

Attribution Of Energy Savings

Demonstrating Program Effects

Carol White

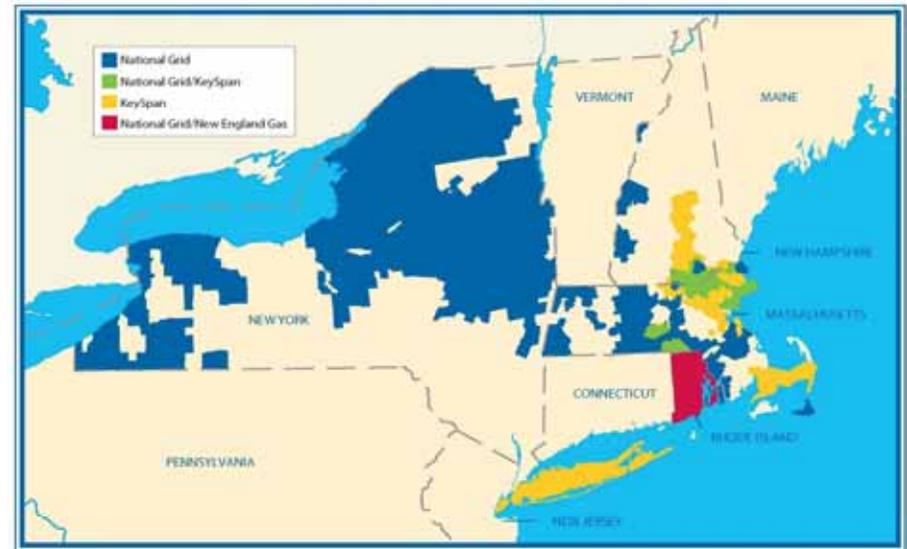
**Director, Energy Efficiency Evaluation
& Regulatory Affairs**

January 30, 2008

nationalgrid

Introduction To National Grid

- ◆ One of the world's largest investor owned utilities – electricity and natural gas
- ◆ Focused on energy delivery business



Approximately 4.4 million electric customers and
3.4 million gas customers*

Attribution – What Are We Really Accomplishing?



Attribution – Are We Using Customer Funds Efficiently?



Approaches Taken In New England

- ◆ **Survey based approaches – program participants, non-participants, trade allies**
- ◆ **Billing data analyses with a comparison group**
- ◆ **Sales data – single state comparison or national comparisons**

Free-ridership, Spillover, Market Effects.....

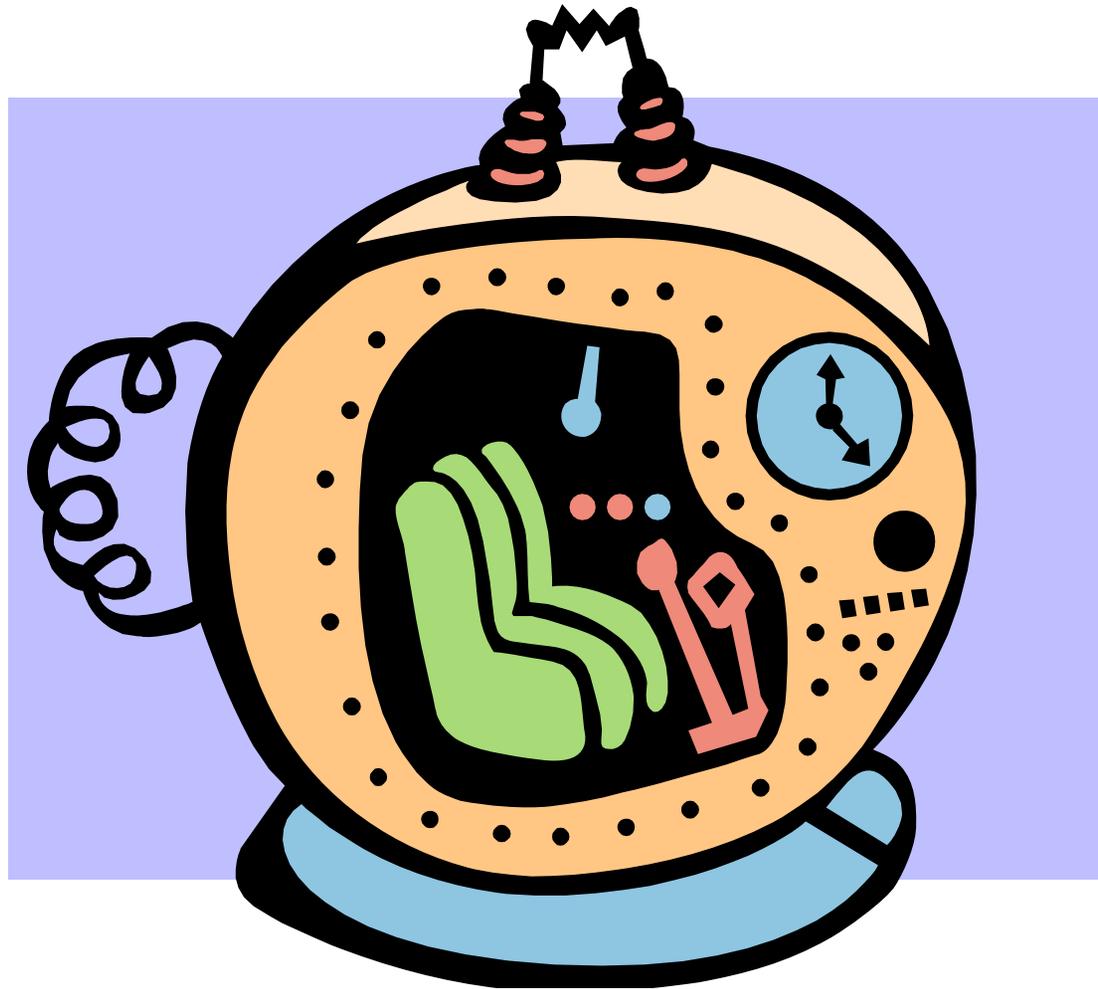
Is the zebra white with black stripes...

