The Whole Is Greater Than the Sum of its Parts:

Finding Synergy Between Surveys and Consumption Analysis

Navigant

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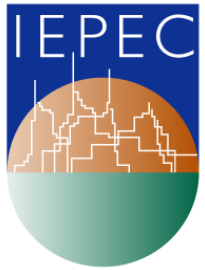

The Context

	Billing Analysis	Customer Surveys
Advantages	• Accurate estimates of what the savings are	• Explanation and context for the estimated savings
Limitations	• Not enough information to determine why the estimated savings were found	• Reliability of self-reported results • Uncertainty around which behaviors drive savings

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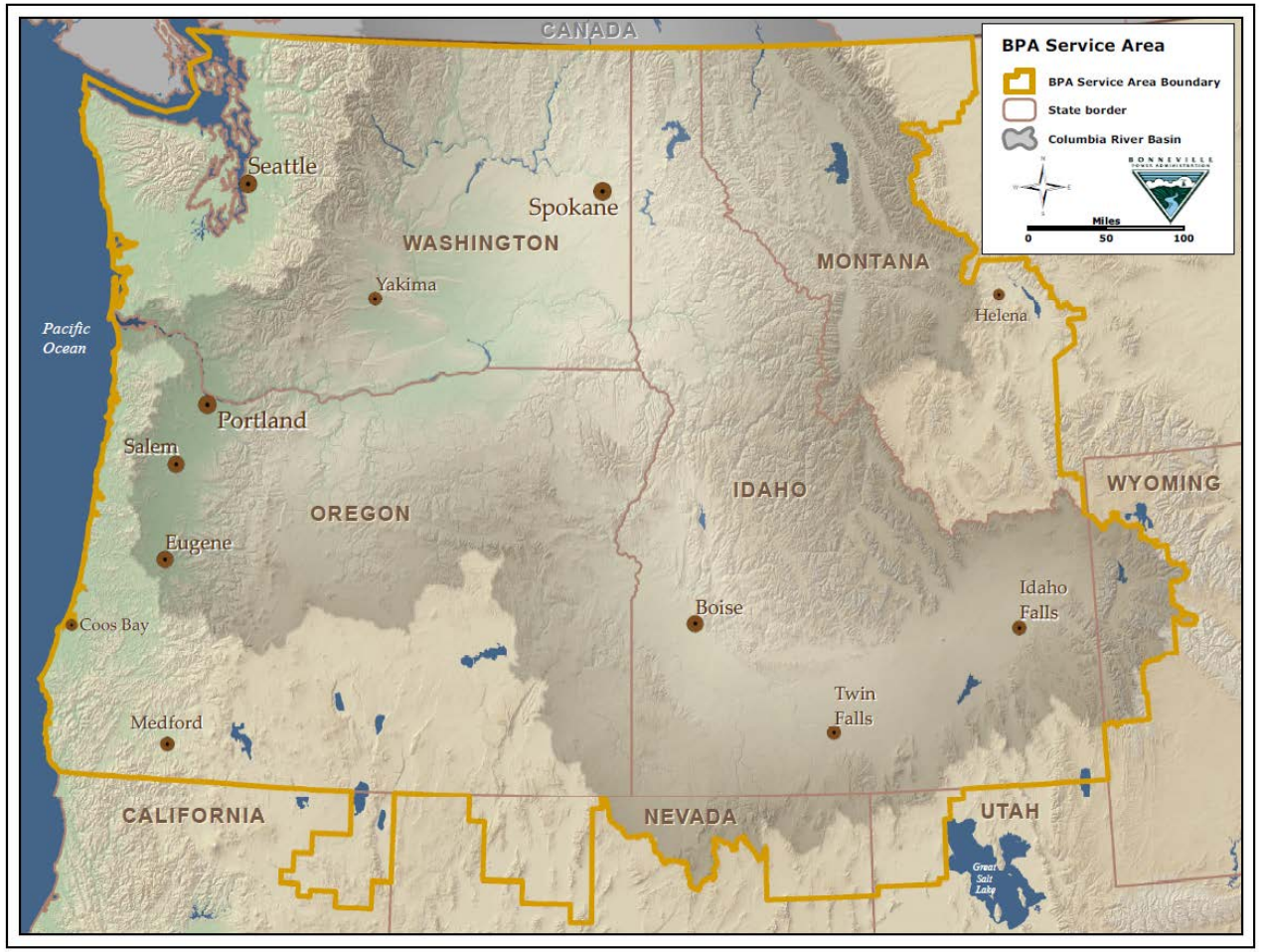
A comprehensive approach incorporating the survey responses with the billing analysis can combat these limitations.

