A Customer-Oriented and Holistic Approach to Assessing Electrification Projects Using Cashflow Analysis
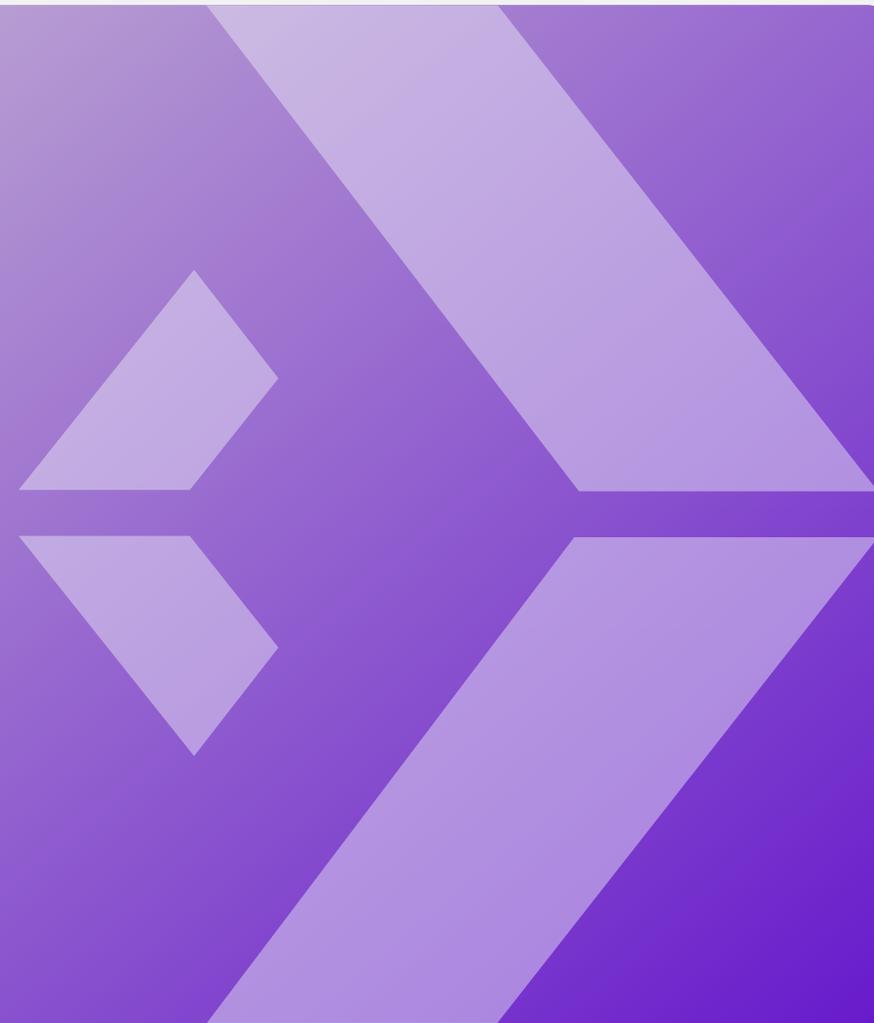
Presented by Angel Moreno

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Background and Motivation

The Case for Cashflow in Electrification Analysis

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Opportunities: Electrification on the Rise

Policy Drivers

Growing interest in electrification as a decarbonization strategy within energy efficiency programs.

Market expansion

Utilities and cities increasingly testing electrification pilots and incentive structures.

Equity emphasis

Regulators prioritizing affordability and access for financially vulnerable customers.

Program integration

Electrification measures now being evaluated alongside traditional efficiency upgrades.

IEPEC | October 6-8 | Denver, Co

Challenges in Assessing Electrification

Fuel switching trade-offs

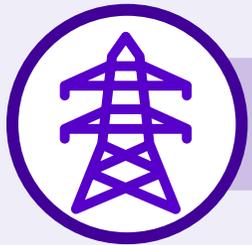Reduced gas use and increased electricity demand complicate impact estimates.

Rate structure variation

Bills affected by TOU, fixed, and low-income tariffs.

Infrastructure needs

Panel and circuit upgrades add cost and uncertainty.

System impacts

Coincident peak demand creates grid and planning challenges.

Why is a Customer-Oriented Lens Needed?

Traditional Assessments

- Focuses on **energy savings** and **cost-effectiveness** at program/portfolio level.

