Optimal ENERGY Integrated Energy Resources

Setting Goals and Measuring Performance: Absolute Loads vs. Counterfactual Net Savings

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Introduction

- Goal Setting and Performance Measurement based on:
  - Absolute actual metered loads/emissions vs.
  - Traditional ex-ante or ex-post net savings estimates
- Where is this happening?
- Pros and Cons of Absolute Load and Net Counterfactual methods
- Case Study: Adjusting for exogenous changes
- Goals based on all fuel savings – fuel neutrality

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Absolute vs. Traditional Goals Concept

- Absolute goals: defined and measured as actual *ex-post* total reduction in observed emissions or energy loads

- Examples:
  - MA Global Warming Solutions Act: 80% reduction from 1990 emissions by 2050
  - NY Executive Order 88: 20% reduction by 2020 from 2010 total Btu/sq. ft.
  - NY EAMs for absolute weather-normalized kWh and peak KW utility retail load
  - NJ 2.0%/yr. elec, 0.75%/yr. gas….?

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Absolute vs. Traditional Goals Concept

- Traditional EE Goals: defined and measured as net savings against a counterfactual baseline
  - Independent of all exogenous factors
- Examples:
  - MA Green Communities Act Energy Efficiency Resource Standard; all cost-effective savings → PA net goals and performance incentives
  - IL Future Energy Jobs Act 20% net cumulative savings by 2030 → PA annual incremental and cumulative net savings goals and performance incentives

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Benefits of an Absolute Metered Approach

- No turf battles – multiple efforts and collaboration
- Market transformation, codes and standards, out of box approaches, integration of DG, others?
- Carbon or fuel-neutral methods can facilitate more creative approaches
- Save EM&V costs – just read the meters!
- *What Society, the Planet, and Physics ultimately care about*

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Barriers of an Absolute Metered Approach

- No feedback on attribution, cost-effectiveness
- Inability to track and manage programs and to manage toward goals
- Dependent on uncertain forecasts, inability to properly adjust for exogenous factors
- Increased risk to PAs
  - Potential penalty/reward based on market activity out of PA's control
    - economic recession = success

