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Long-Run Savings and Cost-Effectiveness of Home Energy Reports Programs

ACEEE-SEE Action Webinar

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Study Background

Growing offering of utility home energy reports (HER) programs since 2008

Convention to assume HER measure life of one year in most jurisdictions

Assumption was appropriate because insufficient evidence about measure life

Now reconsider conventions for estimating HER measure life

- Recent impact studies show savings persist after treatment ends

Research Questions

How do HER programs perform over time?

What happens when utility customers stop receiving reports?

How does persistence affect HER savings and cost accounting?

HOW DO HER PROGRAMS PERFORM OVER TIME?

WHAT HAPPENS WHEN CUSTOMERS STOP RECEIVING REPORTS?

HOW DOES PERSISTENCE AFFECT HER SAVINGS AND COST ACCOUNTING?

HER Programs

Inform residential customers about energy use

- Historical analysis
- Normative comparisons
- Savings tips

Electronic or paper reports delivered periodically

Two kinds of HER savings considered in this study

- In-treatment
- Post-treatment

In-Treatment Savings

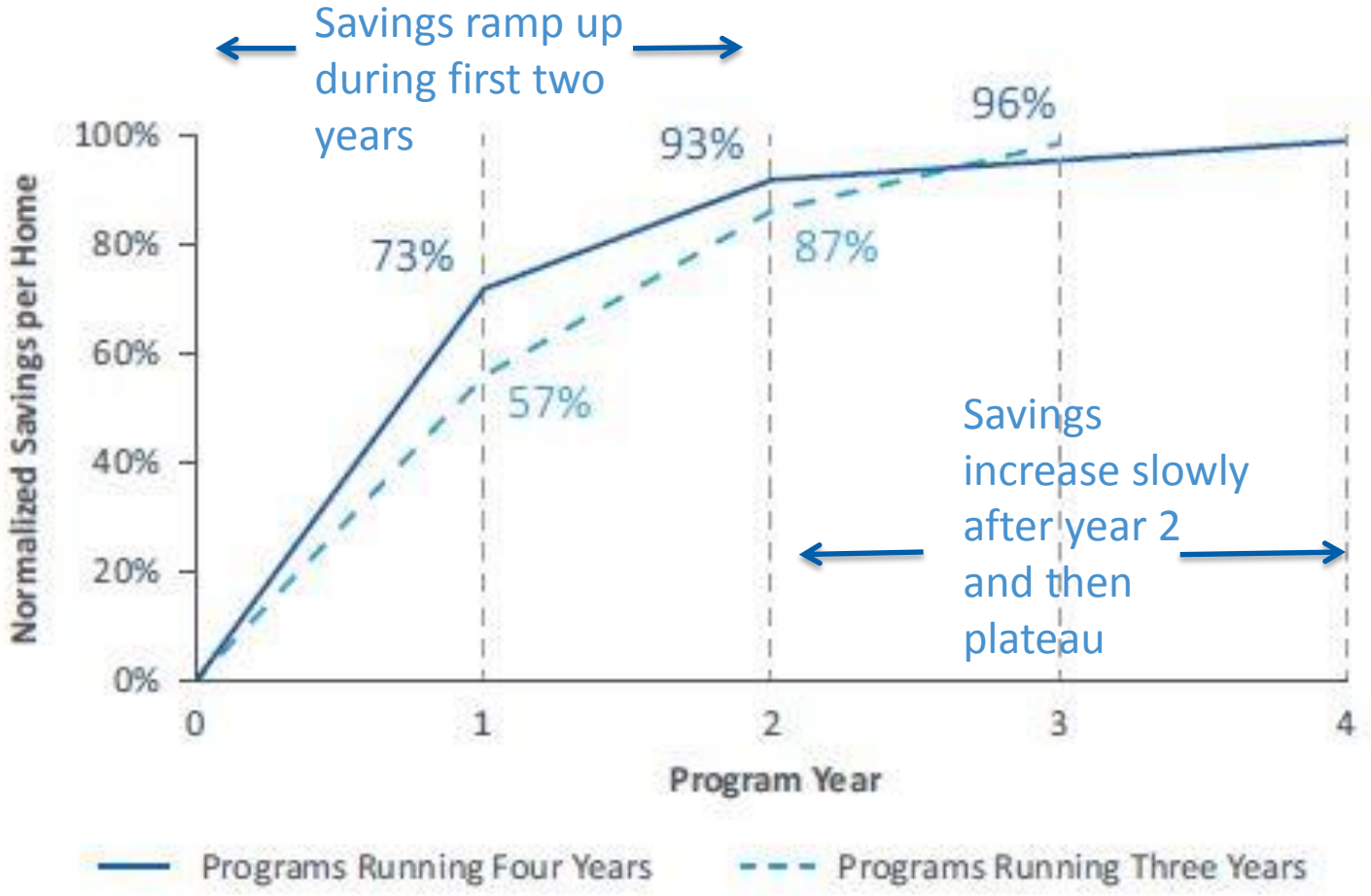
Cadmus reviewed impact studies of mature (3+ years) Opower HER programs by independent evaluators

Highly credible savings estimates based on randomized control trials

Most mature programs achieved electricity savings of 1.5%-3%

- Savings vary seasonally
- High users save more energy
- Increased participation in utility energy efficiency programs

Mature HER Program kWh Savings



HOW DO HER PROGRAMS PERFORM OVER TIME?