- Often **nets out details** that **matter for customers** (absolute usage not captured).

- Provides **limited insight** into monthly bill impacts and affordability.

Customer-Oriented Assessment

- Focuses on **monthly cashflow**, including financing, incentives, and bill impacts.

- Captures **customer perspective**, not just program or societal views.

- Helps utilities **design incentives that align** with customer affordability.

Customer-oriented assessment complements **traditional tools** by making impacts tangible for households.

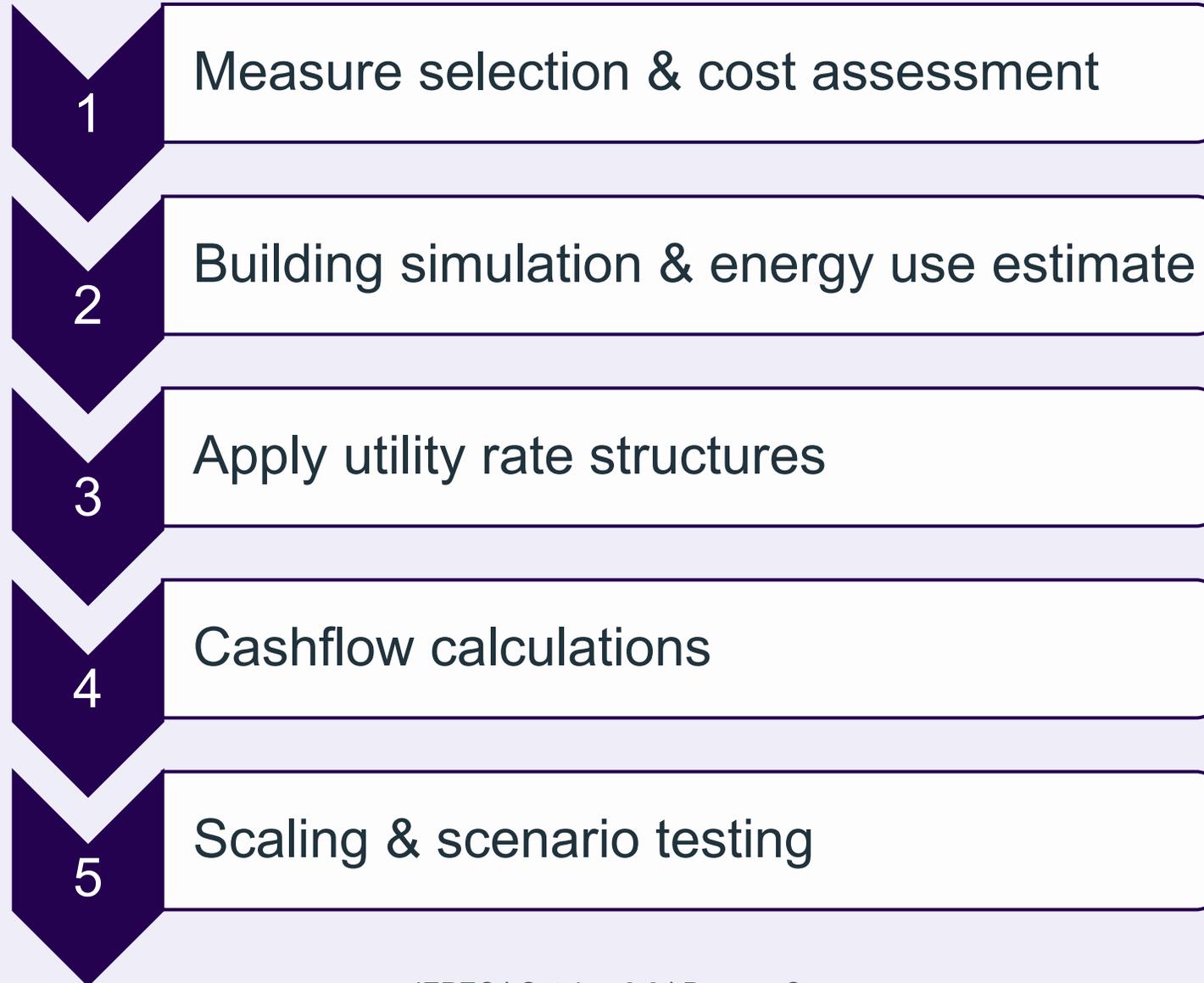# Cashflow Analysis Methodology

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Cashflow Analysis Accounts For Challenges in Assessing Electrification

- Reduction in Gas usage and increase in Electricity usage from fuel switching.