Or

Is the zebra black with white stripes???



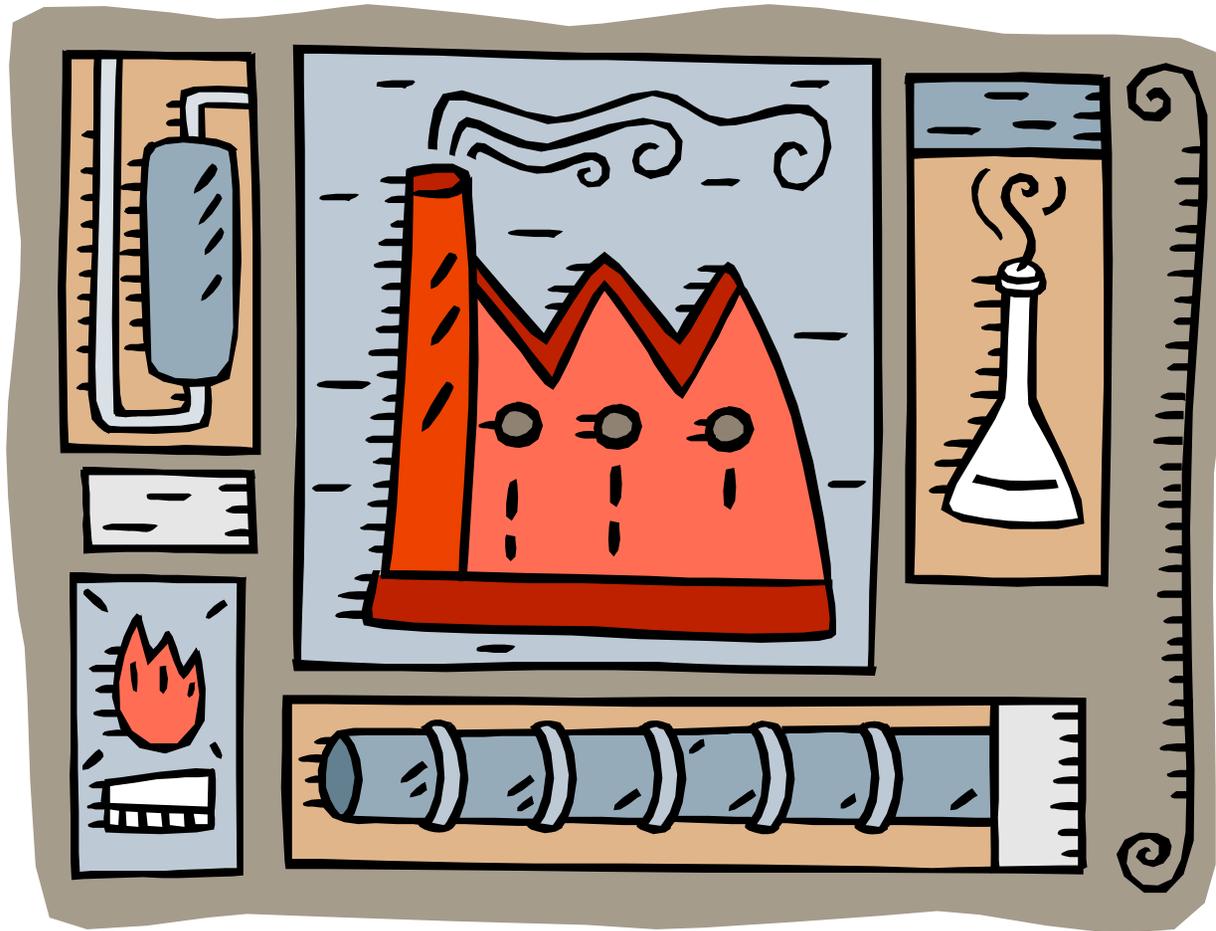
Free-ridership And Spillover – The Time Dimension



Are Our Savings Estimates Too High, Too Low, Or Just Right?



Can We Do Better? How?





Electric / Gas / Water



Panel Discussion on Attribution of Energy Savings in a Multi- Intervener Context

AESP
Clearwater, FL

January 29-31, 2008

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Background

- Conducting evaluation and EE potential and adoption forecasting studies since 1987:
 - California, Spain, New England, Florida, New Mexico, Idaho, Colorado
- Currently working on several potential and goals-related studies:
 - CA IOU Potential Study Update
 - Database for Energy Efficiency Resources (DEER)
 - CPUC Goals Study



Knowledge to Shape Your Future

Introduction

- Why all this talk about “attribution”?
 - Is there a problem?
- If so:
 - Which are the big animals?
 - Can they be domesticated or should they be managed in the wild?
- What to do?
 - What would we like?
 - What do we need?