    - economic growth = failure

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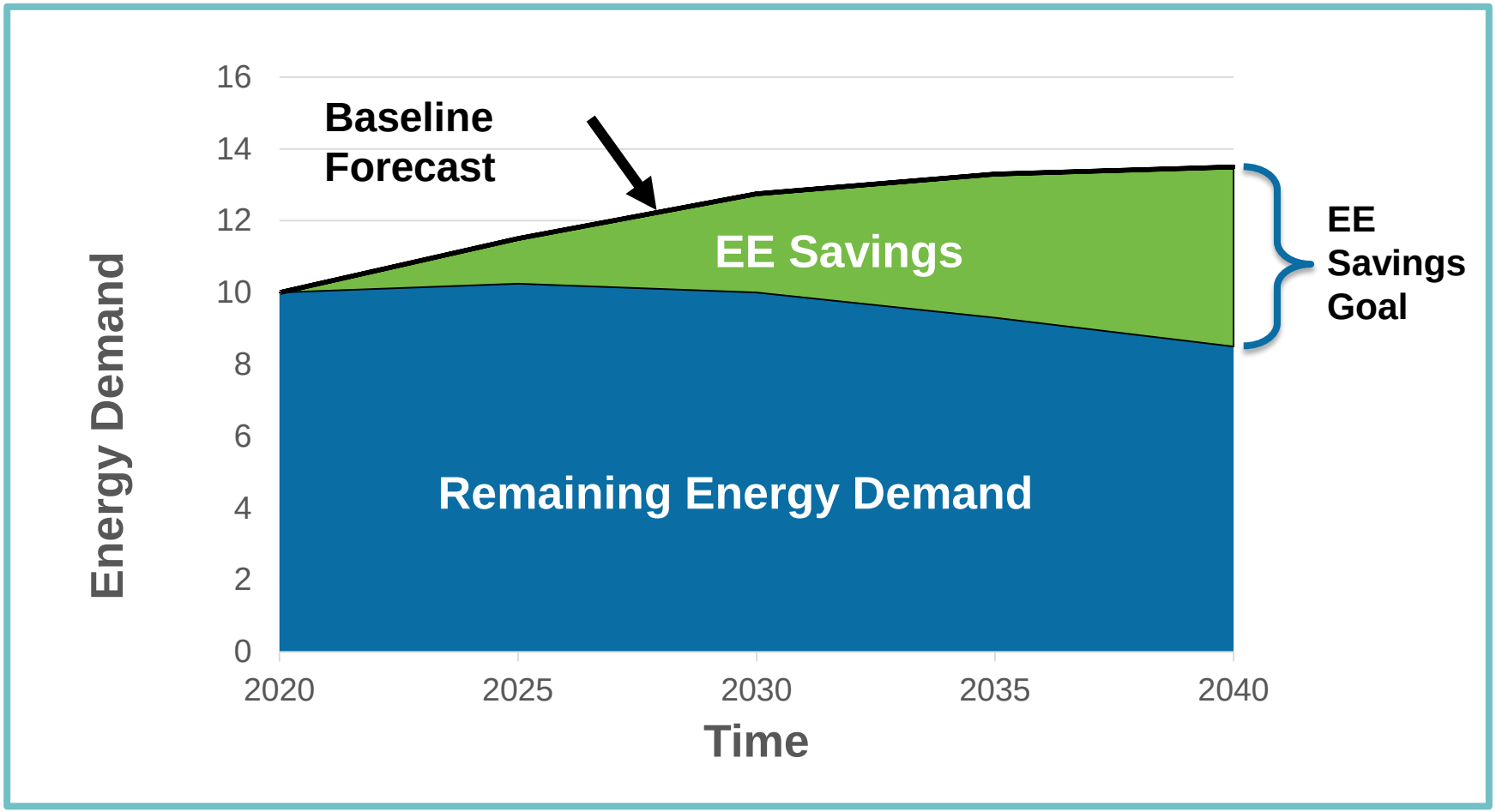