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Post-Treatment Savings

Recent studies of HER savings after treatment ends

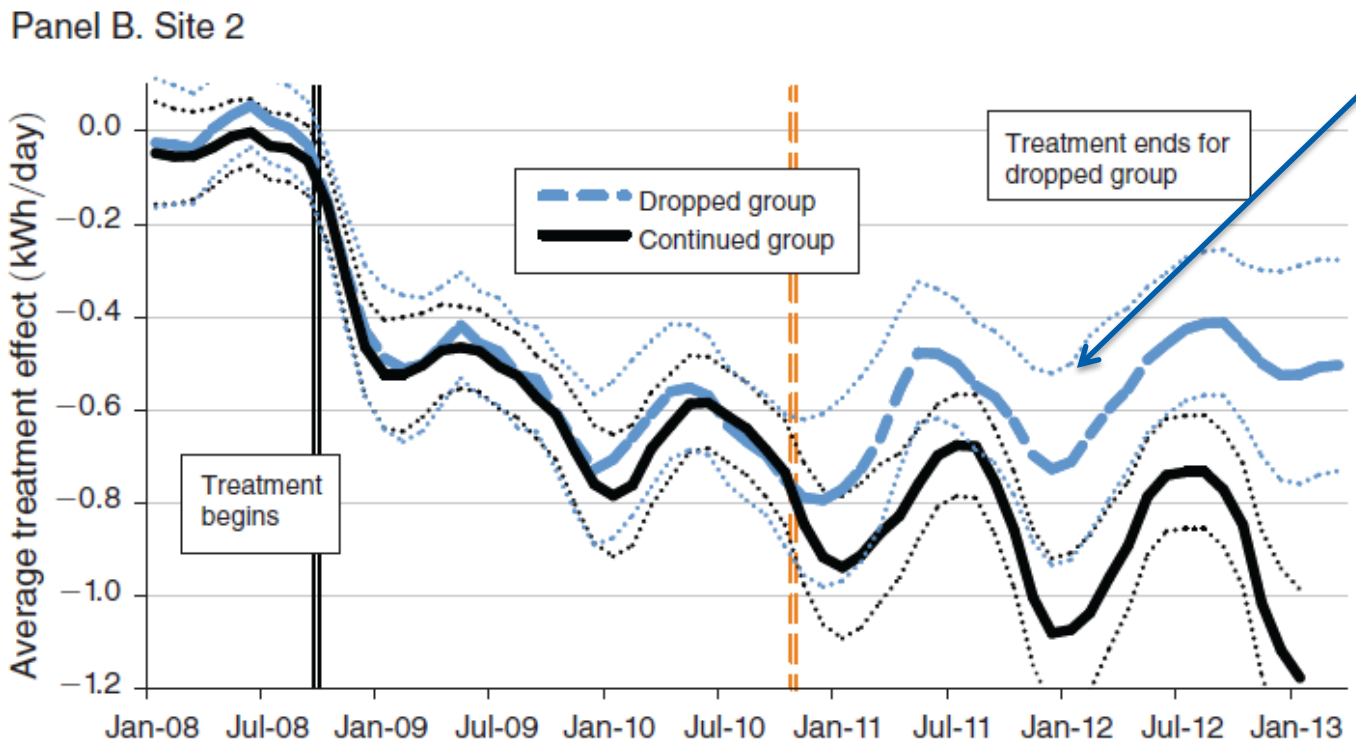
RCTs compare discontinued treatment and control group to estimate persistence

Recipients stopped receiving reports after 2 years of treatment in most studies

Savings persistence estimated for 1-3 years after end of treatment

Post-Treatment Savings Decay

Gradual savings decay after treatment ends



Source: Allcott & Rogers, 2014. American Economic Review, p. 3018.

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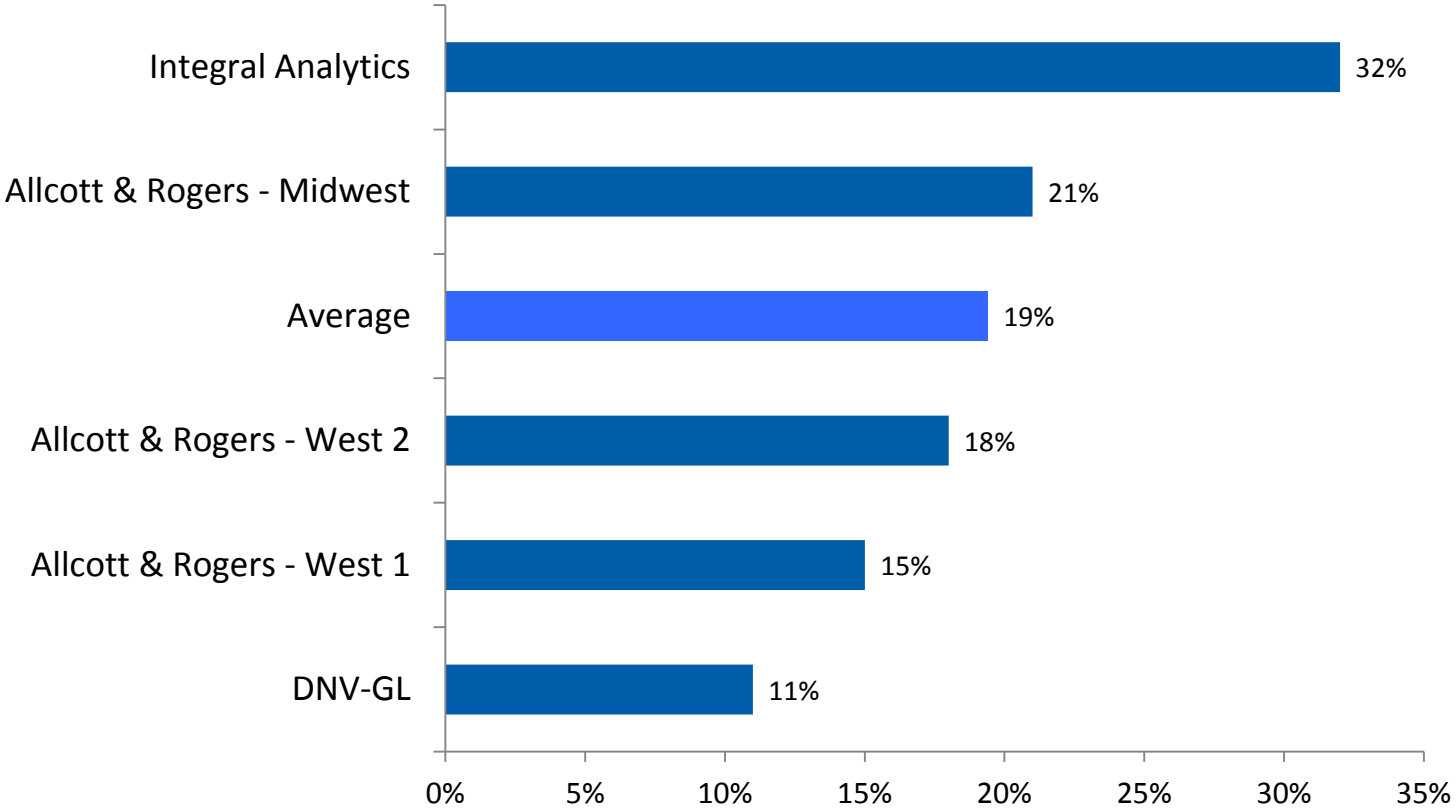
Estimated Average Annual Savings Decay Rates