Why All this Talk About “Attribution”

- As Hamlet said: “Goals, goals, goals...”
- EE Goals are soaring to new heights:
 - CEC IEPR: “All cost-effective potential by 2020”
 - Current CPUC IOU: ~2,500 net GWh/yr
 - Minnesota: 1% of load per year
 - New York: 15% load reduction by 2015
 - New Mexico: 20% per capita reduction by 2020
 - See ACEEE scorecard for others



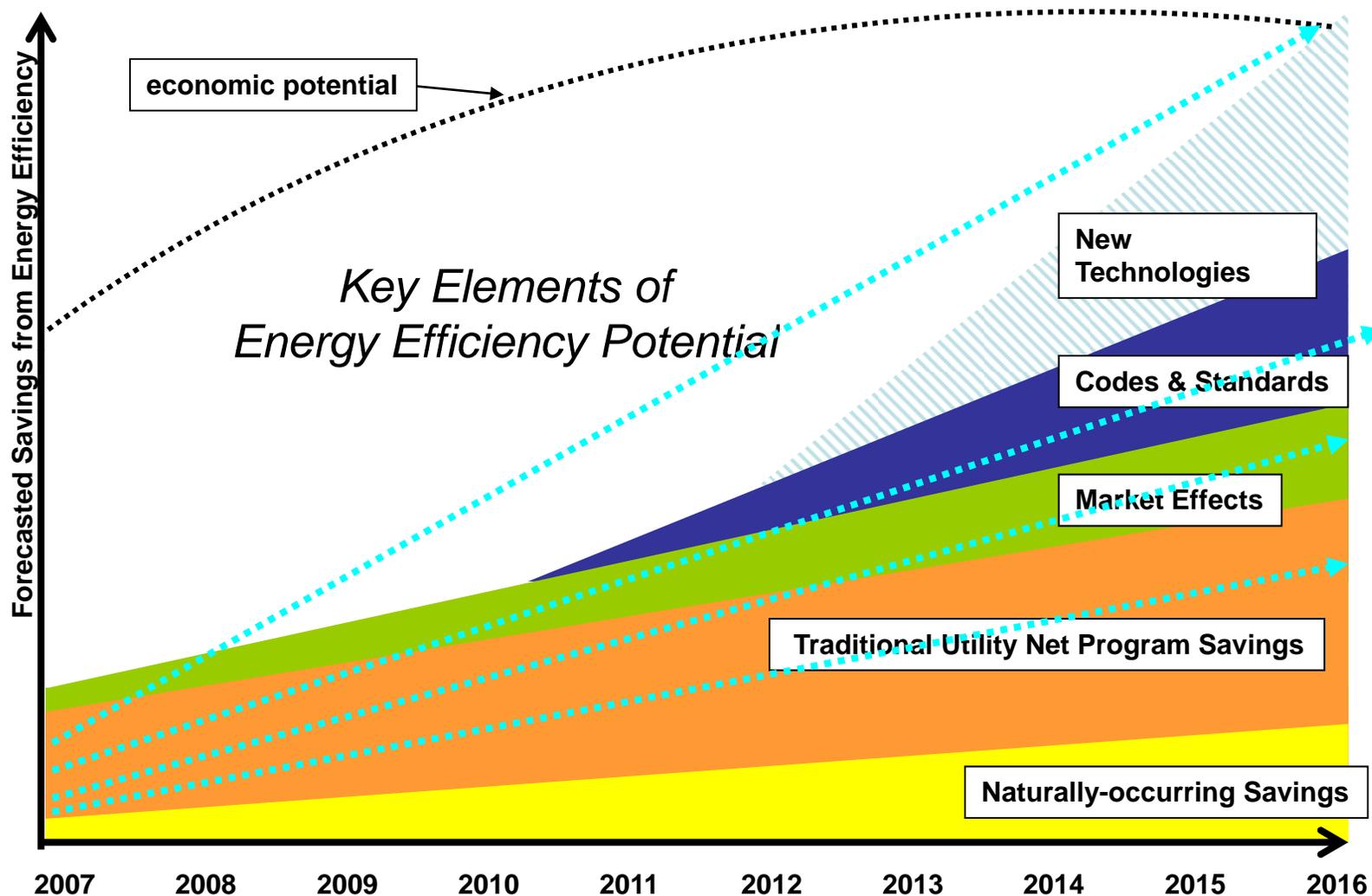
Itron

Knowledge to Shape Your Future

Attribution and Incentives in a High Goals Environment

- Stakes have risen with height of EE targets
 - Lots more money on the table
- From *tokenistic* to *foundational* element of policy
- Consequently, more eyes and import
 - Need for massive GHG reductions
 - Effects on other resource decisions
 - e.g. central and DG renewables
- Importance of goal attainment
- Consequences of non-attainment

The Many Faces of EE Potential



Knowledge to Shape Your Future

Savings Mechanisms & Requirements to Reach High Goals

- Voluntary Programs
- State Codes and Standards (C&S)
- Federal C&S
- Tax Incentives
- R&D
- Price Signals
- Etc.



Technological Changes
(price decreases, efficiency increases,
availability increases, service
improvements, etc.)

Behavioral Changes
(knowledge increases, more favorable
EE adoption criteria, broader EE ethic,
etc.)