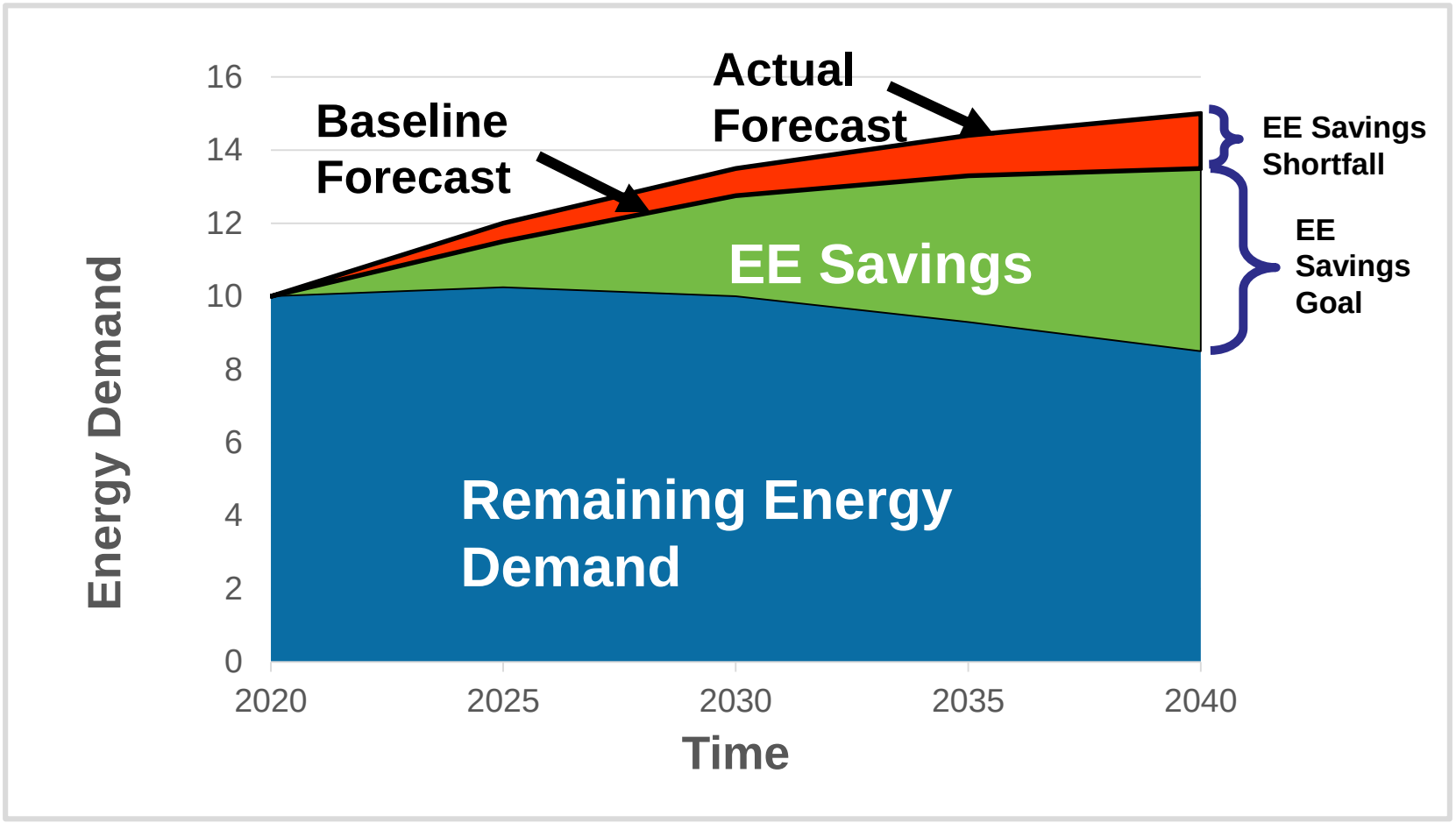
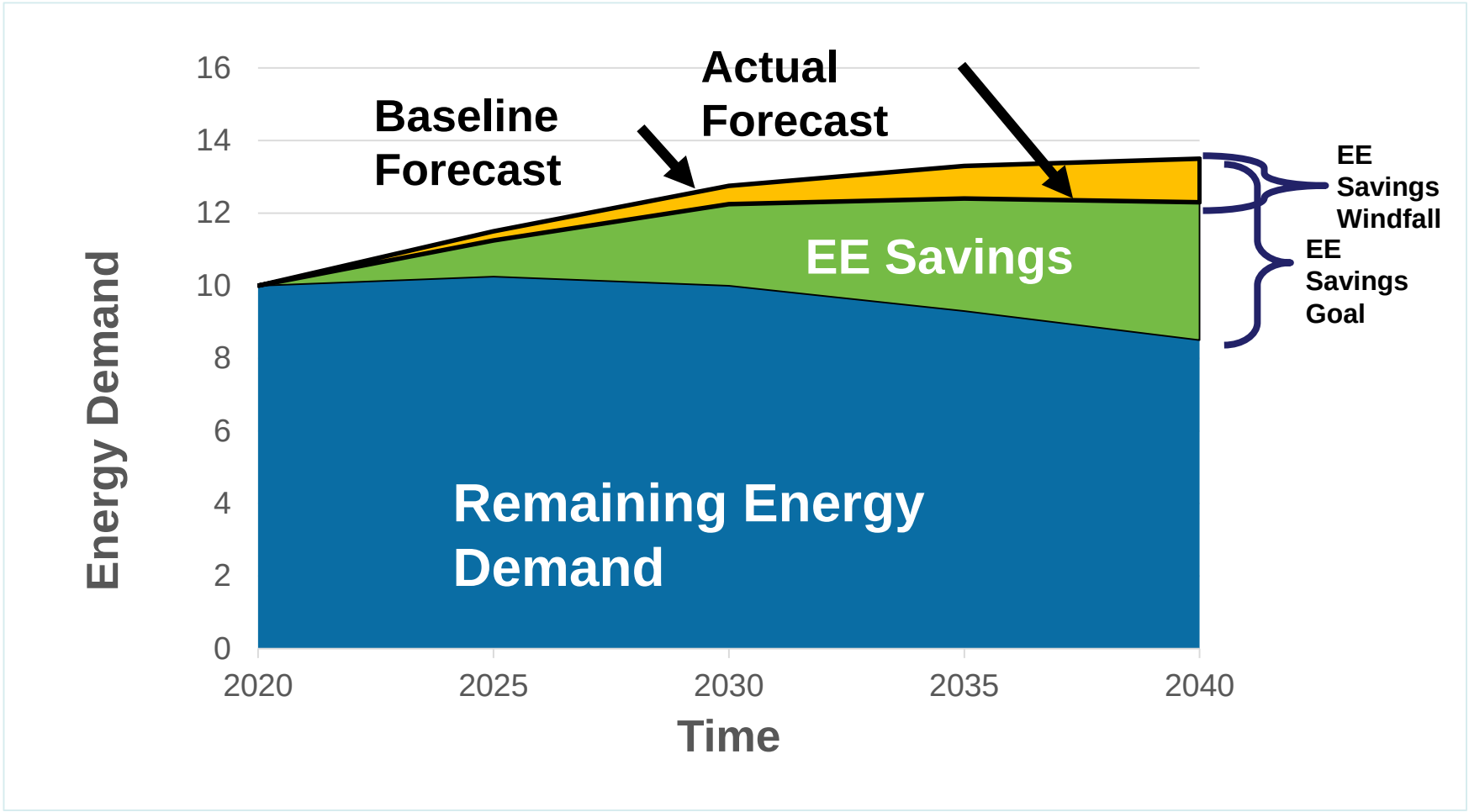
Absolute Metered Approach



