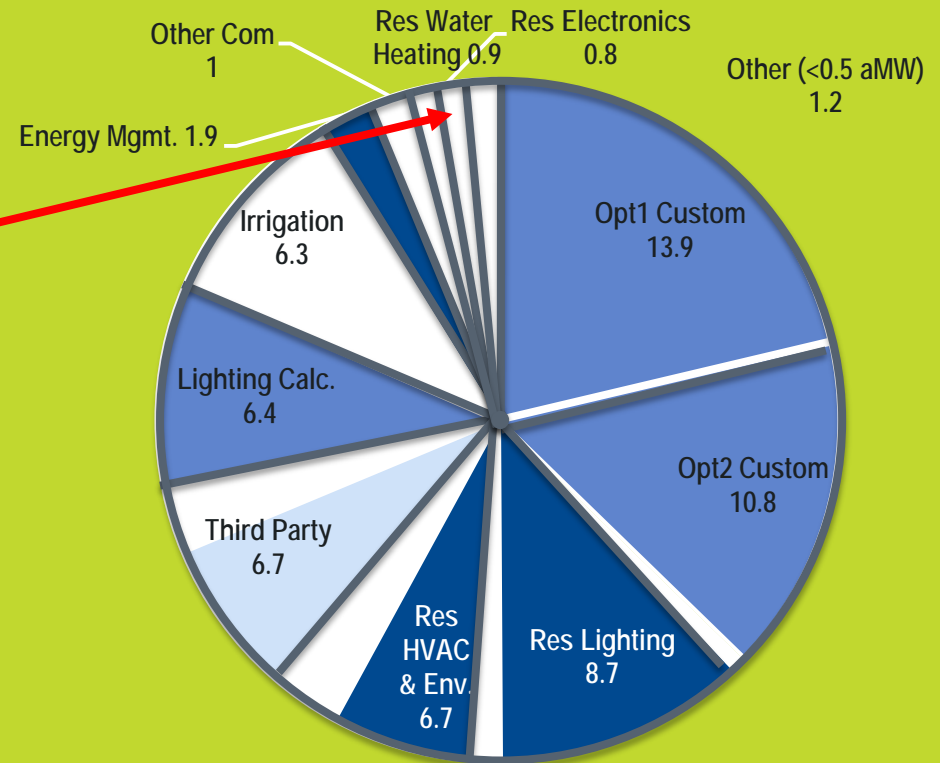
Measure Status	Savings (aMW)	Percent of Savings	Percent of Res Sector	Percent of Total UES
Planning	0.77	100%	7%	2%
<b>Total</b>	<b>0.77</b>		<b>7%</b>	<b>2%</b>

\* Measure status for changed to "Planning" on the RTF website as of Aug 16, 2016

## FY2015

**# of Projects = 698**

**# of Utilities = 31**





# Residential Showerheads

## Document Review

- Provide insight into growing measure



### Data Required

Invoice

Measure  
Distribution Log

### Verifies

- Purchased quantity
- Measure specifications

### Remaining Uncertainty

- Underlying assumptions

*Preliminary feedback suggests customer contact data not available for persistence research  
Planning measure → Delivery Verification won't satisfy impact evaluation  
BPA Tween process tracking research opportunities*

# Residential Showerheads

## Detailed Requirements for Delivery Verification

Specification	Component	Requirement	Proposed Data Source	Details
Measure Identifiers	Delivery: {Retail, Mail-by-Request, Direct Install}	Check Delivery Mechanism	Measure Distribution Log	Entry in correct tab of Measure Distribution Log*
	Water Heating System Type: {Electric, Gas, Any}	Check the water heating system type	Measure Distribution Log*	Water Heater Fuel
	Rated Flow Rate: {2.0 gpm, 1.75 gpm, 1.5 gpm}	Check the flow rate	Invoice	Make and Model
Savings Baseline	Retail (Current Practice)	N/A		
	Mail-by-Request, Direct Install (Pre-Conditions)	N/A		
Implementation and Product Standards	N/A	N/A		

\* Measure Distribution Log has two separate tabs for “by-Request” and “Direct Install” measures.

### Special considerations:

Largest reported projects are often captured in a single invoice for a large quantity of program units.

Report	Sector	MeasureNm	QuantityAmt
1018800	Residential	Showerheads Any Showerhead 1.5 or less Gallons	3600
764100	Residential	Showerheads Any Showerhead 1.5 or less Gallons	2700