Why Worry About Attribution

- Traditional non-participant's perspective
 - Don't give my \$ to someone else to do something they were doing anyway
- Program efficacy
 - Competition for scarce public purpose dollars
 - Lots of social problems besides energy
 - Energy field not alone in need to prove efficacy
- These concerns can't be cavalierly dismissed
 - and someone will (and should) always raise them
- But...
 - when programs are effective over the long-term, and
 - when participation is widespread, then
 - concerns can be mitigated, if not eliminated.

What is the problem?

- What is the question?
 - Is the NTG/MT theory flawed?
 - No, but the language used is imprecise.
 - Is the design of studies flawed?
 - Sometimes.
 - Is the scope of the studies flawed?
 - Often.
 - Is the measurement flawed?
 - Often.
 - Is the application of results flawed?
 - Often.
 - Answers to these questions usually vary by:
 - Short-term versus long-term
 - Market segment
 - Technology/Practices

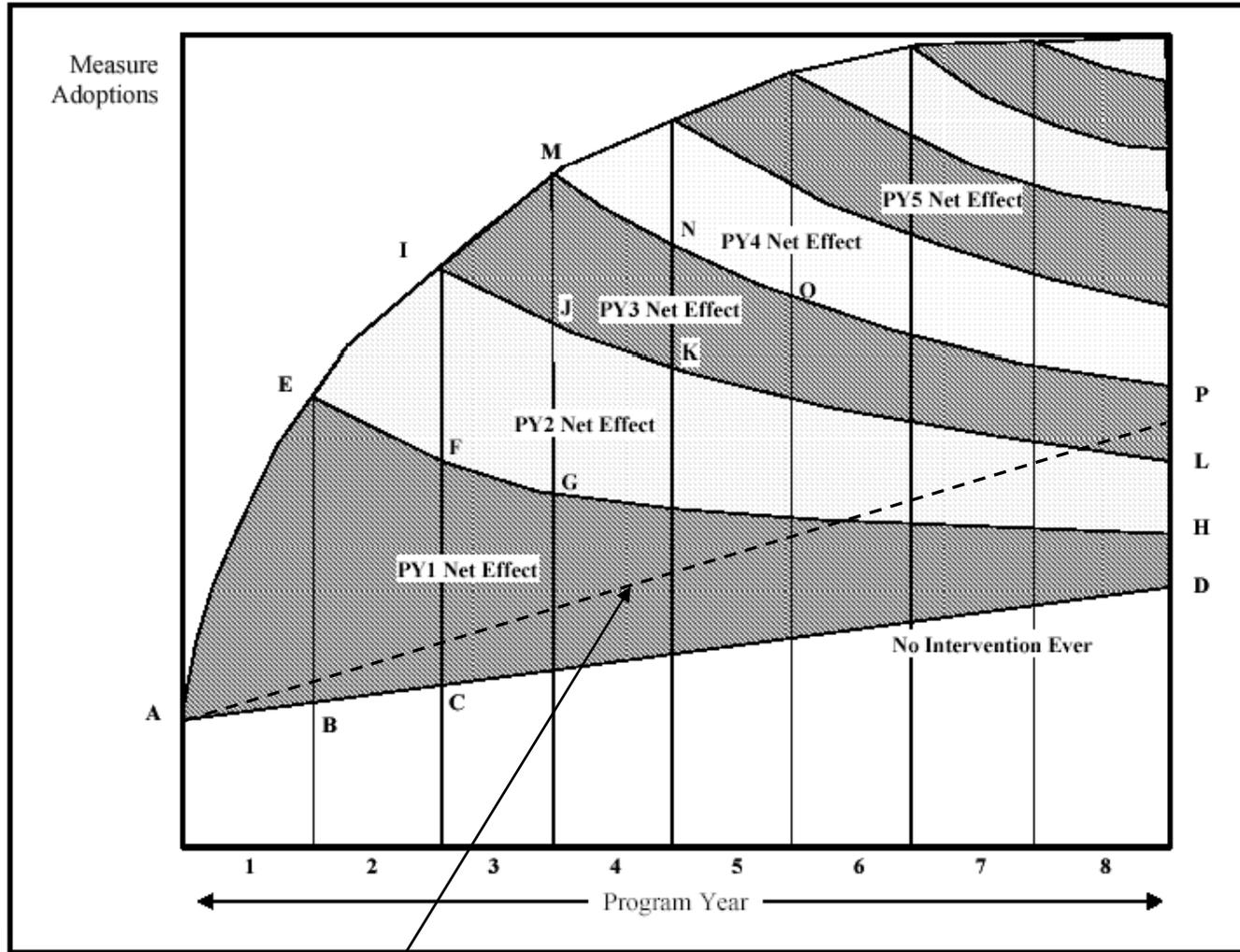
Attribution in Practice

- Sure there are problems, lots of them
- Adoption is non-linear over time and so is free ridership
- Markets are dynamic and when interventions succeed change is accelerated
 - What is a true naturally occurring baseline 25 years after the first market interventions?
 - Today's free riders are often yesterday's market effects
- Measurement techniques are limited
 - No pure control groups
 - Though experimental designs can sometimes help
 - Variation in program type/intensity can be leveraged
 - The vagaries of self reports
 - The pain of market tracking



Knowledge to Shape Your Future

Program Effects are Often Acceleration (RER 2001)



No Intervention Ever PLUS Program-Induced Market Effects. This is what we “see” when we try to measure “free ridership”. We are usually also picking up market effects from previous program efforts.



