Residential M&V Panel: Real Time M&V

Where are we, where could we go, what would it take?

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Background

Changing EM&V Paradigm - Landscape of New Tools & Data Analytics, A Review of Key Trends and New Industry Developments, and Their Implications on Current and Future EM&V Practices, prepared by DNV GL

- DRAFT REPORT FOR STAKEHOLDER REVIEW 11-10-15

Purpose: Help stakeholders understand emerging trends, technologies, and techniques that can be leveraged to enhance EM&V

Thanks to:

- Julie Michals, NEEP
- Outside reviewers

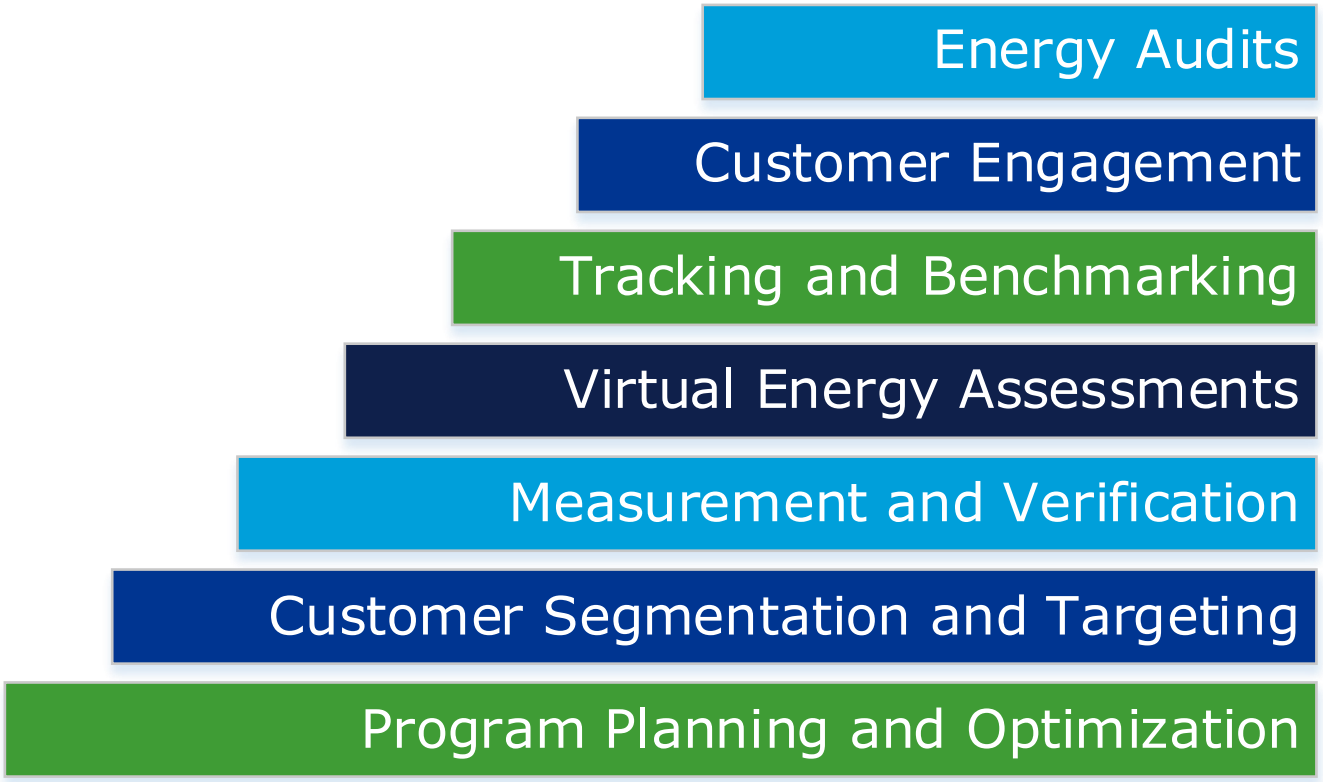
What's New?