Absolute Metered Approach



Absolute Metered Approach



A Role for Both?

- Are Market Actors Important?
  - Government
    - Absolute appropriate as overall goal – aspirational or in statute
    - Risks and Benefits MAY BE aligned
    - Develop Pathways that may result in traditional goals assigned
  - Utilities
    - Risks and Benefits NOT aligned (Muni & Co-op Exception?)
    - Absolute creates high risk – particularly issue for IOUs
    - Can't easily manage to goals and assess progress and effectiveness
  - Non-Public End Users
    - Risks and Benefits ARE aligned
    - Gross savings and bill reductions are all that ultimately matters

Example: New York IOUs

- Earnings Adjustment Mechanism (EAM) Creates Hybrid:
  - Absolute
    - EAM$$ for actual metered and partially adjusted energy and peak demand
      - Adjustments Limited to: Weather, Number of Customers, EVs, Program Participant Electrification, CHP
  - Traditional
    - EAM$$ for estimated EE and Electrification gross/net savings
    - Assessed with traditional and EM&V methods

Case Study: New York Executive Order 88

- EO 88
  - State entities to reduce average EUI (total Btu/sq. ft.) by at least 20% relative to FY 2010 by April 1, 2020.
- BuildSmart to implement efficiency and track progresss
  - NYPA delivers efficiency services and financing
  - NYPA and NYEM track and report progress annually for each agency/authority
  - Developed some adjustment protocols and factors to address exogenous variables

Case Study: New York Executive Order 88

- Algorithms developed to adjust EUIs to address some key anticipated situations:
  - Weather
  - Building occupant density and hours of operation
  - Space type
  - EVs
  - Major process loads
- Implementation proved problematic; only explicitly exempted traction load, leased space; and weather normalized results initially

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Case Study: New York Executive Order 88

- Numerous and varied building and operational changes can significantly impact EUI:

Examples:

- Changes to space types and/or functions (e.g., addition of IT equipment in previous storage space, new construction)
- Employees, students, inmates, occupant density and behavior
- Operating hours
- End uses (e.g., plug loads, EVs, cooling)
- Leased vs. Owned
- Campus and district energy systems
- Production activity

Case Study: New York Executive Order 88

EUIs Growing! ….. Despite Extensive EE

- Ex-post attempt to collect data and adjust for selected agencies complicated by:
  - Data gaps
  - Identifying and gaining access to key staff
  - Hard to know all non-efficiency-related site-specific changes that may impact EUI
  - Lack of sub-metering district systems
  - Time intensive, customized, people-driven process
  - Accuracy very uncertain