Note: All studies discontinued treatment after approximately two years. Savings decay rates based on authors' calculations. See Cadmus white paper for references.

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HOW DO HER PROGRAMS PERFORM OVER TIME?

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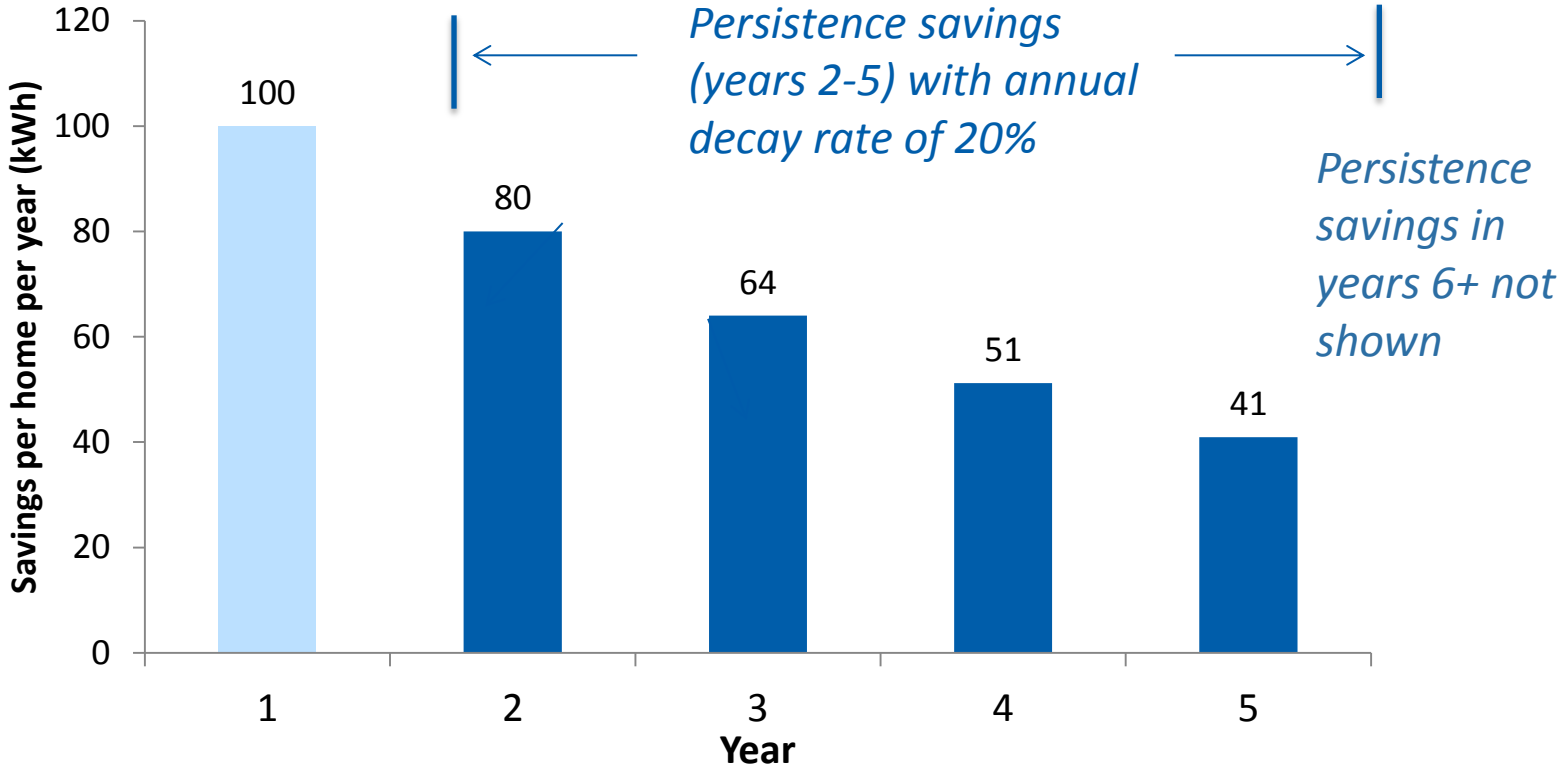
HER Lifetime Savings