Advanced Data Analytics	**Software:** Cloud-based Platforms & programs for rapid high-volume processing Potential to analyze higher volume & higher frequency data collection
Improved Data Collection Tools & Increases in Data Availability	**Hardware:** Smart meters, smart T-Stats, NILM New ways to collect data Potential to increase amount and types of data collected

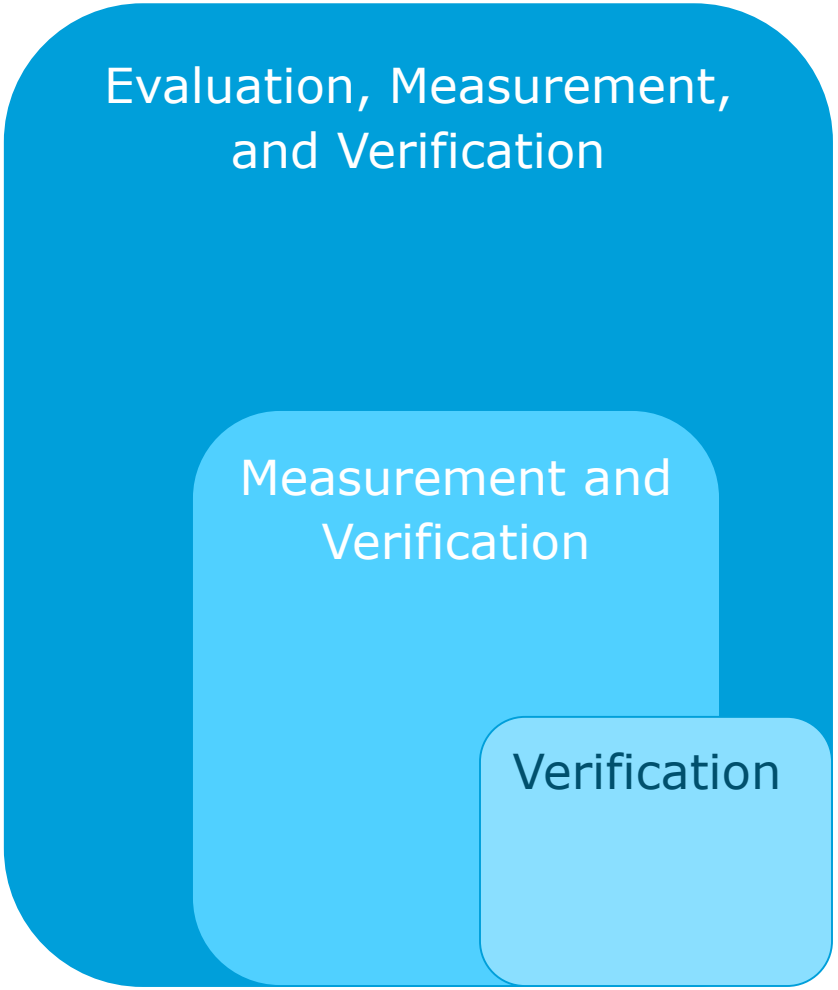
Advanced Data Collection and Analysis Tools

New Tool/Method	Key New Features	
Advanced Data Analytics	Predictive Analytics Machine learning	
Auto M&V Software	Machine learning Cloud platform High volume auto processing	
Auto M&V Software as a Service (SaaS)	Service delivery via Auto M&V	
AMI	Large scale high-volume interval data 2-way communication	
Smart Devices	2-way communication	
Home Energy Management System	Monitoring, feedback, & controls, 2-way communication	
End-Use Metering	Non-Intrusive Load Monitoring	

Key EE Delivery Applications of Advanced Data Collection and Analytic Tools



What Are E M and V?