Background



Source: Bonneville Power Administration

- Bonneville Power Administration covers a large territory in the Northwest
- Provides electricity primarily to public utility districts, municipalities, and electric cooperatives
- Maintains energy efficiency goals and incentivizes energy efficiency measures to help meet targets

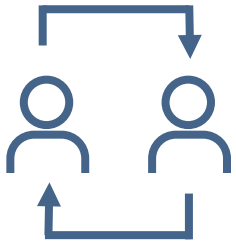
Study Objective

Evaluate energy savings from ductless heat pumps (DHPs) displacing the use of electric forced air furnaces (eFAFs) in residential homes

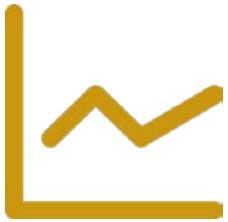
eFAF **DHP**

Billing Analysis Methodology

Data collection and cleaning: Collected monthly billing data and removed anomalous bills and sites that could not be included in the evaluation



Comparison group matching: Matched on pre-period energy use, heat zone, and home type



Regression analysis: Used a regression model to control for non-treatment differences in energy use between treatment and comparison group customers

Billing Analysis Results

The WHAT

Billing analysis results revealed savings estimates for DHPs were about **50% of the deemed savings.**

The WHY

The analysis and results gave **no indication as to why** the savings were lower than expected.

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The WHY

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Next step: provide context around the savings estimates found with the billing analysis.

Survey Implementation

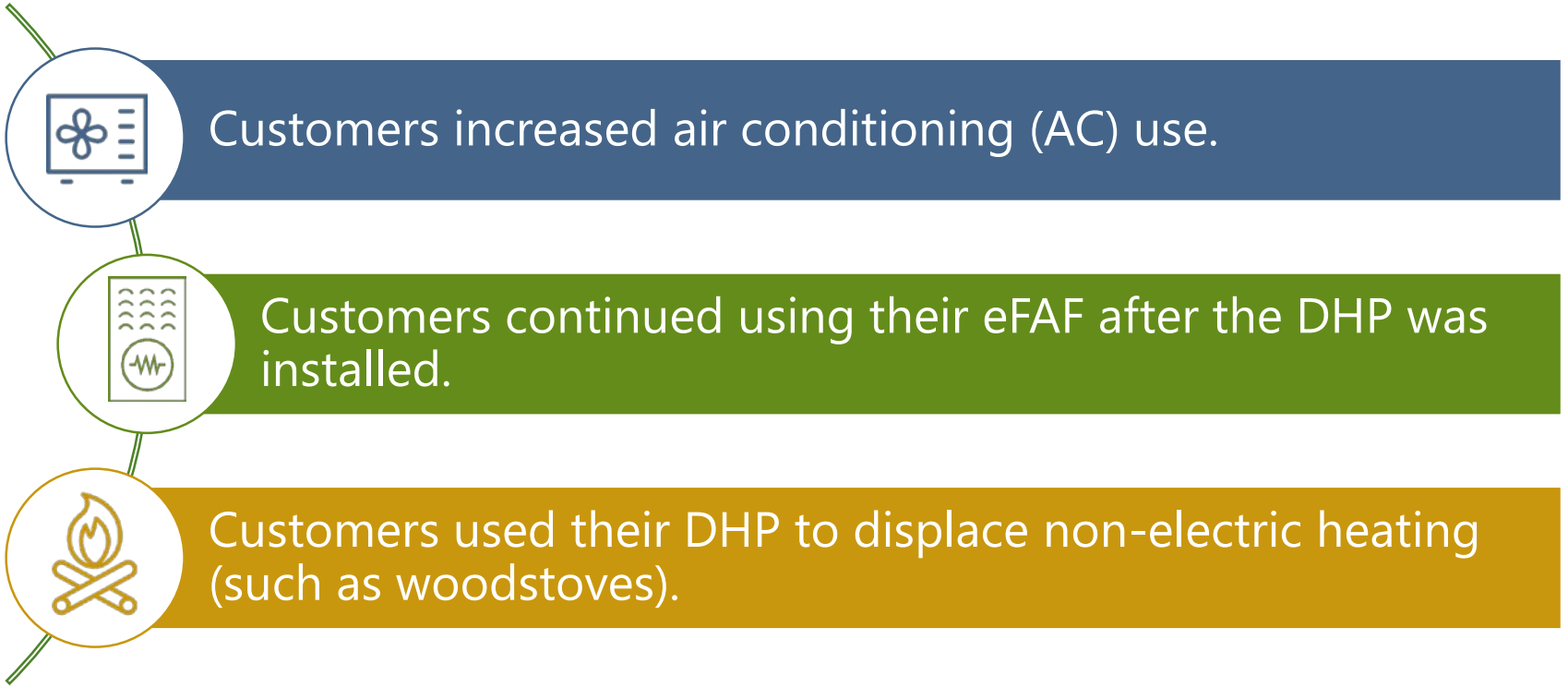
Goal: Design a survey to learn about customer behaviors and use of their heating equipment