Knowledge to Shape Your Future

Attribution: Application to Implementers

- Extreme cases
 - Linear scaling of reward/penalty, threshold triggers
 - No financial feedback to implementers whatsoever
- Nationally:
 - Fear and stipulation
 - Maybe if we don't measure it it will go away
- But even narrow NTG can provide vital feedback
 - For improving program design
 - *Partially* reward/penalize depending on what administrators can realistically control
 - Not a substitute for multi-year market effects analyses



NTG Under Aggressive Program Funding

- Over the long term
 - EE program \$ essentially savings and investment fund
 - Customers are really using their own money
 - To enhance buying power
 - Stimulate new markets
 - Mitigate market barriers
 - Short-term free ridership becomes less of a concern
 - If long-term participation is widespread
 - Significant market effects are accomplished
 - Programs/policies adapt quickly to accomplishments/failures
 - Requires continuous measurement of both short-term program impacts and long-term market effects



Knowledge to Shape Your Future

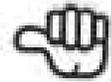
A Few Principals for Incentives and Attribution

- Align short-term Program Administrator (PA) performance incentives with mid-term societal resource goals
 - Metrics may be differ (e.g., “net” for incentives; “gross” for goals)
- Align PA incentives/goals with other EE mechanisms
 - In particular, C&S and market effects
- Align EE research with short and mid-term goals
 - Ex post evaluation by itself is inadequate
 - Ongoing baseline and market share measurement is critical
- Balance quantitative and qualitative performance criteria
 - Neither usually defensible in isolation
 - Avoid step functions that require precise measurement
- Test mechanisms for vulnerability to perverse outcomes
- Encourage stakeholder input and process transparency



Conclusions

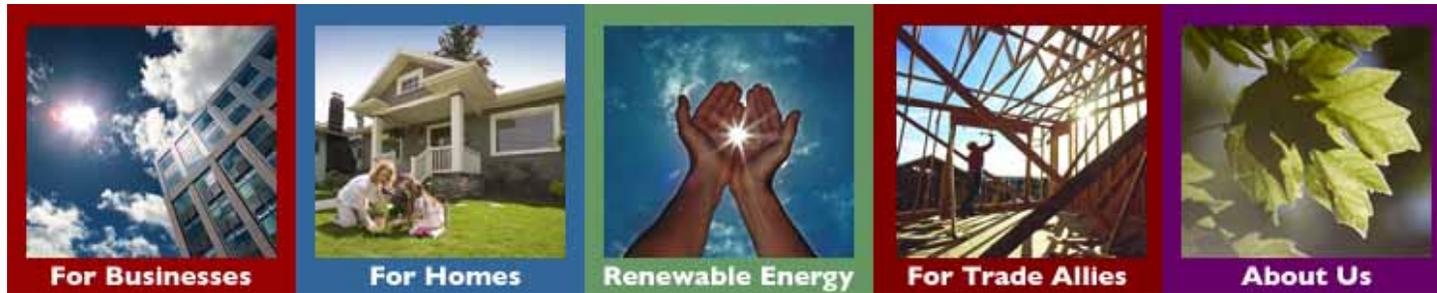
- Attribution is obviously challenging
 - Precise attribution will always be difficult
 - Directional attribution less so
 - Uncertainty should be addressed in design stage and performance mechanisms
- Results should be used to
 - Optimize program and portfolio design
 - Know when to
 - *declare victory, admit failure, redesign, or otherwise move on*
 - Appropriately direct and motivate implementers, w/out
 - Penalizing for factors outside direct control
 - Creating perverse incentives
 - Maximizing short-term impacts at expense of long-term impacts and market effects
 - Discouraging changes to C&S
 - Improve baselines and forecasts
 - Need much better baseline and market share data
 - Need on-going frozen efficiency forecasts



Conclusions

- Not measuring should not be an option
- But focus on only “free riders” is suboptimal and can lead to wrong conclusions
 - “Free rider” term itself problematic/derogatory
 - Not consistent enough w. traditional economic use of term
- What matters are
 - Short-term marginal program effectiveness (“additionality”)
 - Long-term load reductions
 - Totality of: Direct program participation, market effects, codes/standards, and other influences
 - And, yes, associated program attribution

Energy Trust of Oregon



ATTRIBUTION OF SAVINGS Fred Gordon- Energy Trust of Oregon For AESP- January 2008

What is an Energy Trust?

- Nonprofit- Funded in Oregon since 2002 to deliver programs for efficiency and renewable energy (not load management)
 - Electric Renewables and Efficiency: PGE and Pacificorp since 2002
 - Gas Efficiency for Oregon customers of NW Natural, Cascade Gas, some programs for Avista gas.
 - PUC and gas companies contract with us. Volunteer board
- This paper is about efficiency.
 - Mandate: “cost-effective conservation”.
 - Resource acquisition and market transformation
- 2006: 25.5 Ave Mw and almost 2.3 million annual therms saved

In the Northwest, There Are Many Helpers

- Efficiency happens due to market forces and prior programs
- Oregon Dept. of Energy tax credits for business/homes
- NW Alliance regional market transformation efforts
 - Funded by Energy Trust and utilities, who claim their savings.
- Energy Trust and Utility (elsewhere) programs.
- Others play roles for some programs
 - City of Portland, other cities
 - Climate Trust- buys carbon reduction for Oregon
 - US IRS/EPA/DOE- ENERGY STAR brand name, standards, tax credits
 - Utilities served by Energy Trust help market efficiency