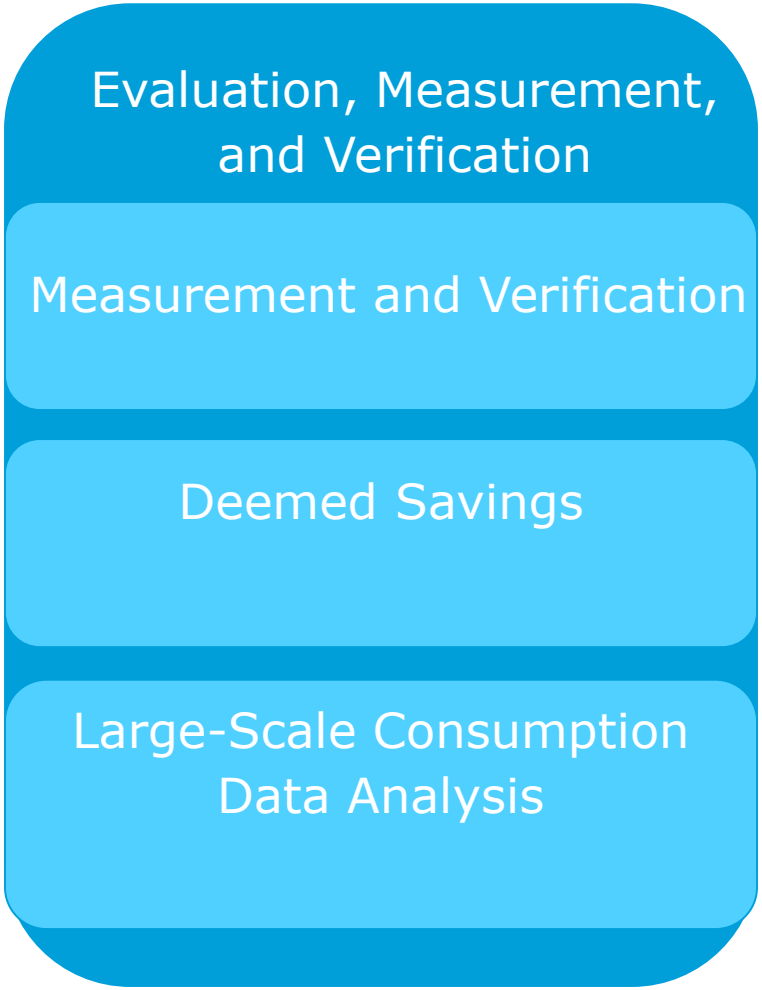


Assessment of the effects of a program and the effectiveness of program processes

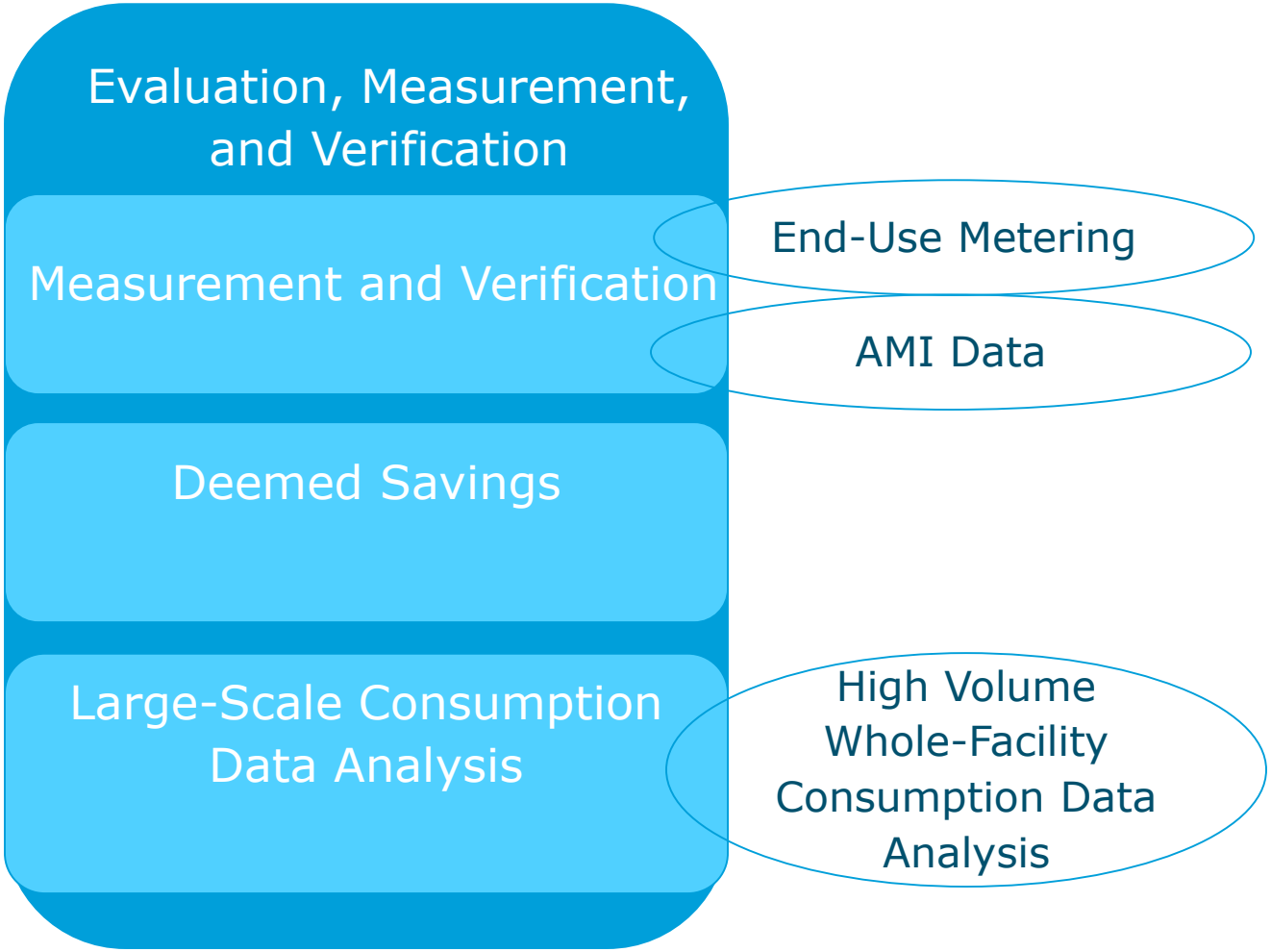
Determination of energy savings from particular sites or measures, based on a combination of measured parameters and calculations