Method: Field to phone and web-based survey to 487 customers who were included in our billing analysis

Response rate: 172 completes (35%)

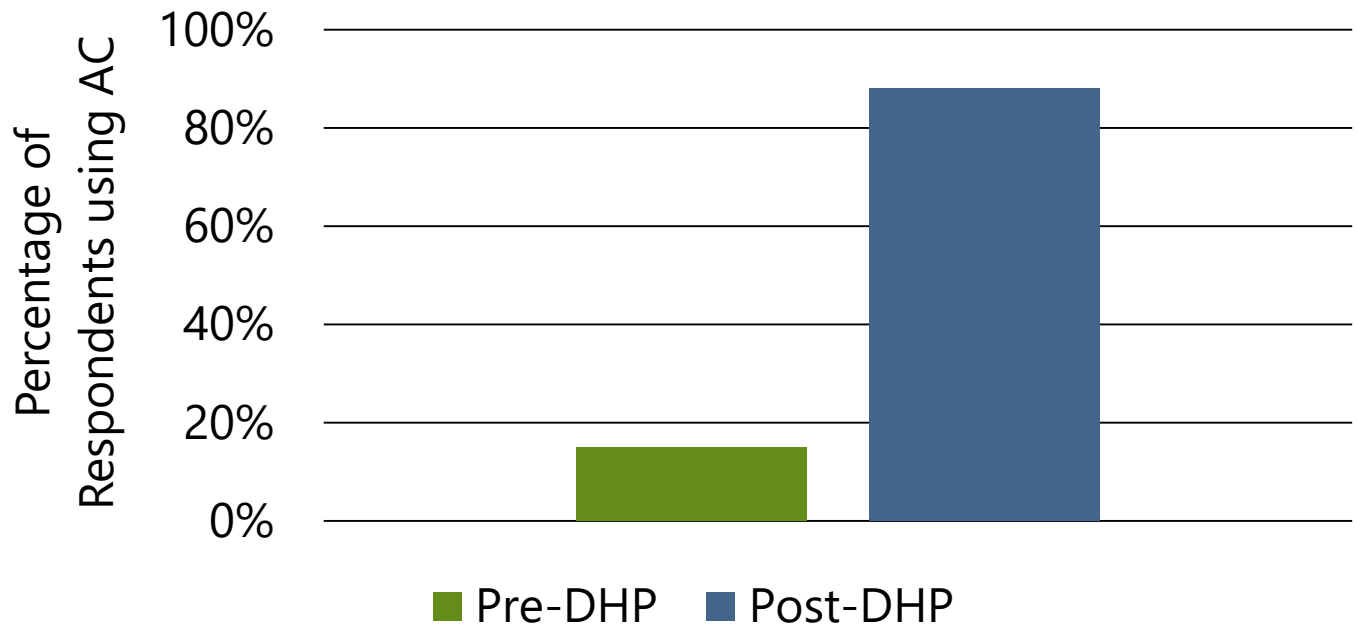
Survey Findings

Many customers responded to the survey indicating they use DHPs such that savings should be lower than expected



Investigate AC Use