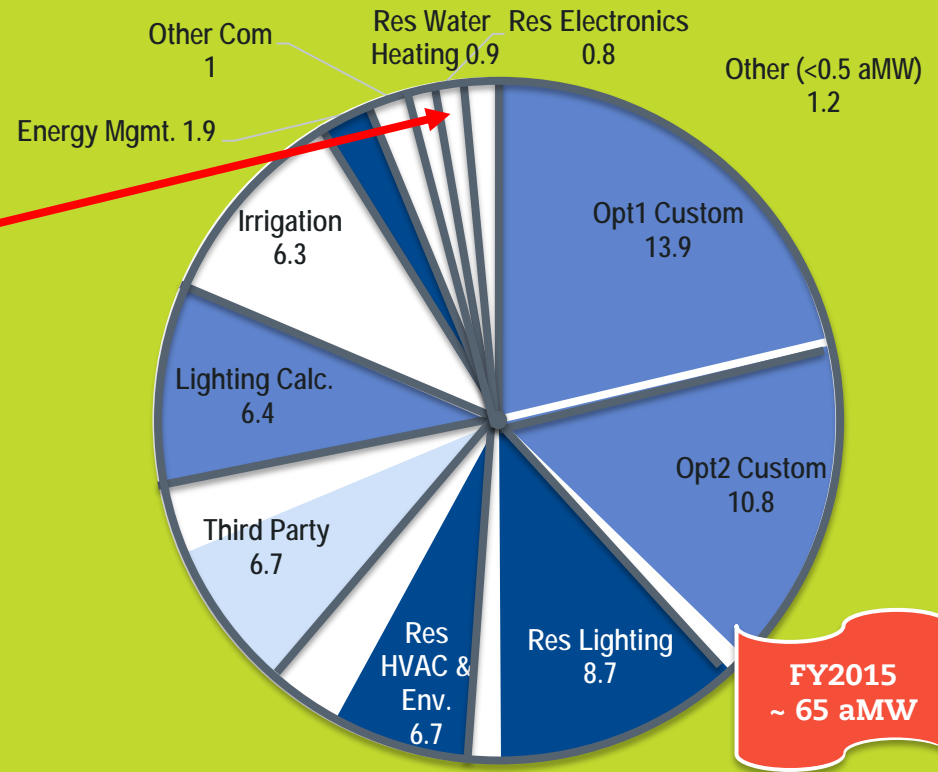
# Residential HPWH

Measure Status	Savings (aMW)	Percent of Savings	Percent of Res Sector	Percent of Total UES
Provisional	0.19	100%	2%	0%
<b>Total</b>	<b>0.19</b>		<b>2%</b>	<b>0%</b>

\* Measure status for changed to "Planning" on the RTF website as of Aug 16, 2016

## FY2015

# of Projects = 841  
 # of Utilities = 33



# Residential HPWH

## Document Review

- Provide insight into growing measure
- Look at feasibility of doc review only for future eval



### Data Required

Invoice

HPWH Installation  
Form

### Verifies

- Purchased quantity
- Measure specifications

### Remaining Uncertainty

- Underlying assumptions

*Planning measure → Delivery Verification won't satisfy impact evaluation  
NEEA/BPA satisfying RTF research needs*

# Residential HPWH

Specification	Component	Requirement	Proposed Data Source	Details
<b>Measure Identifiers</b>	Efficiency Tier	Check Efficiency Tier	Installation Form	Make and Model
	Install Location	Check installation location	Installation Form	Installation Location
	HVAC Type	If unit is installed in conditioned interior space, check heating system type	Installation Form	Heating System Type
	Exhaust ducting	Check whether exhaust air is ducted to the outside.	Installation Form	Installation Information
	Heating Zone	Check the heating zone.	Installation Form	Can be derived from physical address
<b>Savings Baseline</b>	Current Practice	N/A		
<b>Implementation and Product Standards</b>	NEEA Advanced Water Heater Specification	<ul style="list-style-type: none"> <li>- Check that unit is listed on the Northern Climate Specification QPL for the claimed efficiency tier or the unit meets all efficiency requirements of the Northern Climate specification for the claimed tier.</li> <li>- If tier qualification is dependent on operation mode, check that operation mode is set to the one required by the claimed tier.*</li> </ul>	Installation Form*	Make and Model