Confirmation that an EE measure has been installed

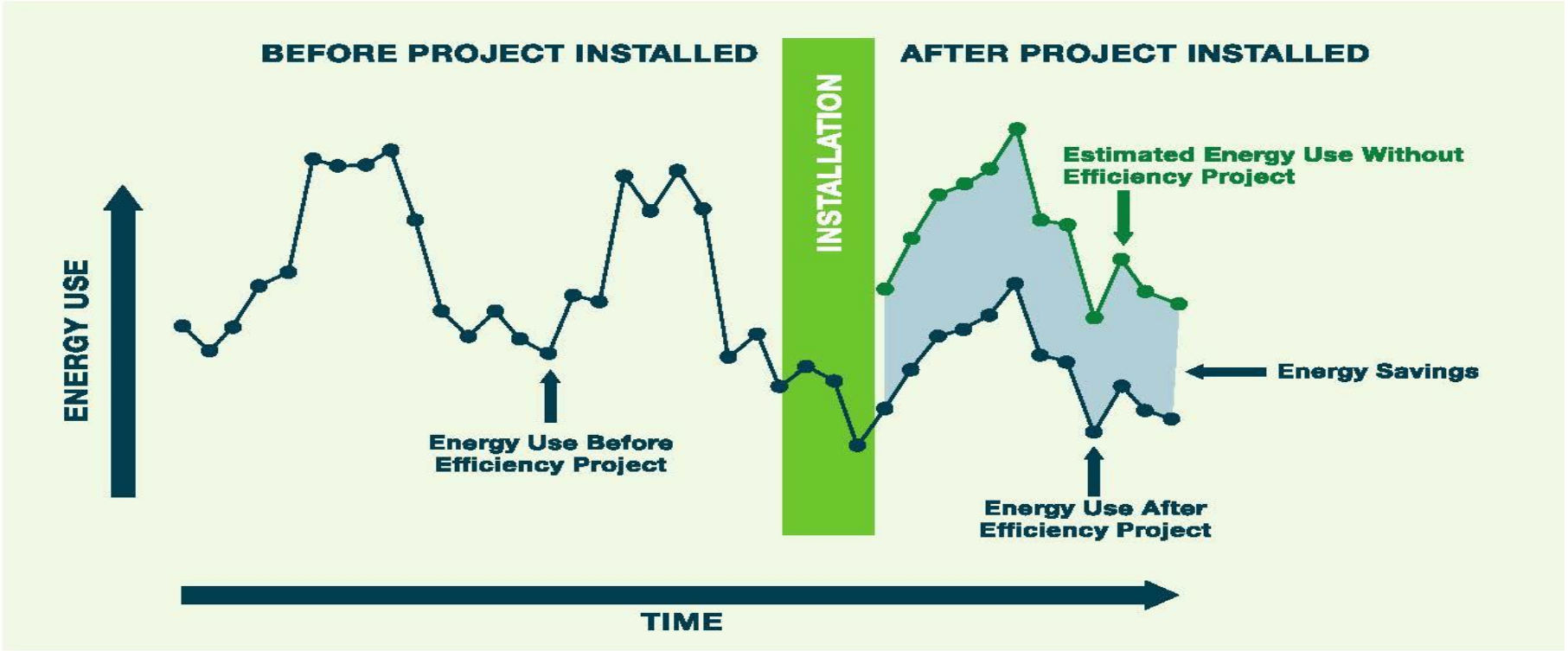
Evaluation Approaches (SEE Action, CPP EM&V Guidance)