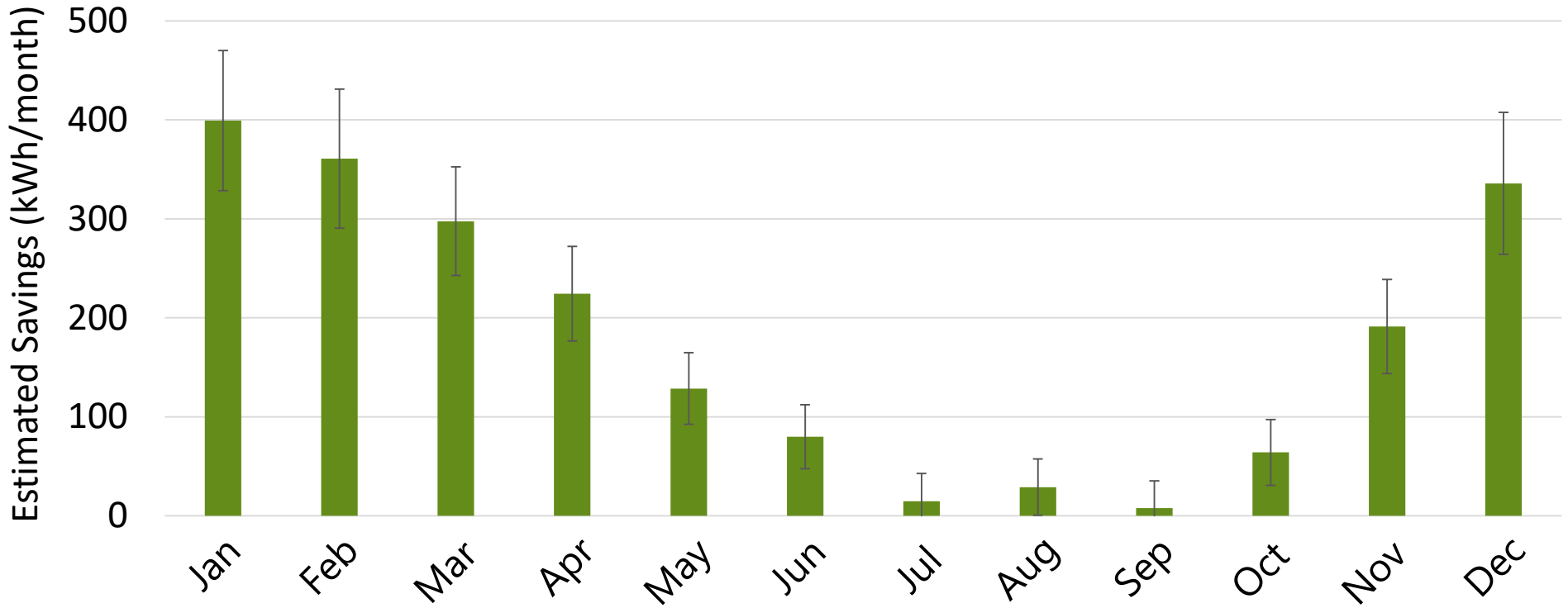
Ran a monthly model to determine if energy consumption increases during summer months due to increased AC use



AC Use Findings

Impacts during summer months are small but generally positive

Increased AC use due to new DHP installations is not a primary cause for lower than expected savings.