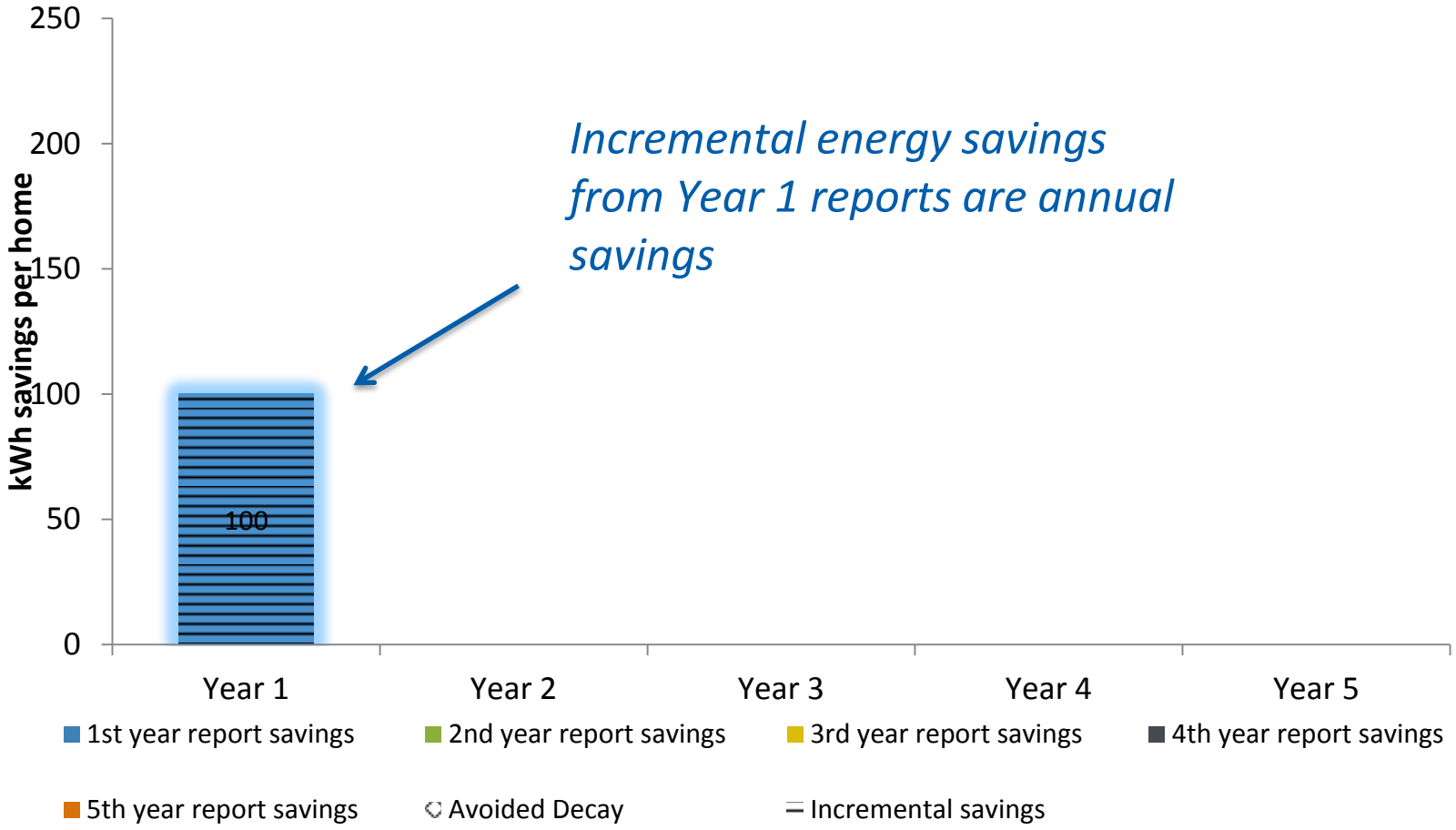
Sum of in-treatment savings and post-treatment savings for Years 1-5 = 336 kWh. Lifetime savings = 500 kWh.