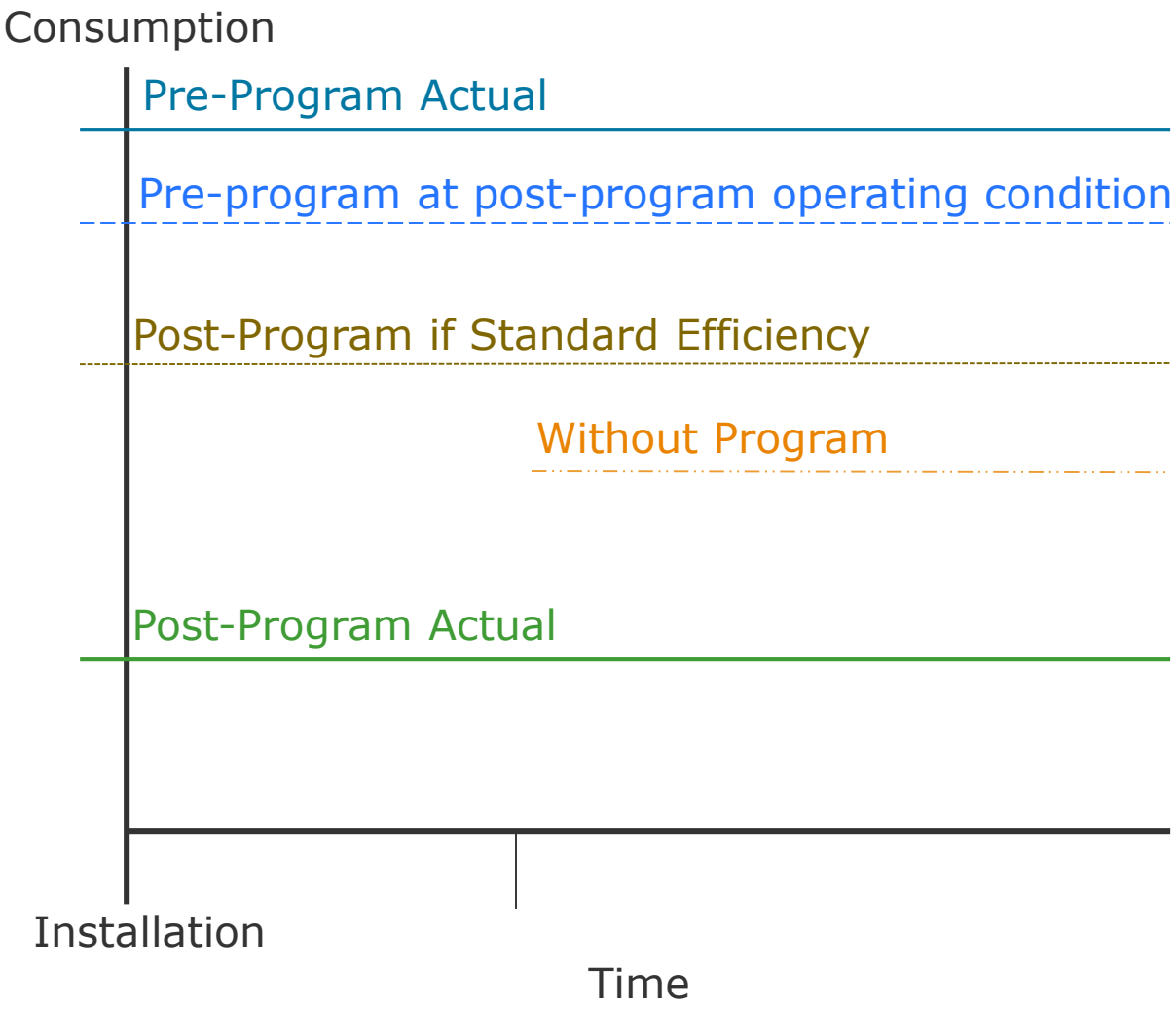
Where Do New Tools Fit into Evaluation?