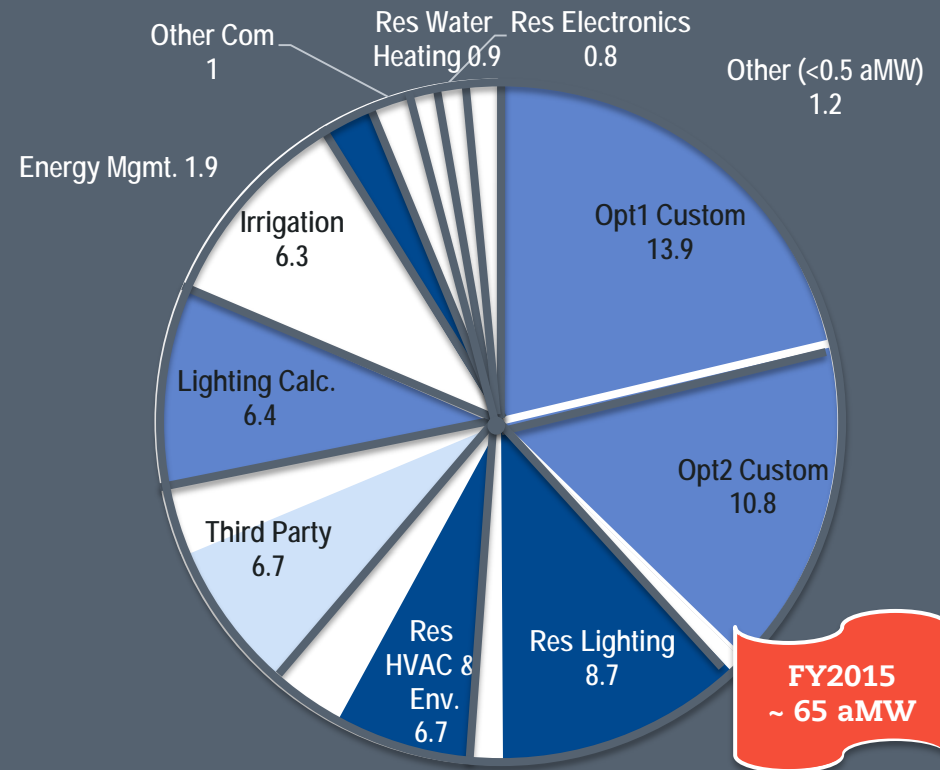


# RSAT

CY16 activities include evaluating impacts of residential lighting projects.

\* FY2015 savings

Stakeholders requested an independent assessment of RSAT allocation process and its application.

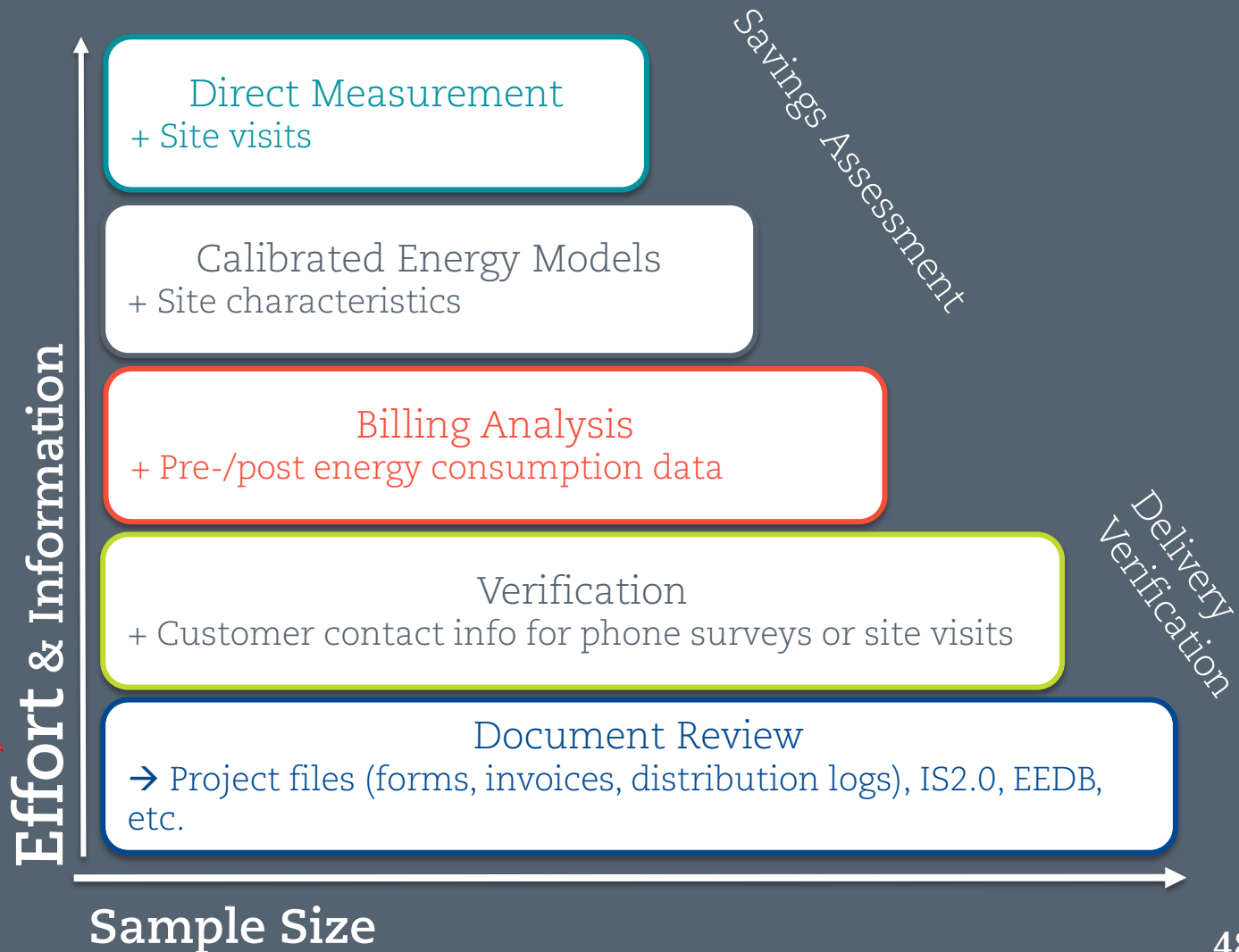


# Questions?

[lsmgage@bpa.gov](mailto:lsmgage@bpa.gov)



# What Do These Require?



We need more data for each additional layer.



# What Info Do These Provide?

