Moving and Measuring Market Transformation of a Decarbonizing Economy

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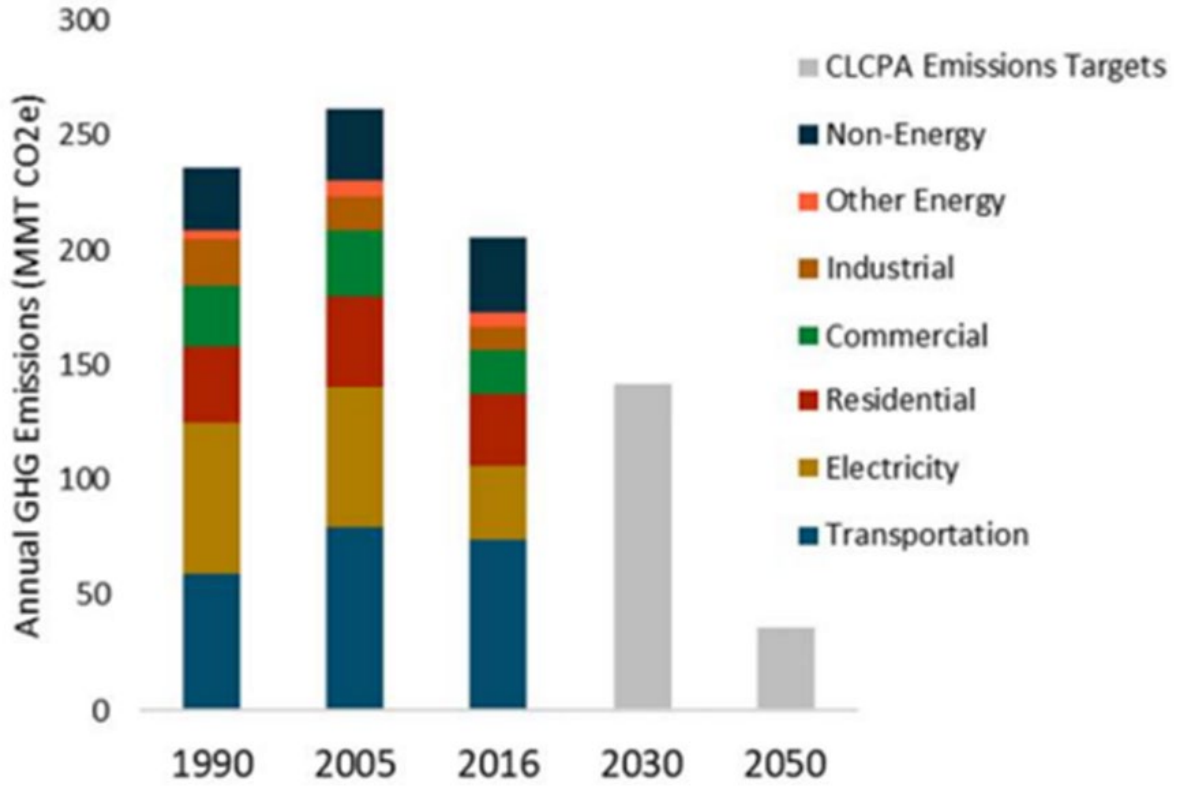
Project Background

- Economy-wide decarbonization requires ‘unprecedented transformation’ across sectors.
- NYSERDA I&R investments *when successful*, will have broader impacts than direct project impacts.
- Challenge: identifying these **longer-term, economy-wide, cross-program outcomes**.

Figure 3. NYS GHG Emissions by Sector: 1990, 2005, 2016, and CLCPA Emissions Targets: 2030 and 2050



Project Goal

A curated **set of market-level metrics** and tools that provide I&R:

1) Directionality of I&R sector/market movement
2) Speed of market-level changes

Early indicators of whether/how:

- Longer-term I&R investment outcomes are appearing,
- I&R investments are moving markets, and/or
- Changes in investment strategy are needed.