- Rate schedule changes from pre and post (TOU, fixed, all electric).

- Special considerations for vulnerable customers.

- Incentives and rebates by customer segment.

- Financing availability and terms.

- Infrastructure upgrade costs (panels, circuits, service).

- Single monthly net cashflow metric for customers.

- Connects technical outcomes to customer financial realities and supports incentive design.

Analysis Methodology: 5 Steps

1. Measure selection & cost assessment

2. Building simulation & energy use estimate

3. Apply utility rate structures

4. Cashflow calculations

5. Scaling & scenario testing

Step 1: Measure Selection & Cost Assessment

TASKS

- Identify **electrification measures**
- Estimate measure and infrastructure **costs**
- Determine available **rebates** for each customer segment

TIPS

- Be explicit about **cost definitions** to ensure transparency and comparability.
- Perform **sensitivity analysis** on the costs.

LIMITS

- Cost data can be **challenging to estimate**
- **Results** are only as **accurate as the assumptions** about costs & measures

Step 2: Building Simulation & Energy Use Estimate

TASKS
- Produce pre and post **hourly load profiles**
- Create **energy models** for baseline and electrified scenarios

TIPS
- Leverage **building archetypes** for different vintages
- Use **Advanced Metering Infrastructure (AMI) data analysis** for backward looking analysis
- Estimate deemed savings with **load shapes** for low rigor use cases

LIMITS
- Detailed modeling is **resource intensive**
- Results are only as accurate as the **input assumptions**

Step 3: Apply Utility Rate Structures

TASKS

- Convert **hourly usage** into **annual customer bills**
- Test different **electric rate designs** (Time Of Use, fixed, all electric)
- Distinguish **rate schedules** by customer segments and preferences

TIPS

- Confirm you are using the **correct rate schedule** for each scenario
- Monitor base **service charges** and **discounts** (vary across rate schedules)

LIMITS

- Ensure that **rate schedules** are up to date outdate (change over time)

Step 4: Cashflow Calculations

TASKS

Calculate monthly net cashflow:

Monthly Cashflow = (Annual Energy Cost Savings / 12) – Monthly Payments

- **Annual Energy Cost Savings** are the bill impacts of electrification.
- **Monthly Payments** associated the loan used to finance electrification upgrades.

LIMITS

- **High variation** for the counterfactuals and inputs
- **Monthly results are indicative**, not exact

Step 5: Scaling & Scenario Testing (Recommended use case)

TASKS
- Scale by **extrapolating results** to neighborhoods, programs, etc.
- **Test alternative scenarios** for rates, incentives, financing levels, and building vintages

TIPS
- **Scenario testing** and **incentive design** are ideal for analysis
- Confirm your **archetypes are representative** of your population to ensure accurate scaling

LIMITS
- **Estimates are indicative**, not exact (especially if incremental costs are used)

Example Results

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Applying Analysis Methodology on Different Archetypes

Electrification potential of high-rise multifamily buildings in San Francisco

- Four different building archetypes across two different customer segments.

- Analysis used incremental costs under a "Replace on Burnout" scenario and assumed cooling in baseline for post-1990 buildings

Applying Analysis Methodology on Different Archetypes

Electrification potential of **high-rise multifamily buildings** in **San Francisco**

- Monthly payments are expected to **increase** in all scenarios.

- The increase is lower for the **1990-Present archetype**, as the incremental costs are lower due to existing baseline cooling.

- Increase is lower for **Income Qualified customers** due to access higher incentive, which offsets costs for electrification.

End Use	Regular Rates				Income Qualified Rates			
	Pre 1950s	1950-1980	1980s	1990-Present	Pre 1950s	1950-1980	1980s	1990-Present
Total Monthly Cashflow	($86)	($84)	($84)	($29)	($52)	($49)	($50)	($4)

A negative value implies that the total loan payment is greater than any energy cost savings associated with electrification.

QUESTIONS?

Thank You

For more details, contact:
Angel Moreno (Amoreno@trccompanies.com)
Sagar Deo (SDeo@trccompanies.com)