Investigate Customer Behaviors

Ran a model to determine if savings vary by a customer's assigned savings category

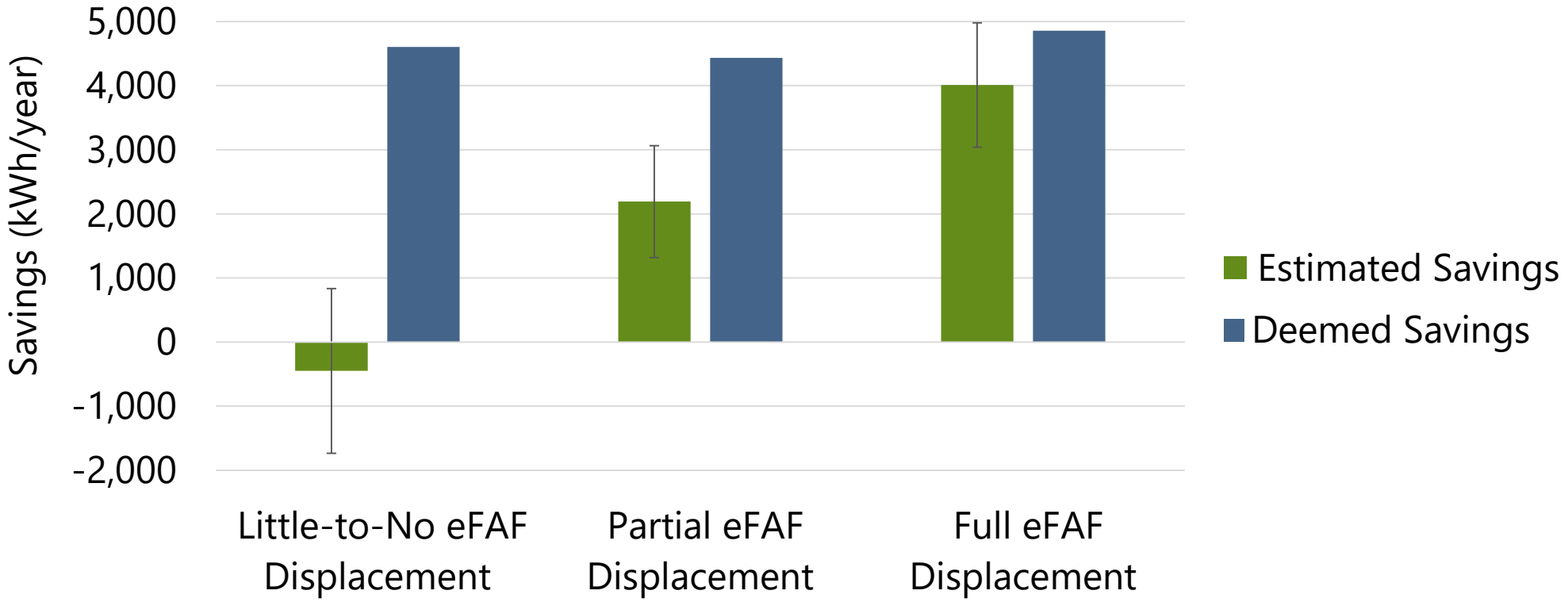
Category	**Expected Level of Savings**	**Description** Customers who:
Little-to-no eFAF displacement	Zero to negative	• Primarily used non-electric heat before DHP was installed • Did not use DHP for heating
Partial eFAF displacement	Positive but low	• Continued to use their eFAF • Displaced some non-electric heat
Full eFAF displacement	High	• Previously used their eFAF as the primary heating source AND completely stopped using the eFAF after the DHP was installed