Annual Savings Accounting with Persistence

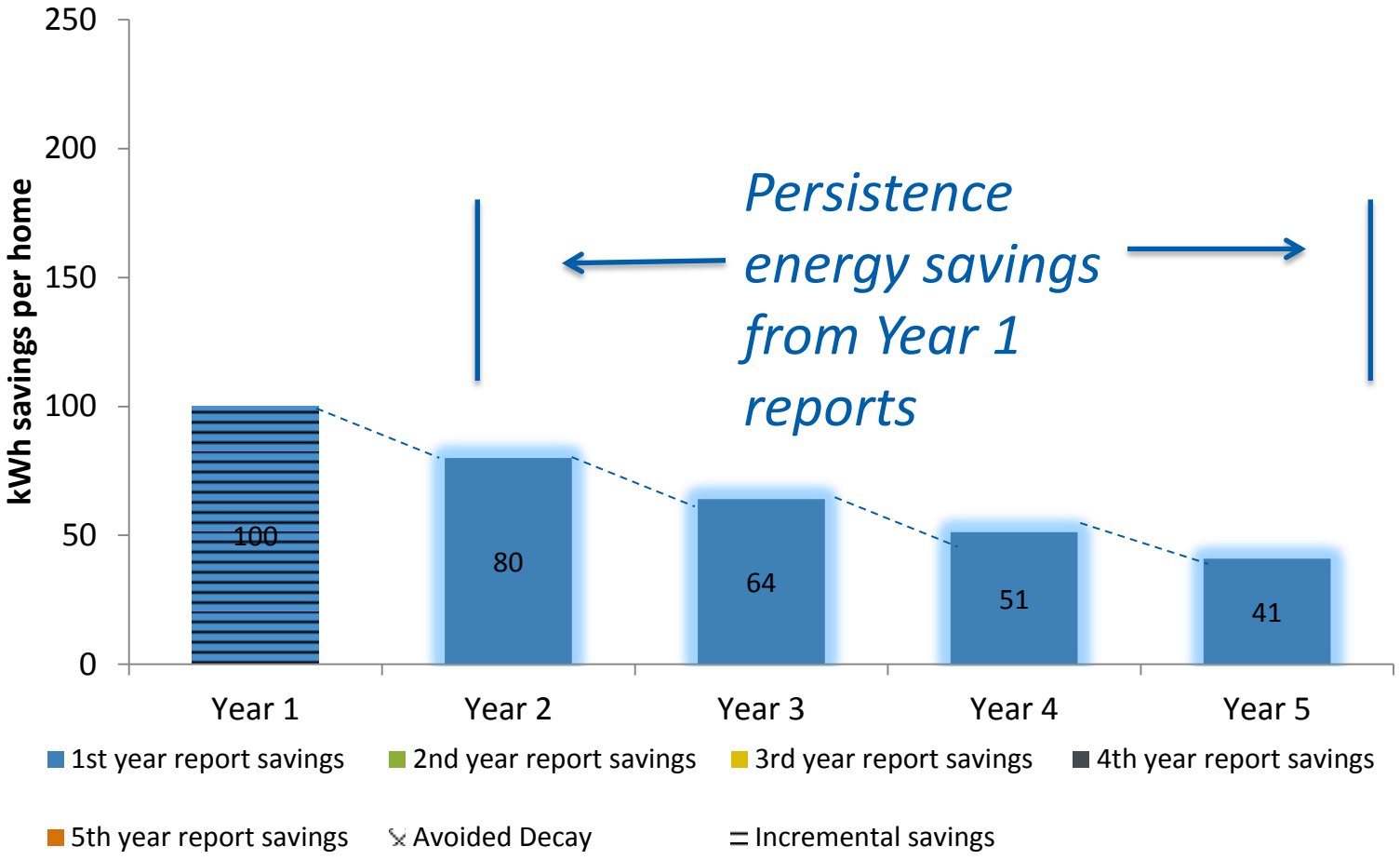
Persistence of savings after treatment ends changes estimation of annual savings

Additional treatments have two effects	• Avoided decay savings • Incremental savings
Avoided decay savings	• Savings that would have been lost if additional reports had not been sent
Incremental savings	• Difference between current and previous period savings