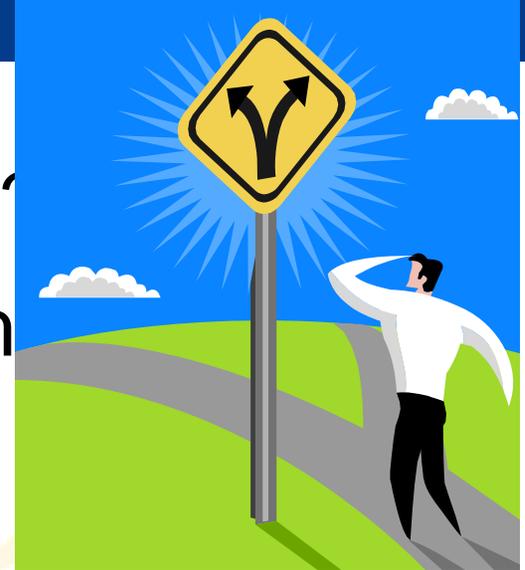
It Sometimes Feels Like:



Key Questions for Attribution

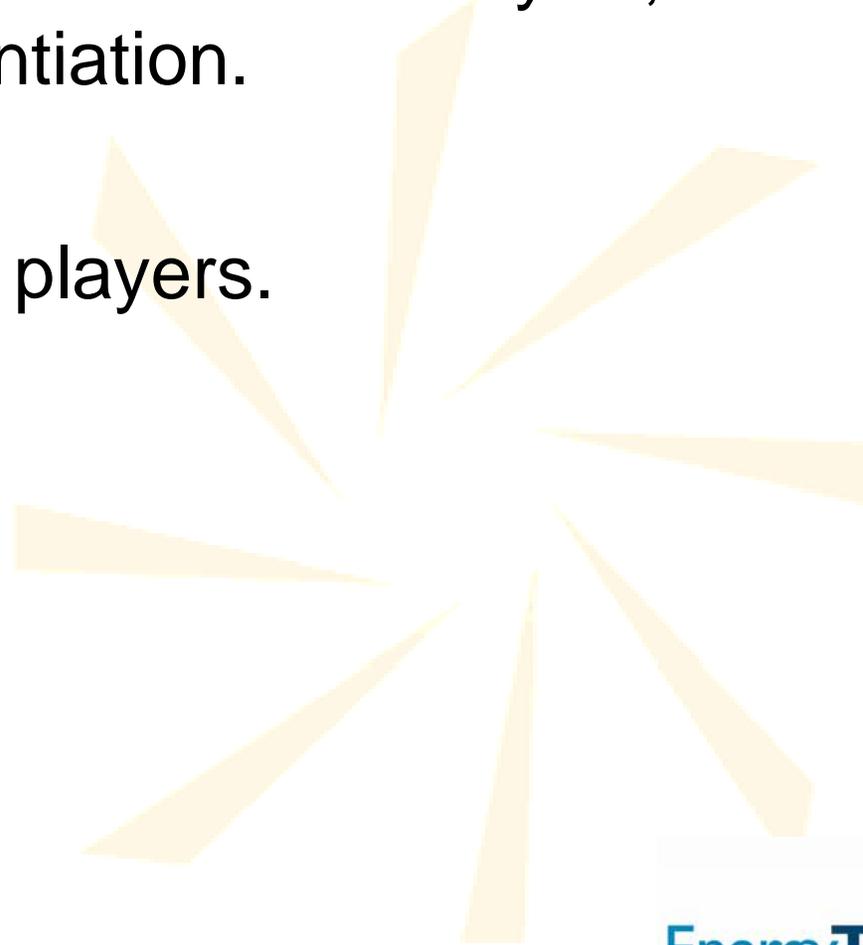
- What are you trying to decide?
- What are you going to do with the information?
- What's the baseline?
- Whose efforts are necessary? Sufficient?

The analysis should support an answer to a useful question.



Strategy:

- Focus on the purpose of the analysis, the reason for differentiation.
- Focus on the key players.



Problem 1. Joint Activity with Common Funding Source

E.G.: NEEA and NW utilities/ET work on new homes, new buildings, building O&M, CFLs, Food Processing and Pulp and paper through *coordinated, complimentary programs.*

- *All savings are reported by utility or ET, NEEA reports to utilities/ET and become part of their total.*
- *But NEEA needs to show some results to support its funding.*
- *NEEA-to-ET and ET direct savings claims must sumcheck to total savings.*

Solution A: Consistent Accounting Without Presumed Attribution

- Utilities/ET report for their programs all savings from direct participants. (some exceptions)
- NEEA tracks savings from overall market change, subtracts out baseline, utility/ET, calls the rest “market effects”
- Gradually increasing baseline forecast over time eventually accounts for all added savings.
- Over and over again we tell decisionmakers that the split is an accounting artifice, not attribution. Utility/ET efforts helped transform markets. NEEA helped drive developers to programs.

Example- the Efficient Moustache Trimmer Program

Total savings by 2020 = 250 Average MW

Market would have done 100 by then (derived from prior forecasts, comparison to other regions, etc.)