Consumption Data Analysis



Find the Baseline—Consumption Data Analysis



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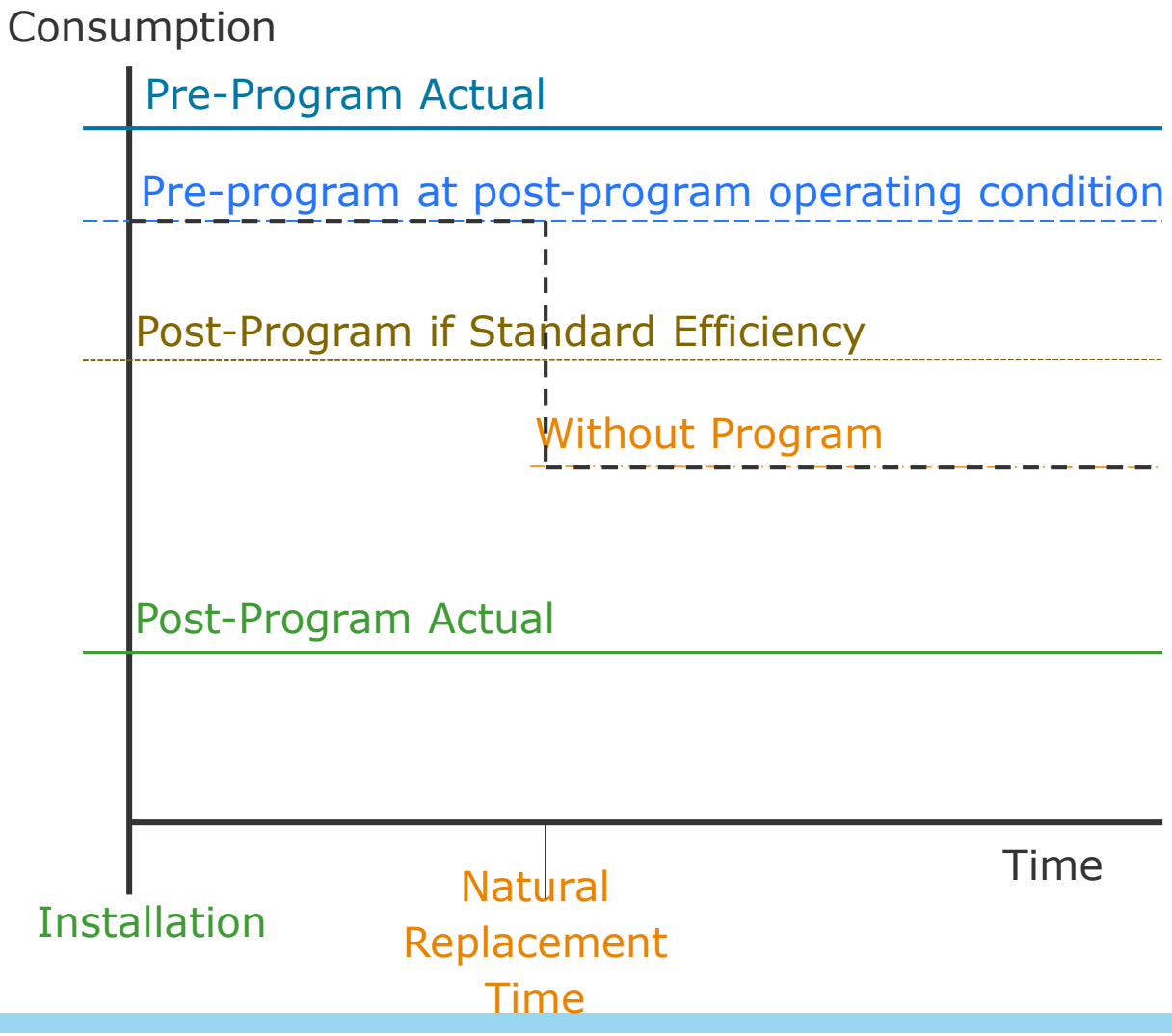


Pre-Installation, even weather-adjusted, is the right baseline for evaluation only in limited circumstances

Have to consider other changes, natural replacement, program influence, (new construction)

Comparison group can sometimes work for large, homogeneous population

How Can New Tools Shorten the Evaluation Timeline? What Would Be Gained and Lost?