Customer Behavior Findings

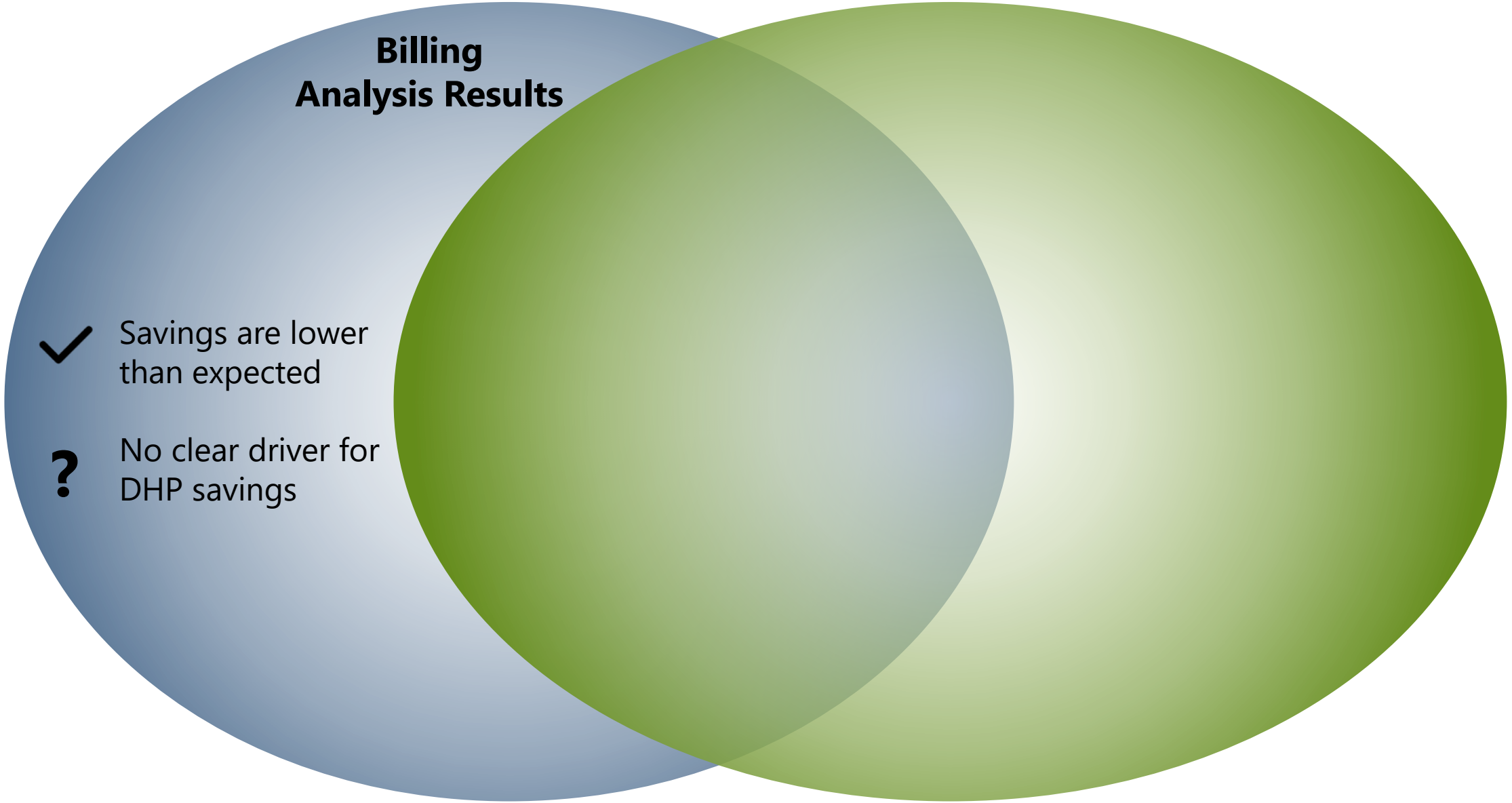
Higher savings: Customers who completely displaced the use of their eFAF

Lower savings: Customers who continued to use their eFAF or displaced non-electric heat

Customer behavior is a primary driver for lower than expected savings.