ET/utilities have paid for 75 AMW

NEEA calls $250 - 100 - 75 = 75$ AMW “market effects of programs”

Solution B: Investment Decisionmaking

Energy Trust looks at costs and benefits from the entire ET/NEEA investment in a market

- Forecasts long term costs and savings from market change.
- Compares to costs for ET plus ET piece of NEEA.
- Cost/benefit analyzed on this basis.
- NEEA is now analyzing this way for the region as one of their “tests”.

Problem 2. Coordinated Activities with Different Funding Sources

Oregon Department of Energy offers efficiency tax credits that often complement Energy Trust technical assistance, marketing, and rebate programs.

- Energy Trust needs to assess whether its own efforts are needed and cost-effective. What did we accomplish, given the baseline of ODOE and Federal activities plus market movement?
- Governor's office wants to account for all carbon reduction and not double-count.

Solution C. What Did Energy Trust “cause”?

“Was ET necessary for this to happen?”

- In our evaluations we ask customers and vendors to differentiate importance of ET versus tax credits.
- They tend to think tax credits are important, but cash and technical help tip the balance.
- It's muddy because Oregon tax credits can be swapped with another taxpayer for cash. And because who knows?
- For large projects it becomes apparent as the deal is negotiated.
- For markets that had a tax credit and nothing happened until we intervened, it's pretty clear.

Solution D- Analyze overlap to get correct Oregon total

- Compare a sample of tax credit participants to ET participants.
 - Program at a time.
 - Eliminate other parts of the state.
 - Try to match addresses and names.
 - Use sample to extrapolate to whole.
 - Develop combined total.



Problem 3. For Utility Profit Incentives and Lost Revenues

- Energy Trust doesn't need to do this! We're nonprofit!



- The question “were the utilities’ actions necessary?” is more meaningful than “did they do that all by themselves?” If you were necessary you lose revenues.
- Regulators can still pay differently for market transformation than for other programs- just don't pretend you know “the percent of the savings that the utility did”.

Summary Conclusions

- “Who caused what savings ” is too simplistic a question. Causality is inevitably intertwined.
- Sometimes you just need a sumcheck.
- Policy higher-ups want to know “how much did party x do?”. A better question is “what would not happen without funding party x?”.
- Do your best to provide meaningful info and help the users understand what is meaningful.
- Sometimes you have to answer a silly question anyway.

Great Acts of Coordination are Possible If You Don't Become Unbalanced



BACKUP SLIDES FOLLOW



Measure Assumptions (examples)

90%+ furnaces

- Low penetration (11%) and high incremental cost (\$1200)
- ENERGY STAR label can drive volume purchases to address both problems.

ENERGY STAR Windows

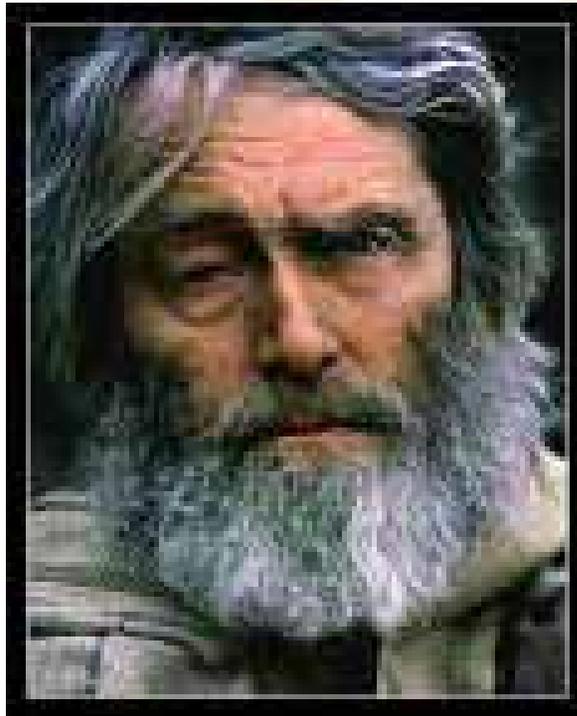
- Pervasive, thanks to prior Alliance program
- So don't count the savings.