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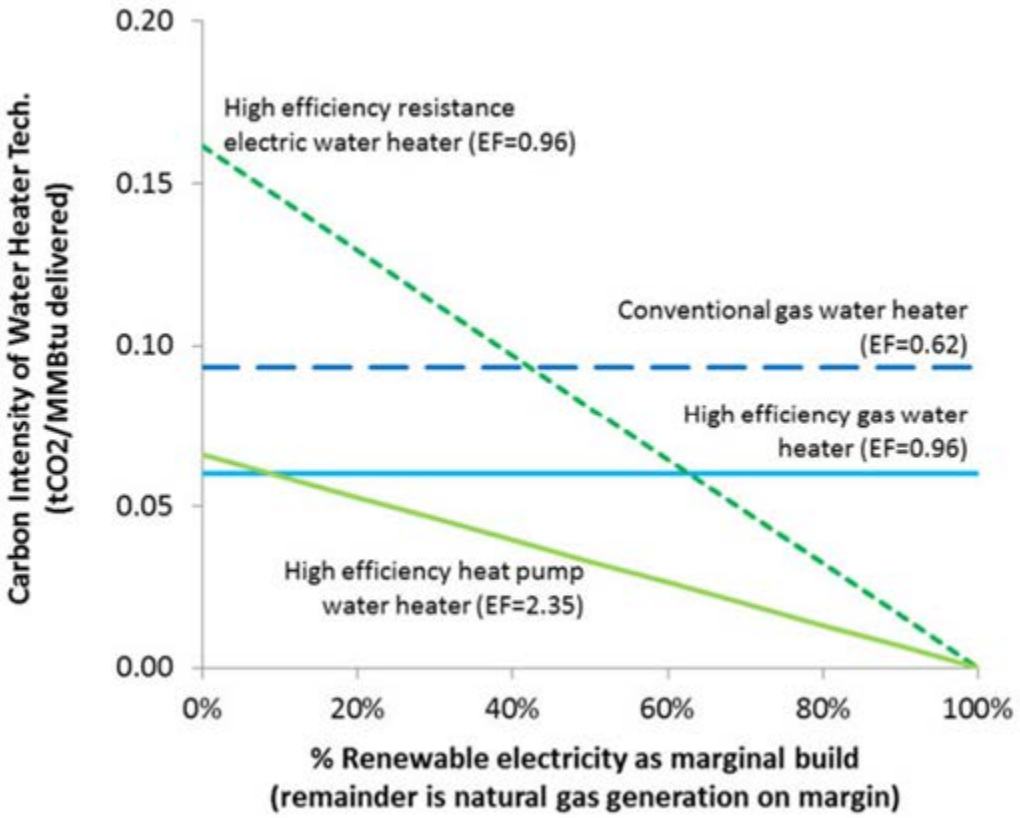
Case Study: New York Executive Order 88

Beyond 2020:

- In December 2018, the New York State Public Service Commission issued New Efficiency: New York
  - Includes a goal of 11 TBTU in *site* savings for state agencies from 2015-2025
  - Goal achievement now based on tracking specific EE projects and traditional EM&V methods

Fuel-Neutral Carbon or Btu Goals



2016 ACEEE Summer Study Proceedings – A Mahone, et. al., *What If Efficiency Goals Were Carbon Goals?*
https://aceee.org/files/proceedings/2016/data/papers/9_284.pdf

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Fuel-Neutral Carbon or MMBtu Goals

- Fuel Conversions – Site vs. Source vs. Carbon

  Site:

  - Consistent with tradition of counting savings at site and cost-effectiveness methods
  - Incentives not always aligned – (e.g., gas condensing furnace to electric resistance heating)
  - Never changes
  - Not what Society cares about

  – Example: MA?

Fuel-Neutral Carbon or MMBtu Goals

- Fuel Conversions – Site vs. Source vs. Carbon

Source:

- Consistent with the physics of overall energy systems
- Incentives better aligned – (e.g., negative savings from gas condensing furnace to electric resistance heating)
  - Fully aligned if goals are just energy savings
- Moving target
- Closer and highly correlated with what society cares about

– Example: MA?

Fuel-Neutral Carbon or MMBtu Goals

- Fuel Conversions – Site vs. Source vs. Carbon

Carbon:

- Incentives fully aligned if objective is carbon reduction
- Moving target
- Highly correlates with source Btu, but not the same
- Encourages and enables integrated approach – EE, DG, EV

– Example: Illinois

Thank You

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