Planning & Scoping

- Stakeholder engagement
- Data cleaning & Sampling

Data Analysis

- Site data analysis
- Site reporting

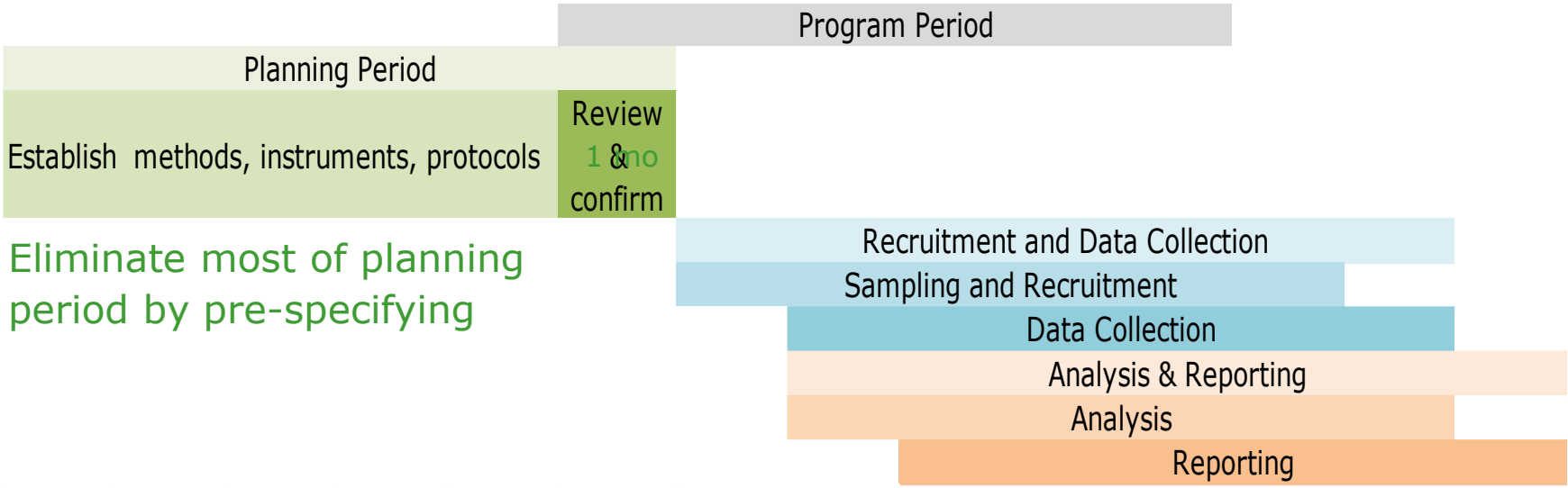
Recruiting & Data Collection

- 3-6 months of metering
- Recruitment, installation & retrieval

Reporting

- Stakeholder engagement
- Reporting & review of results

Streamlining the Process



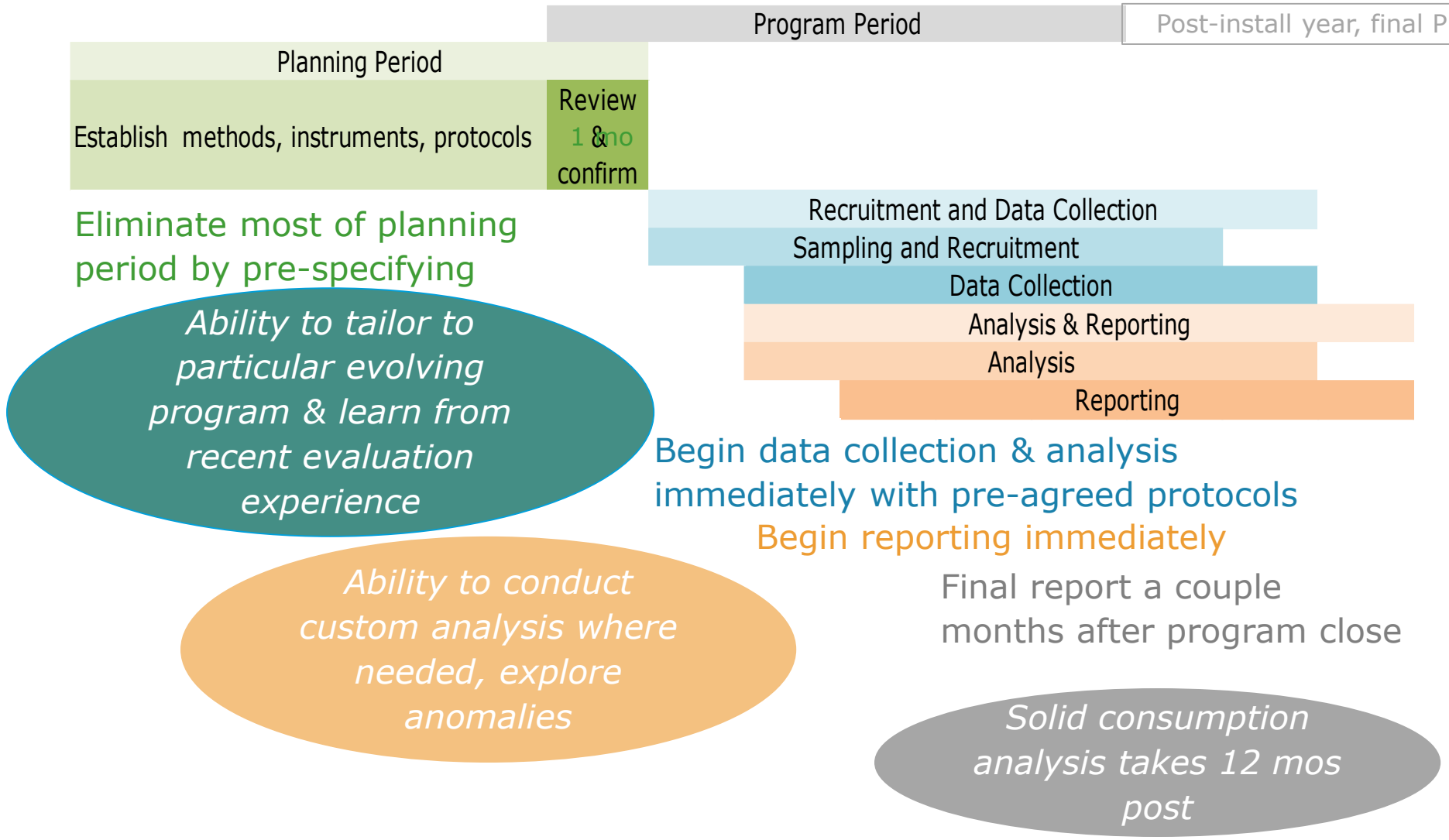
Eliminate most of planning period by pre-specifying

Begin data collection & analysis immediately with pre-agreed protocols

Begin reporting immediately

Final report a couple months after program close

Streamlining the Process—*What Would We Lose?*



Potential Uses of Advanced Data Collection and Automated Analytics for Evaluation

- Early, ongoing feedback is valuable even if it's not the final evaluation word

- Where programs are already gathering and analyzing data via new tools, evaluation ideally will take advantage of those data and analyses
  - Extends long-standing evaluation practice
  - Requires understanding program data handling & analysis, potential biases
  - Requires tool performance assessment
  - Still need evaluation review and potentially adjustment eg for data attrition bias

- Accuracy of baseline estimation tools can be tested empirically, up to a point
  - Often no observable "no-program" or "without the measure" condition
  - Transparency of "nonroutine adjustments" is a challenge

- Pre-agreed standard protocols can streamline evaluation
  - Automated ongoing data analysis is one example
  - Limits depth of exploration and customization possible
  - Establishing meaningful baselines for gross and net savings is not easily automated for many situations

Where Do New Tools Fit into Evaluation?