Heat Pumps-

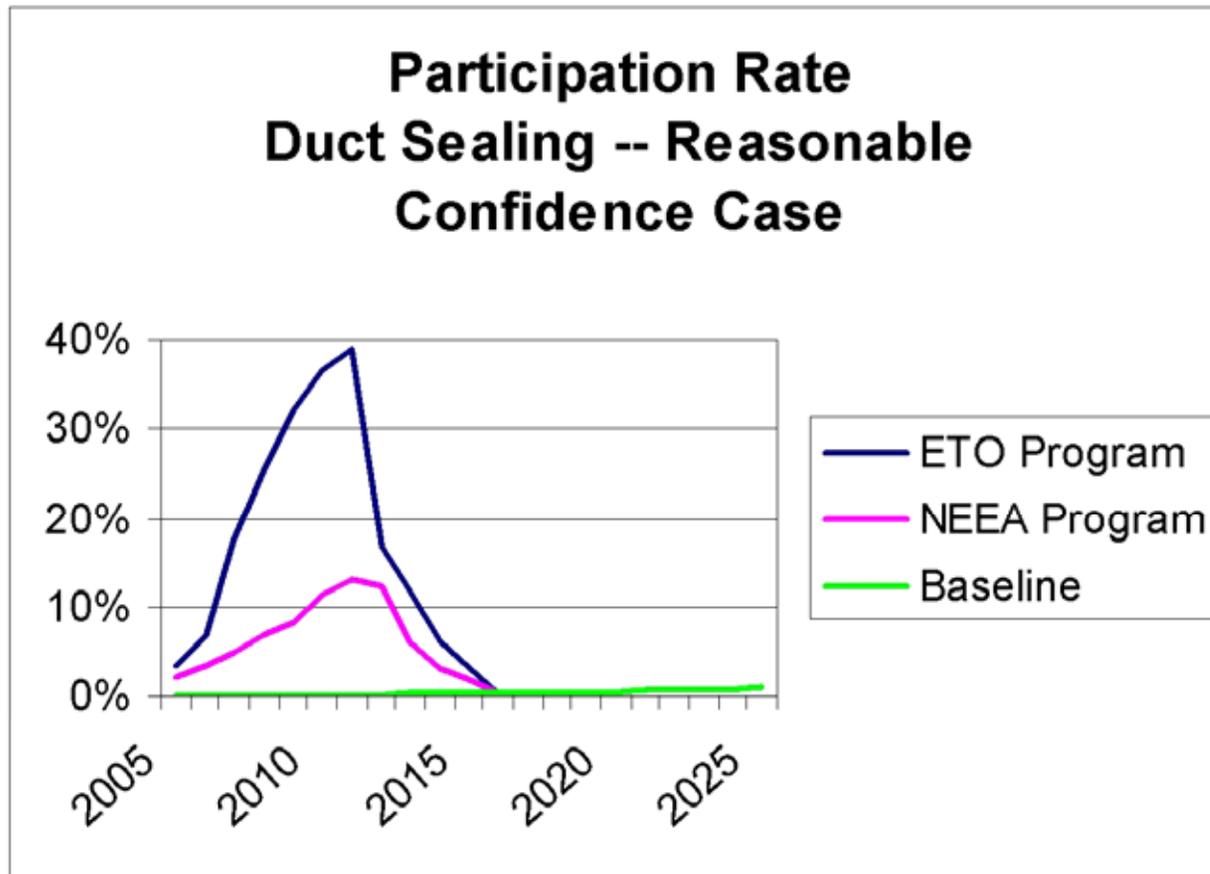
- New Federal Standard Requires 13 SEER/7.8 HSPF
- After new standard comes into play, only count increase to 8.5 HSPF.

Time Frame for New Homes

- Nine program years
- Twelve additional years of market effects.
- Measure lives vary up to 70 years.



Example Projection



Imprecision?

More research before many incentives are paid.

- Duct sealing baseline. Solution - baseline study
- Heat pump installation protocol. Field monitoring study in early program years.
- Penetration. Fine tune projections after 2 years, before many rebates are paid.

Run scenarios with and without code impact

- Duct sealing



Have a
sloppy day

Attribution of Energy Savings in a Multi-Intervener Context

Panel Discussion

AESP National Energy Services Conference
Clearwater, FL

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January 2008

The Attribution Setting at NYSERDA

- Single Source of Funding but Multiple Program Offerings
- Multiple Sources of Funding but Single Program Offering
- Satisfy Stakeholders' Interest and Needs in Program Impacts and Market Effects
- Give Credit but No Double Counting

Attribution Challenges

- Precision/Accuracy vs. Funding
- Sector-Level vs. Program-Level Focus
- Realistic Expectations of Survey Data to Accurately Attribute Savings to Individual Programs
- Energy Savings Apportioned to Multiple Programs/Funders Using Formulas

Precision/Accuracy vs. Funding

- NYSERDA has limited funds for evaluation
- Attribution one of many evaluation needs
- Where can we draw the line for using assumptions and formulas, especially for multi-funder programs?
 - NYSERDA not subject to regulatory oversight like utility co-funders
 - NYSERDA does not receive lost revenue recovery and incentives like utility co-funders

Sector vs. Program Focus

- Multiple NYSERDA programs may impact a single market
- Programs complement and don't compete with each other
- Sector-level surveys more cost-effective and provide robust data at that level
- Apportioning savings to programs acceptable to NYSERDA management and staff and external stakeholders

Data Collection Approach

- Realistic expectations of survey data to accurately attribute savings to programs
 - Vague participant recollection about program influence
 - Non-participant can't easily apportion influence to specific programs

Apportioning Savings

- Non-participant spillover savings apportioned to programs based on share of participant savings
 - e.g., Technical Assistance, C/I Performance, & Loan Fund All Contribute to Existing Buildings
- Specific program impact on spillover is unknown but each program given credit

Apportioning Savings cont.

- Program savings apportioned to multiple funders based on share of funds provided
 - e.g., SBC and SWP cost-share commercial lighting in New York City
- Market-level ENERGY STAR product savings not linked to a specific program or incentive attributed to the general residential marketing effort

Leveraging the Messaging “You Too Can Save and Be Green”

- ENERGY STAR – Appliances, Products, Homes
- LEED/Green Buildings – Lower Program Incentives as Customers Aspire to be Green
- White Tag Sales – Pilot Program to Boost Recognition of Corporations and Organizations as Supporters of Efficiency
- Unique Markets Will Have Unique Actors Requiring Unique Partnerships – Stay Focused

Summary

- Maintain your objectivity and credibility
- Have realistic expectations and manage the expectations of others
- Use limited resources efficiently