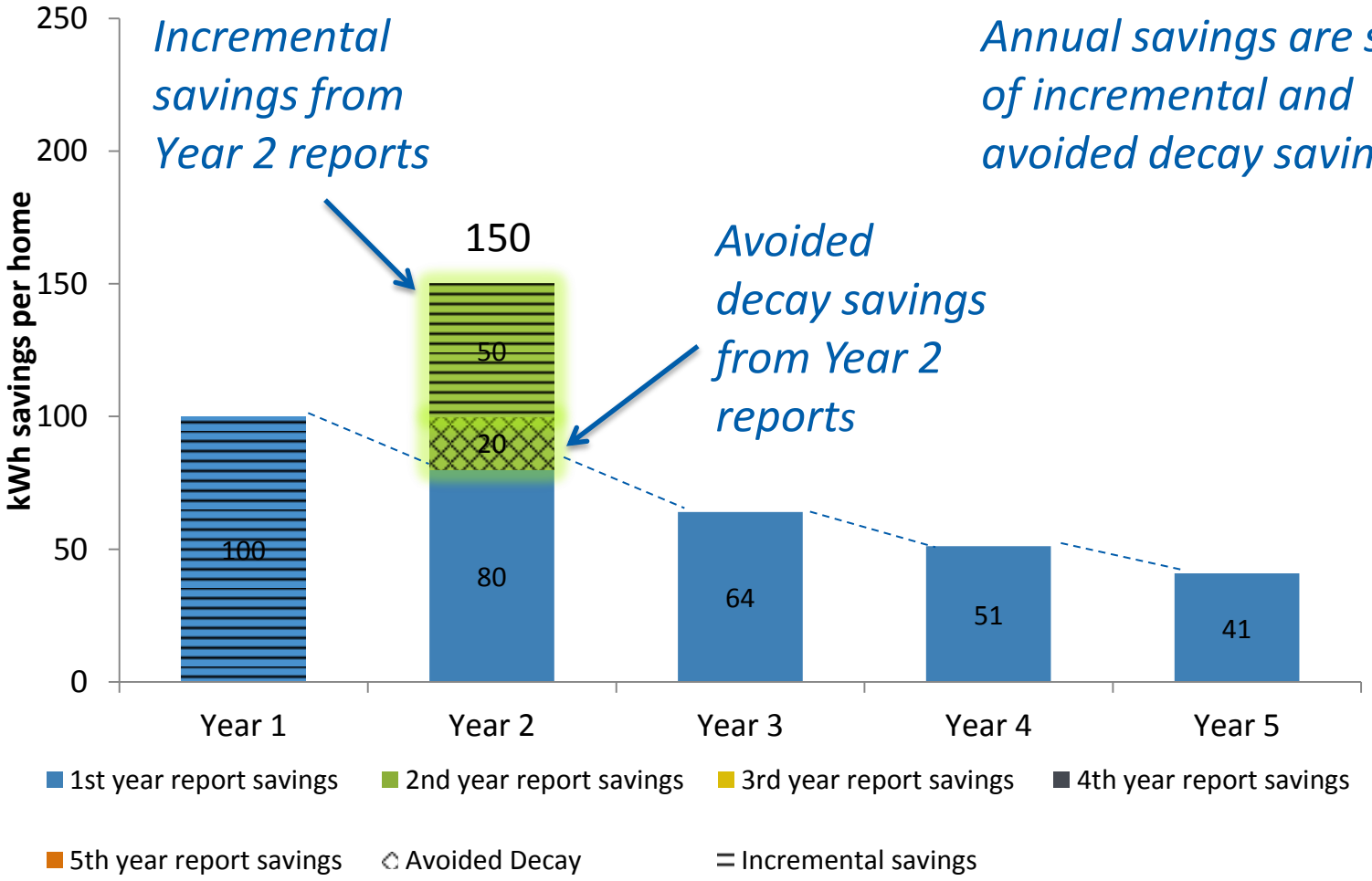
Annual Savings from Year 1 Reports



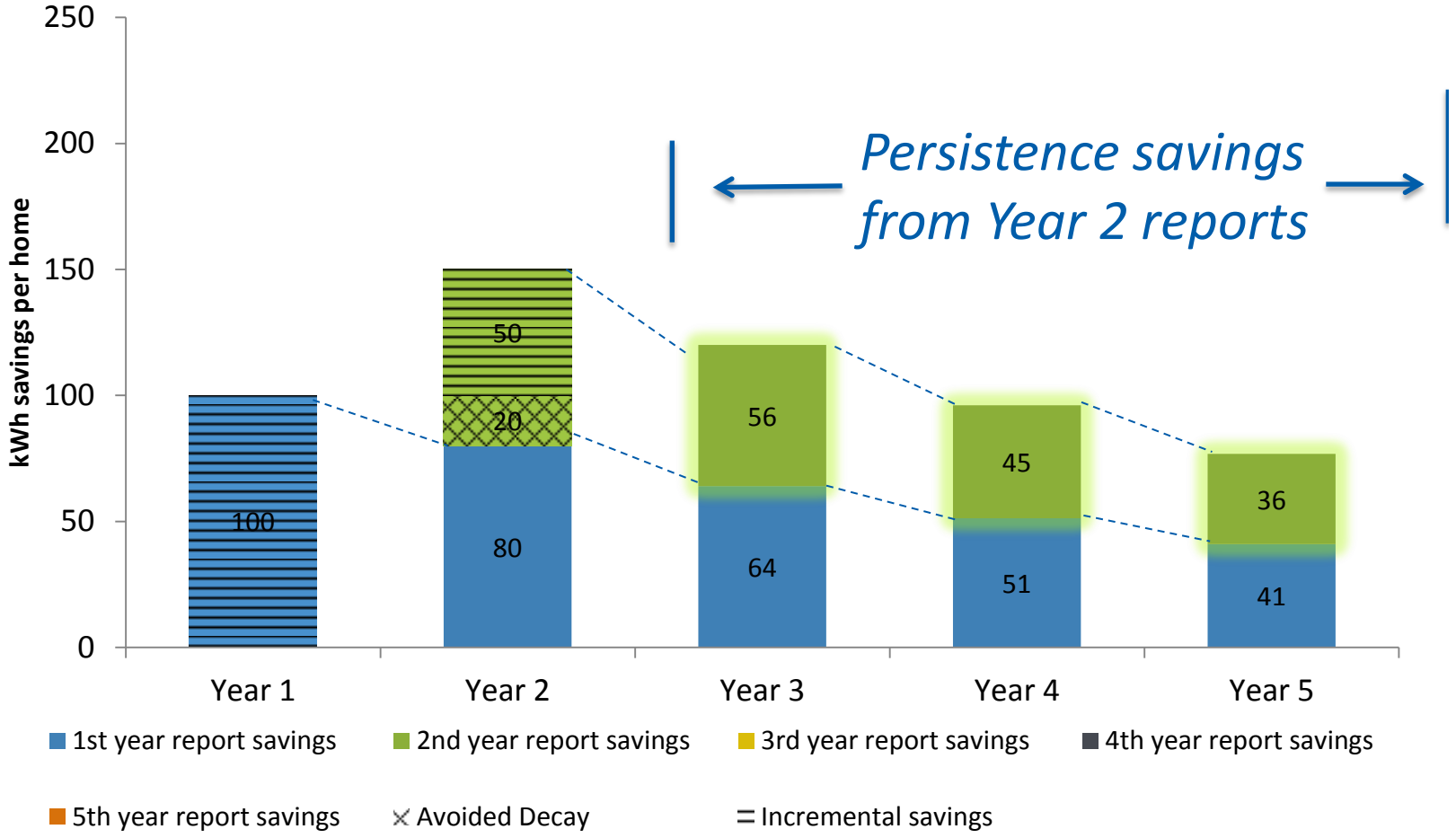
Persistence Savings from Year 1 Reports



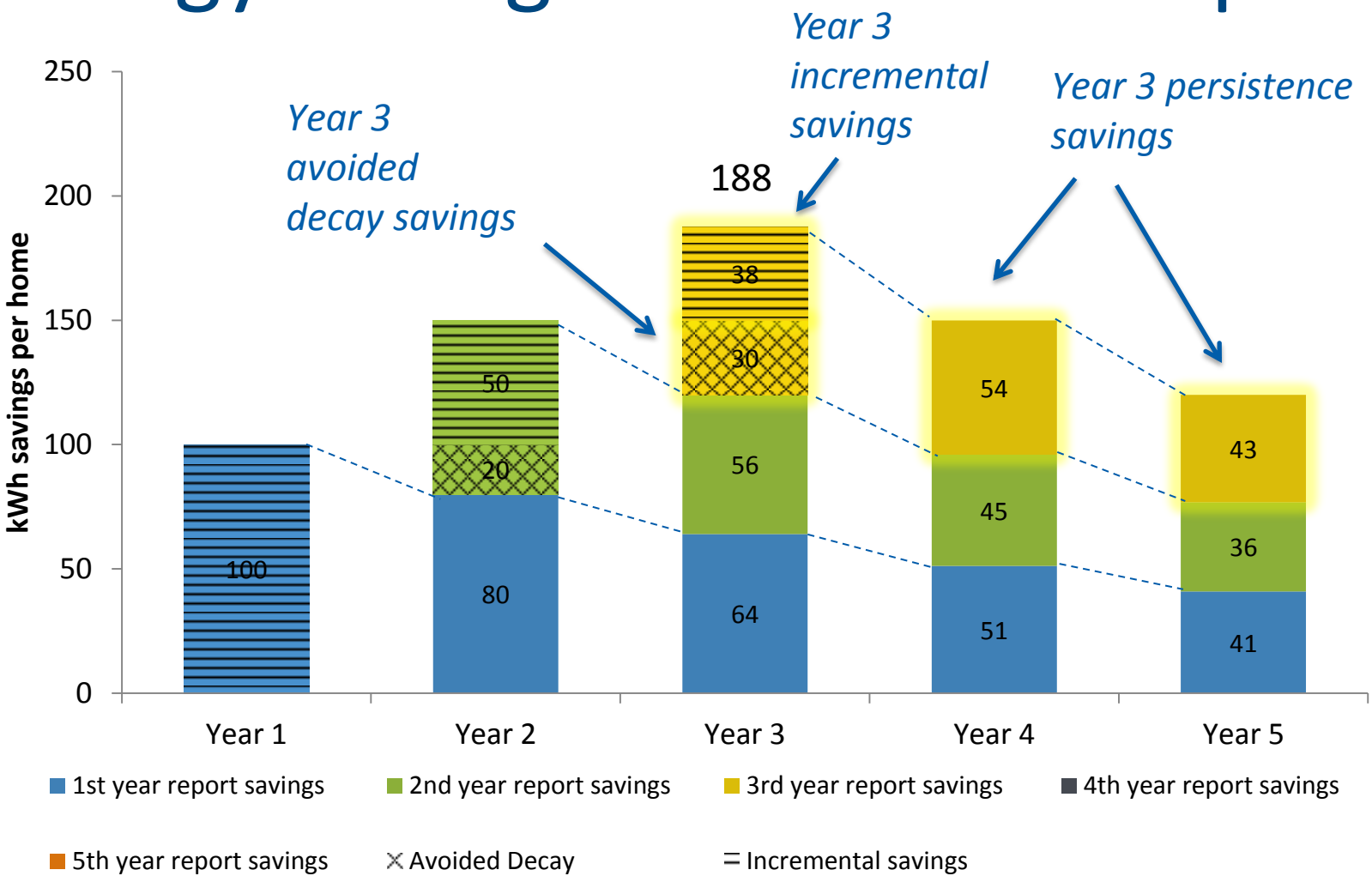
Annual Savings from Year 2 Reports



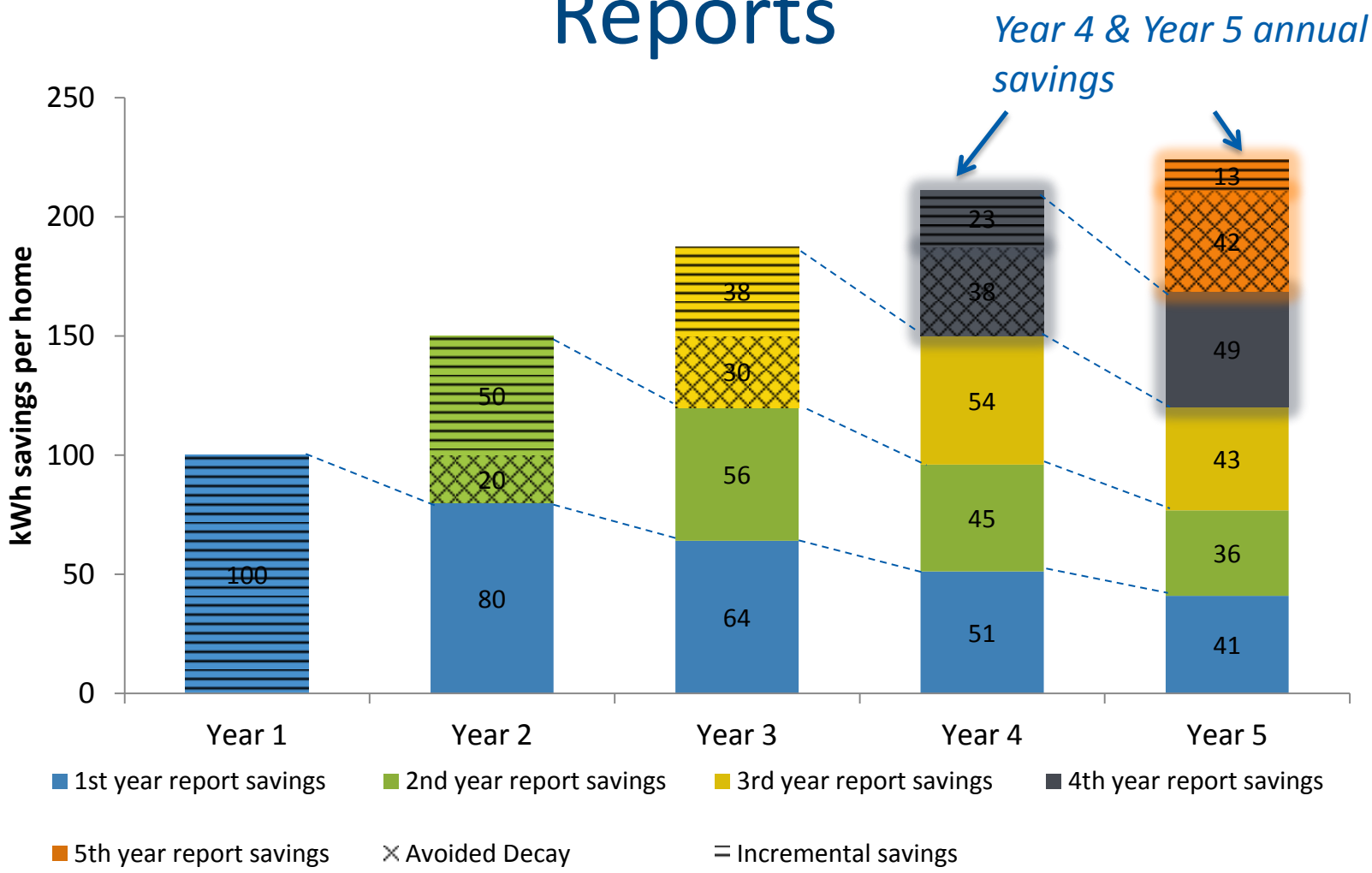
Persistence Savings from Year 2 Reports



Energy Savings from Year 3 Reports



Energy Savings from Year 4 and Year 5 Reports



EERS Goals and HER Annual Savings

Many utilities are subject to energy efficiency resource standards (EERS)

- Most states only count first-year (annual) savings

HER annual savings are sum of incremental and avoided decay savings

Only HER incremental and avoided decay savings should count towards EERS goals

- Persistence savings from treatments in previous years should not be counted

Annual Savings and EERS Goals

Approach Currently Used in Most Jurisdictions					
	Year 1	Year 2	Year 3	Year 4	Year 5
Incremental savings	100	50	38	23	13
Avoided decay	0	20	30	38	42
Persistence savings from spending in previous years	0	80	120	150	169
Total	**100**	**150**	**188**	**211**	**224**
Alternative Approach for Accounting Toward EERS Savings Goals					
Multiyear measure life (incremental + avoided decay)	100	70	68	61	55

* The annual incremental, avoided decay, and persistence HER savings are from Figure 4.