Methodology: Key Design Parameters

- Market-level changes:
  - What direction is the market moving?
  - How quickly are market-level changes occurring?
- Complement (not duplicate) existing NYSERDA project- and program-level metrics
- Suite of metrics that **when viewed collectively** provide ***new*** insights into I&R investments/activities
- Feasible:
  - Can be cost-effectively updated on a regular basis
  - Use available data from credible public state & federal sources

TARGET SECTORS

- Business Assistance
- Advanced Buildings
- Renewable Energy and Distributed Energy Resources
- Smart Grid
- Transportation

Methodology: Metric Identification

1) In-depth literature review
   - Program documents and grant data
   - NYS energy and investment plans
   - Metrics and data used by peer organizations
   - Innovation diffusion and market transformation measurement
2) *Iterative* interviews with:
   - Subject matter experts
   - I&R Program staff
   - NYSERDA Evaluation staff

Methodology: Metric Identification

METRIC CRITERIA

- Ability to measure market-level changes
- Frequency metric/method/data appeared in the literature
- Data availability
- Feasibility of simple (Excel tool) updates
- Long-term reliability
- Minimize influence from external factors

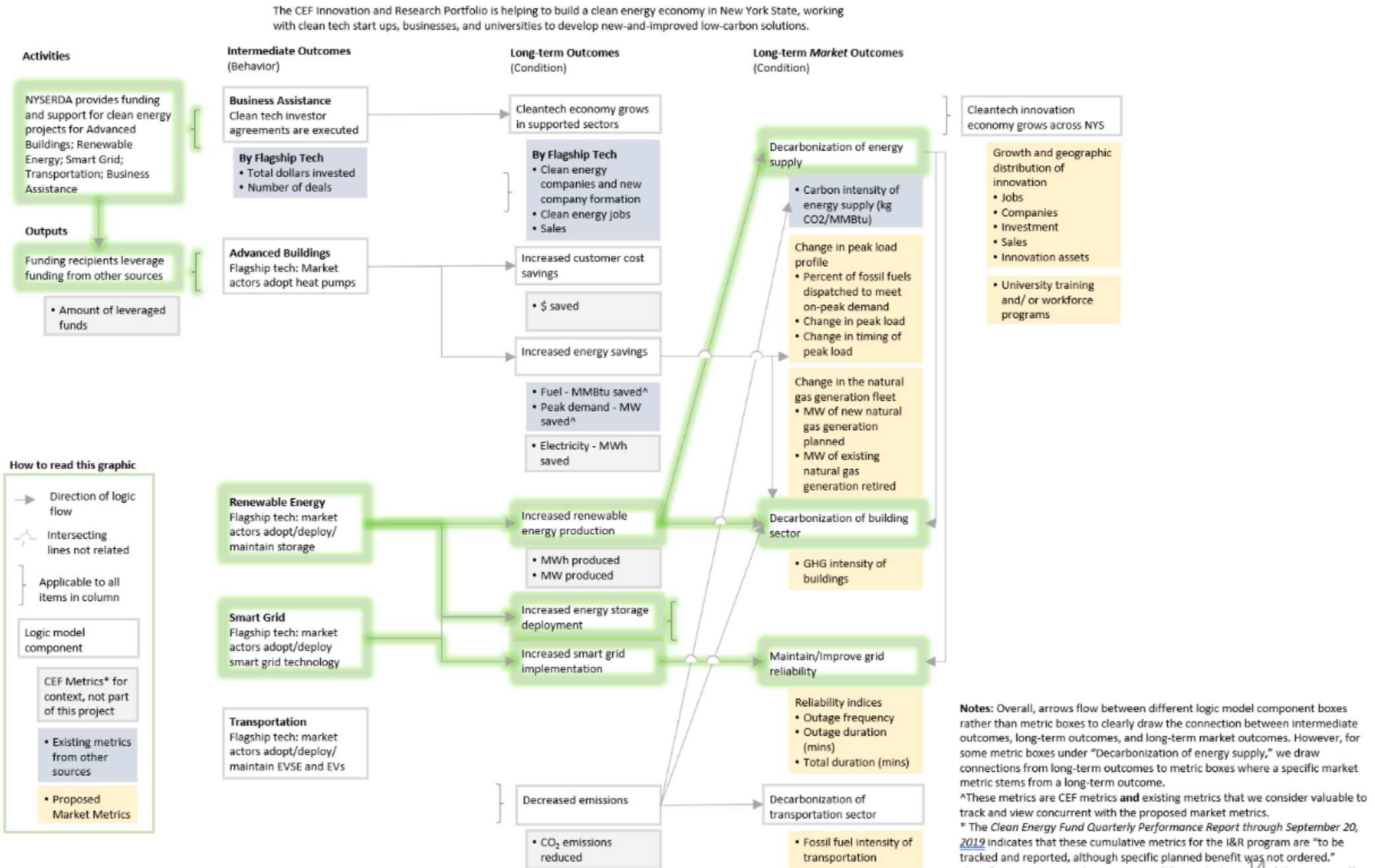
COMMON REASONS METRICS REJECTED

- Mis-alignment between metric and I&R investments/activities
- Metrics tracks an output rather than outcome
- Data availability
- Not feasible to develop an updatable tool
- Another metric (better) tracks the desired outcome

Results

NYS cleantech innovation economy grows	Energy supply decarbonized	Building sector decarbonized	Transportation decarbonized	Grid reliability improves