Results Summary



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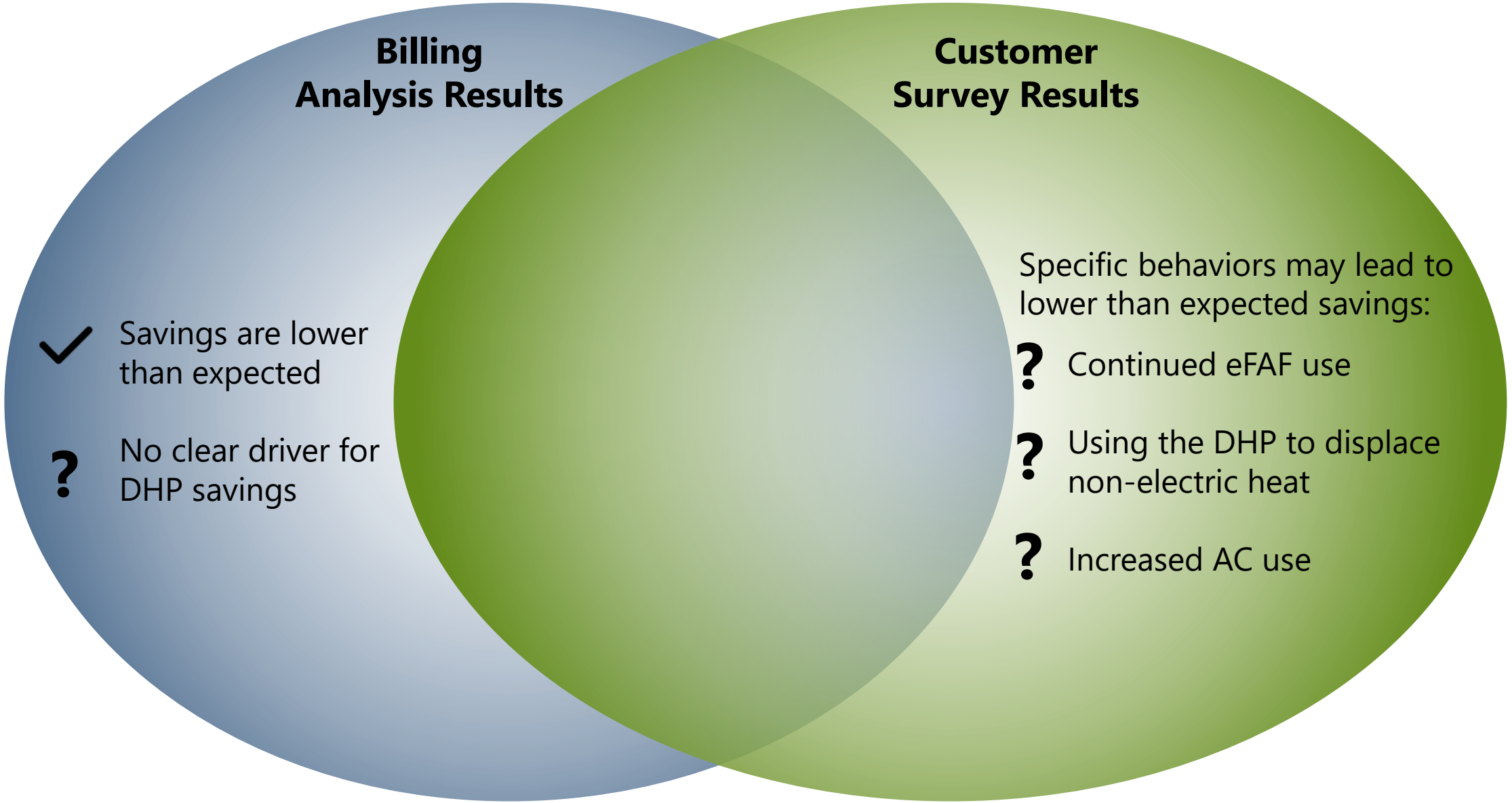