Multiyear measure life results in lower annual savings after Year 1

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HER Measure Life

Measure life represents the time that an EE measure is expected to remain useful

- Lifetime Savings = Measure Life *x* Annual Savings

HER measure life =

Lifetime Savings / Annual Savings

Estimation of lifetime and annual savings requires estimate of savings decay rate

- Measure life should account for participant attrition

HER Measure Life Calculation with Participant Attrition

Assumptions

- 1st year savings = 10,000 MWh
- Annual savings decay rate = 20%
- Annual participant attrition rate=7%

Lifetime savings from 1st year HERs = 39,062 MWh

HER Measure Life = 39,062 MWh/10,000 MWh

≈ 3.9 years

Measurement of HER Post-Treatment Savings

Utilities may measure HER post-treatment savings to claim lifetime or annual savings or estimate measure life or cost-effectiveness

Utilities should conduct impact studies to claim post-treatment savings when feasible

- Compare treatment and control group energy use after treatment ends

Cadmus recommends assumption of 20% savings decay rate

- Utilities should conduct RCTs to true up savings decay rate

Consult DOE UMP on BB program evaluation (forthcoming) for information about estimating HER savings persistence and decay

Summary of Findings Regarding Post-Treatment Savings

HERs continue to generate savings after treatment ends

Average annual rate of savings decay of approximately 20%

Persistence of HER savings after treatment changes savings and cost accounting

Accounting for post-treatment savings increases HER lifetime savings and measure life and results in more accurate estimates of cost-effectiveness

Recommendations

Utilities should account for post-treatment savings in estimating HER annual savings, measure life, and program cost-effectiveness

Utilities should only count annual savings towards EERS savings goals (sum of incremental and avoided decay savings)

When savings decay rates cannot be estimated, utilities should apply an annual savings decay rate of 20%

Utilities should conduct more research about post-treatment savings

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References

- Allcott H. and T. Rogers, 2014. American Economic Review 104 (10), 3003-37.
- Khawaja, M.S. and J.I. Stewart, 2014. Long Run Savings and Cost-Effectiveness of Home Energy Reports Programs. Cadmus White Paper, 2014. Available at http://www.cadmusgroup.com/papers-reports/long-run-savings-cost-effectiveness-home-energy-report-programs/