1-3 years	Long-term (5-10 years)			All years, direct and backstop
Growth, distribution of jobs, companies	Percent fossil dispatched to meet peak seasonal demand	Fossil intensity of buildings	Fossil fuel use of transport per VMT, fleet	Utility Reliability indices
3-5 years	Backstop/ Tipping Point			
Workforce Investment	Change in the number of planned natural gas units			

Appendix 1. Partial I&R Logic Model with Market-Level Metrics



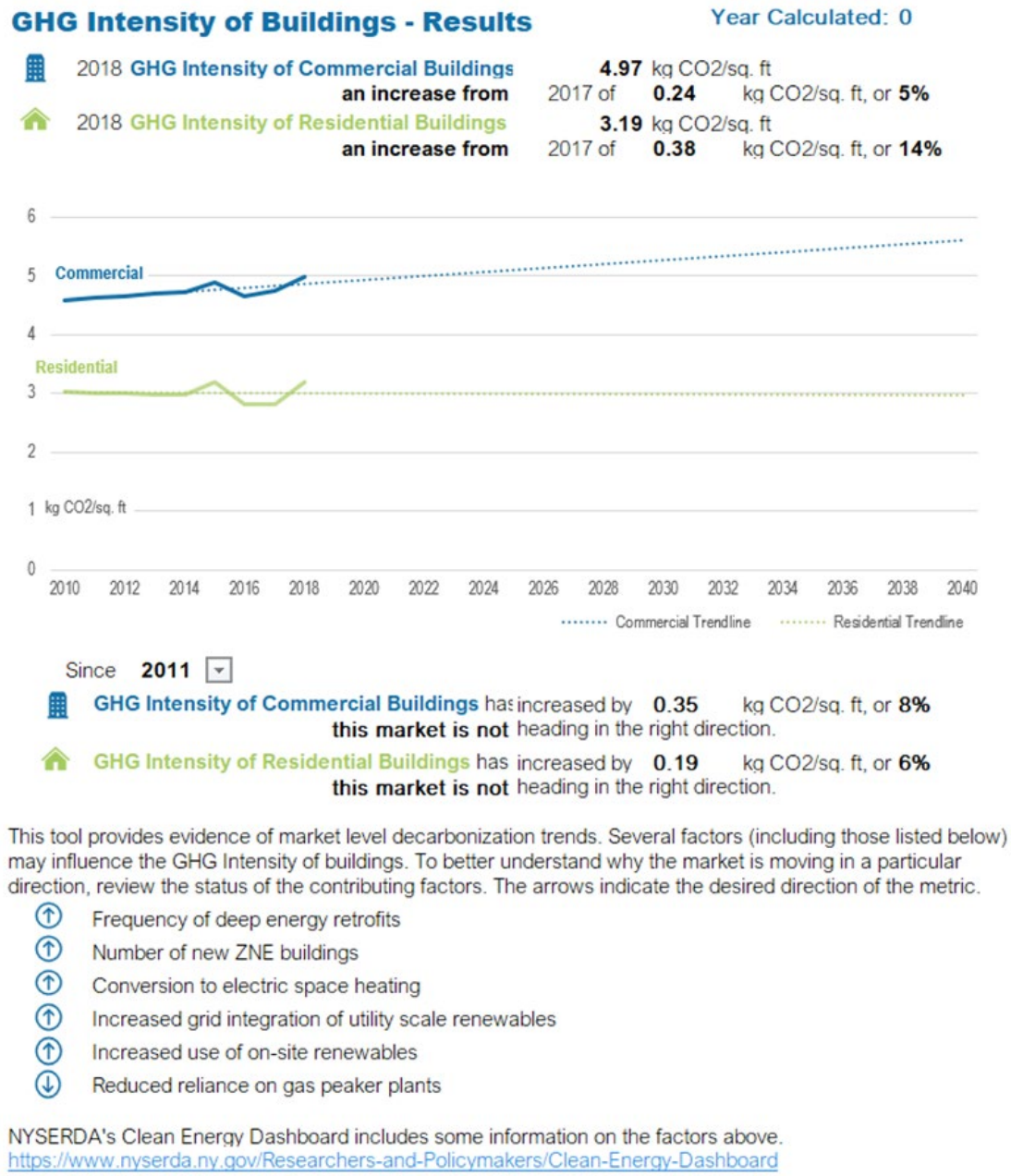
Notes: Overall, arrows flow between different logic model component boxes rather than metric boxes to clearly draw the connection between intermediate outcomes, long-term outcomes, and long-term market outcomes. However, for some metric boxes under "Decarbonization of energy supply," we draw connections from long-term outcomes to metric boxes where a specific market metric stems from a long-term outcome.