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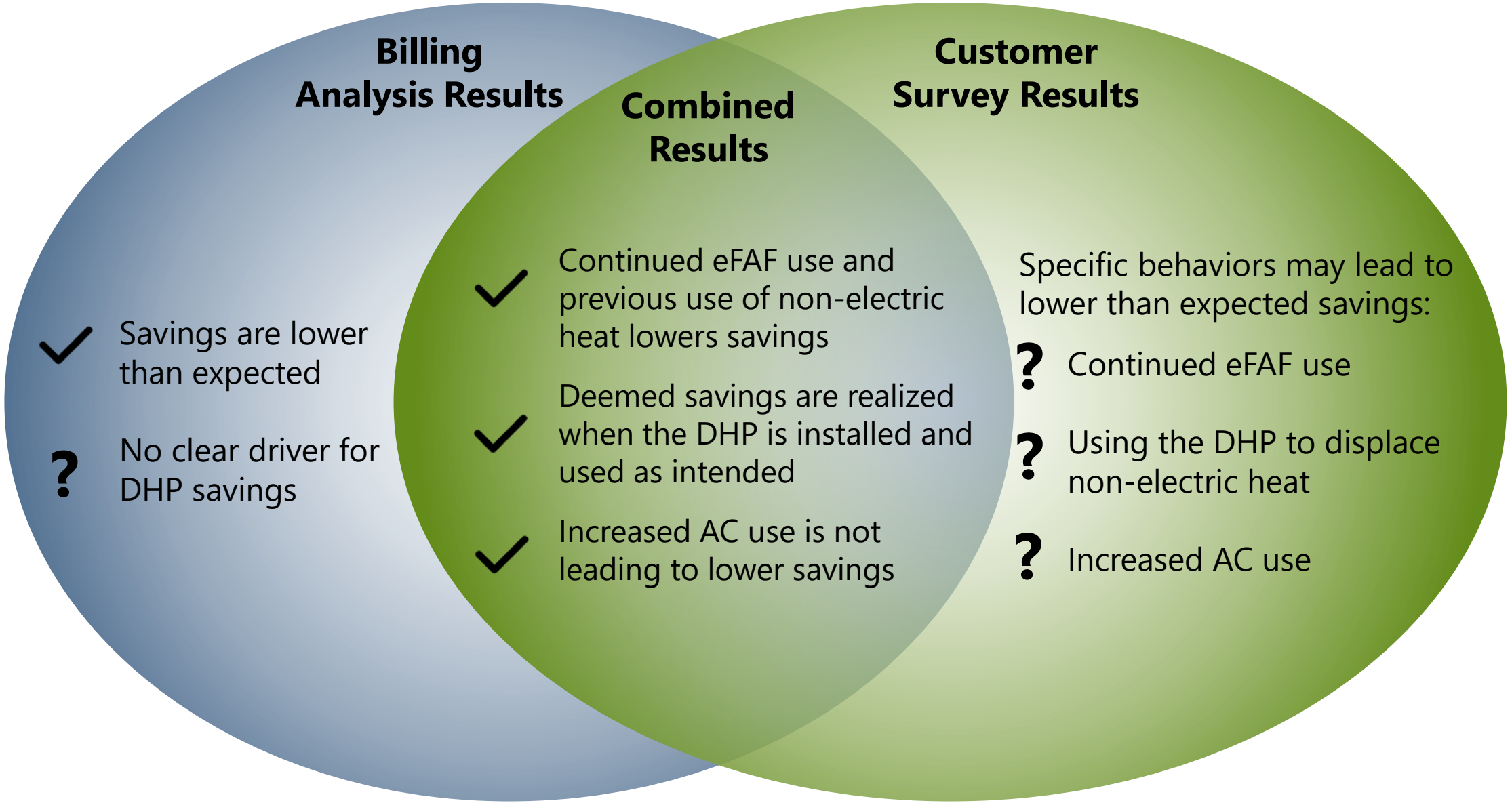

Key Takeaways

The What and The Why

This method can provide you with accurate savings estimates and with information for *why* the estimated savings were found.

Context Inspired Confidence

With context around the savings estimates, stakeholders can trust the results, which allows them to have productive conversations focused on improving measures.

Value Added

Understanding why the savings estimates were found allows evaluators to provide real world, actionable insights to program administrators and regulators to make informed decisions.

Thank You

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