^These metrics are CEF metrics **and** existing metrics that we consider valuable to track and view concurrent with the proposed market metrics.

* The *Clean Energy Fund Quarterly Performance Report through September 20, 2019* indicates that these cumulative metrics for the I&R program are "to be tracked and reported, although specific planned benefit was not ordered." Therefore, IEc assumes these metrics will be tracked outside of this current effort.

Results: Excel Tools

- Stand alone, updatable tools in Microsoft Excel
- Detailed user guide
- Data input tables
- Embedded metric calculations
- Summary tabs with user friendly data visualization



Results: Excel Tools

- Stand alone, updatable tools in Microsoft Excel
- Detailed user guide
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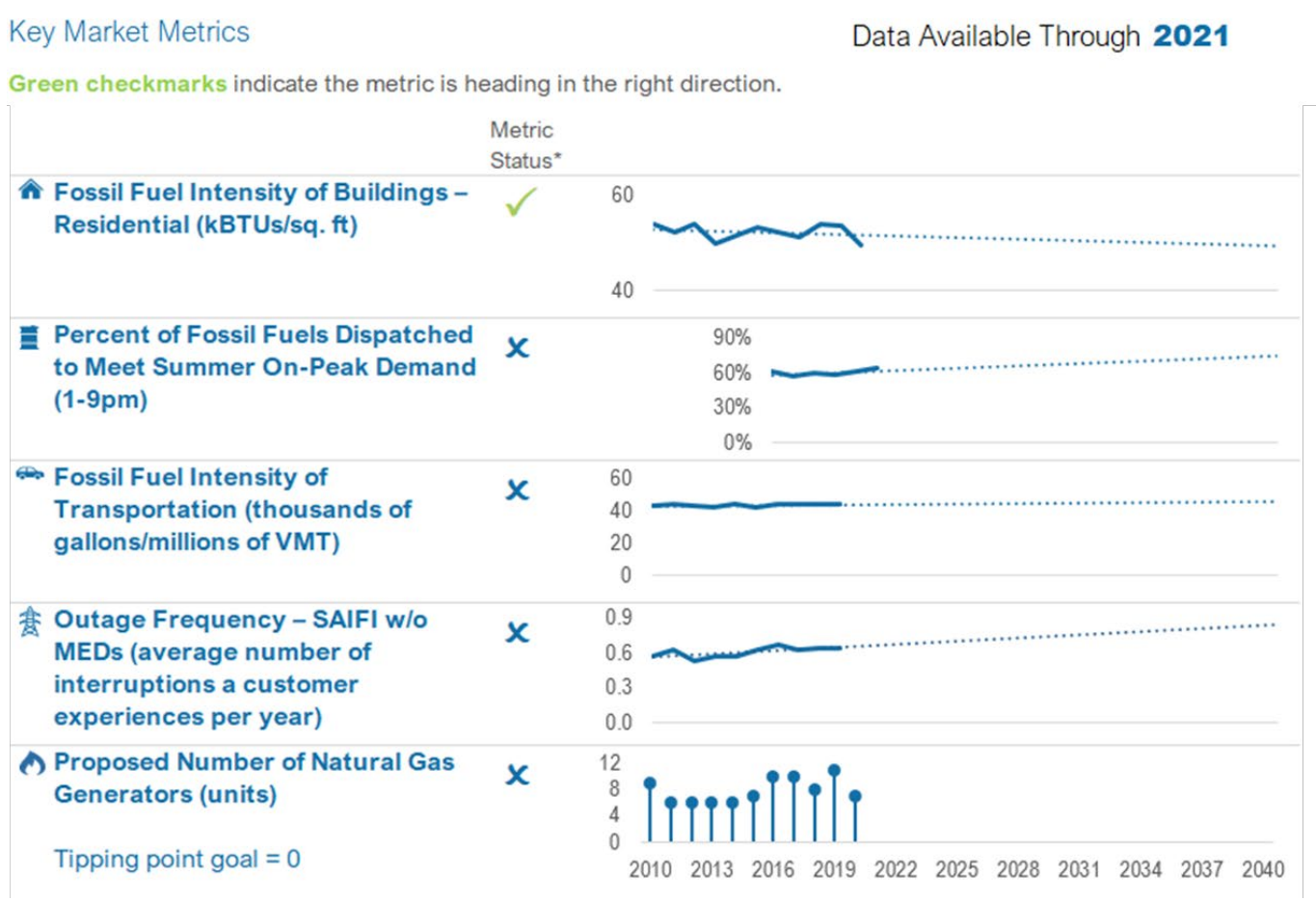
Results: Excel Tools

Summary tool that aggregates and arrays all metrics together to allow program staff to view metrics collectively



Long-term indicators (5-10 years)

Mid-range indicator (3-5 years)

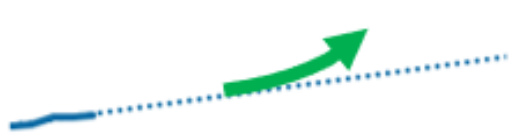
Long-term indicator (5-10 years)

Results: Example Review Process

Expected Metric Changes Over Time

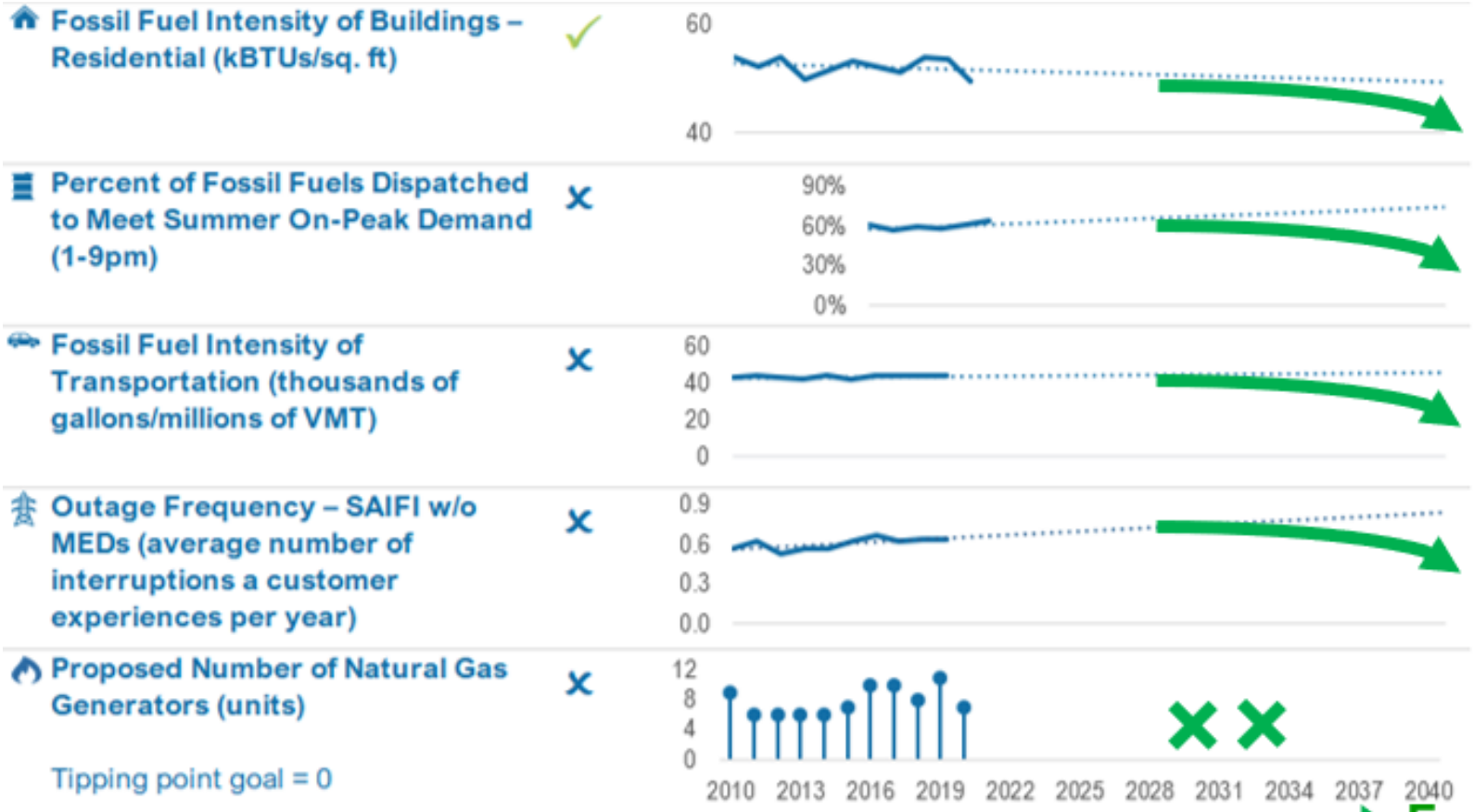
Renewable HVAC Jobs (number of jobs) ✓

Energy Storage Jobs (number of jobs) ✓



- Is the rate of job growth fast enough to support production at scale/increased technology adoption

Results: Example Review Process



- Captures the market effect of increases in heat pump installations
- As more wind and storage is installed, dispatch of fossil fuel during peak periods begins to fall
- Is the grid handling increased load from buildings, RE, and EVs? If not, more investment in the grid may be needed

→ Expected Metric Changes Over Time

Results

KEY INSIGHTS

- Initial results track with anticipated performance
- Near-term successes, “jury still out” on longer-term metrics
- Metrics, data inform staff on investment strategies that might need to change

KEY CHALLENGES

- Changes may not yet be visible in target markets
  - Some markets still in early stages of development (e.g., RE and storage)
- Attribution limited – market-level metrics may reflect impacts of other programs and external factors

Conclusions and New Challenges

- Current metrics: longitudinal starting point
  - Expect to see impacts of recent policy changes, data centers
    - Clear methods – no “black box”
    - Data sources, methods may need to adapt
- Additional metrics for sharper insights
  - “Force multiplier” role of I&R
  - Transitional efforts (e.g., alternative fuels)
  - Emerging technologies (VPP, plug-in solar)

Thank you!

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