Opinion Dynamics

IEPEC

Transportation Electrification

Using Embedded Evaluation to Improve EV Initiatives and Optimize Learning

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Presentation Structure

- Evaluation approaches
- Value of embedded evaluation
  - Example 1: Electric Bus Deployment Pilot
  - Example 2: Outreach, Marketing & Charging Infrastructure Deployment Pilot

Evaluation Continuum

Independent Third-party External Evaluation

Highly Embedded Evaluation

Example 1: External evaluator and fixed evaluation design

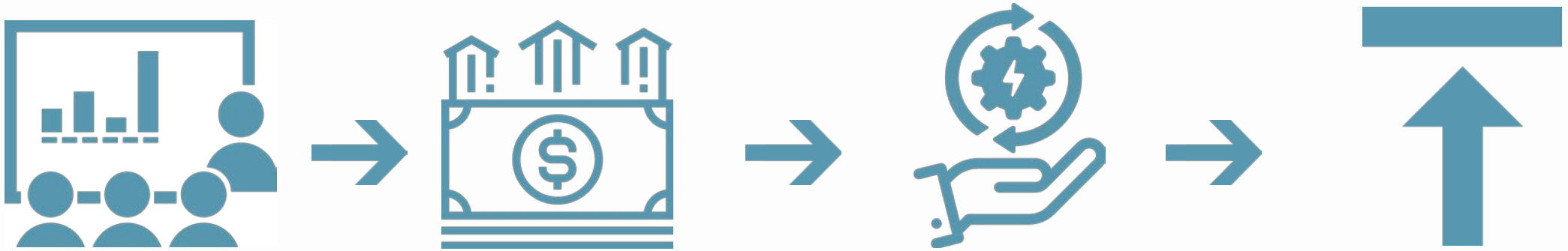
Example 2: Adaptive program design, internal formative evaluation & external summative evaluation

Example 3: Adaptive program design, embedded but still external summative evaluation

Example 4: Adaptive program design, adaptive and embedded internal evaluation

Electric Bus Operator Training Program in California

Highly embedded evaluation measuring the effect of:



Value of Embedded Evaluation: Early Program Design Feedback

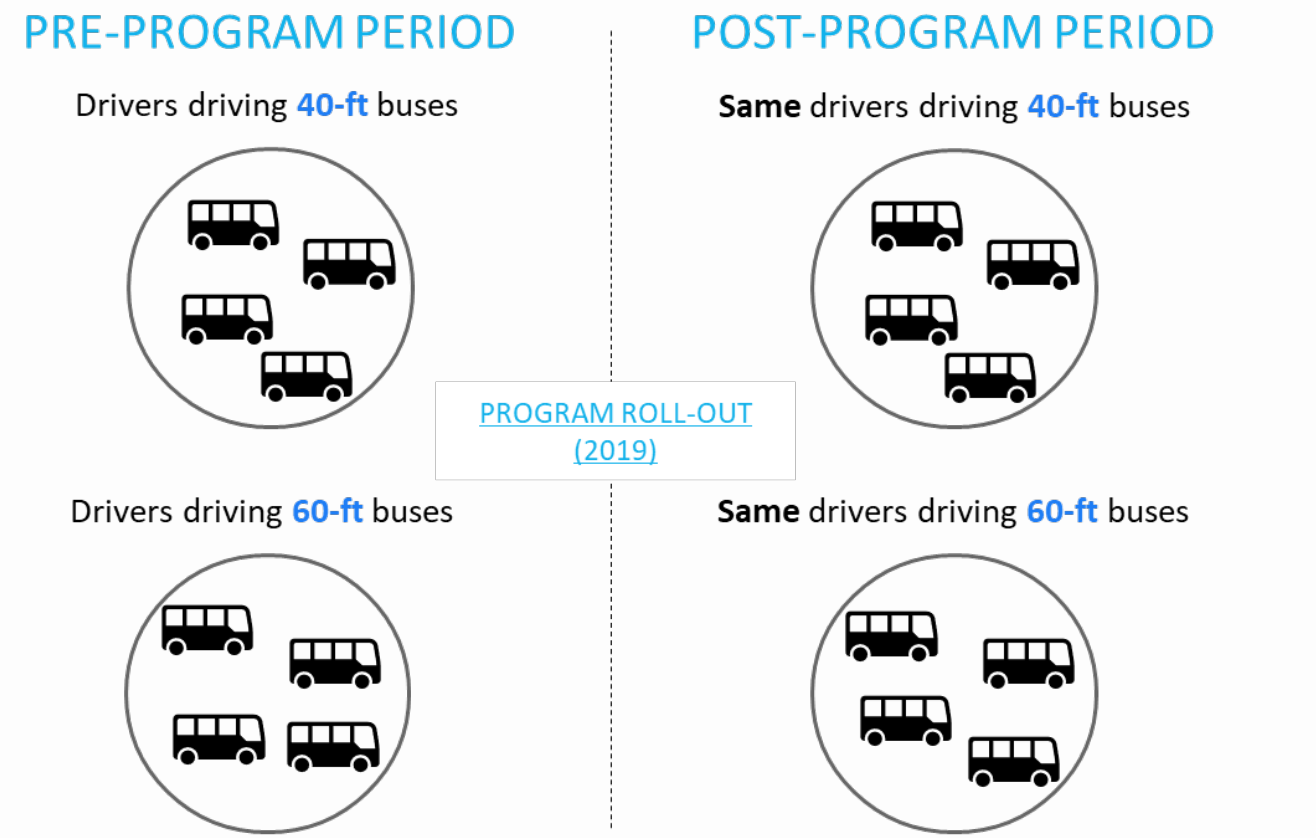
- Evaluators collaborated with implementers to collect the E-Bus and driver baseline data (pre-program roll out data)
- Baseline data examined:
  - Driver coasting & braking
    - Affects kWh/mile
  - Acceleration
    - No impact on kWh/mile
- Training and feedback focused on coasting and gradual deceleration

Value of Embedded Evaluation: Ensuring Program Can Be Evaluated

Checking Assumptions

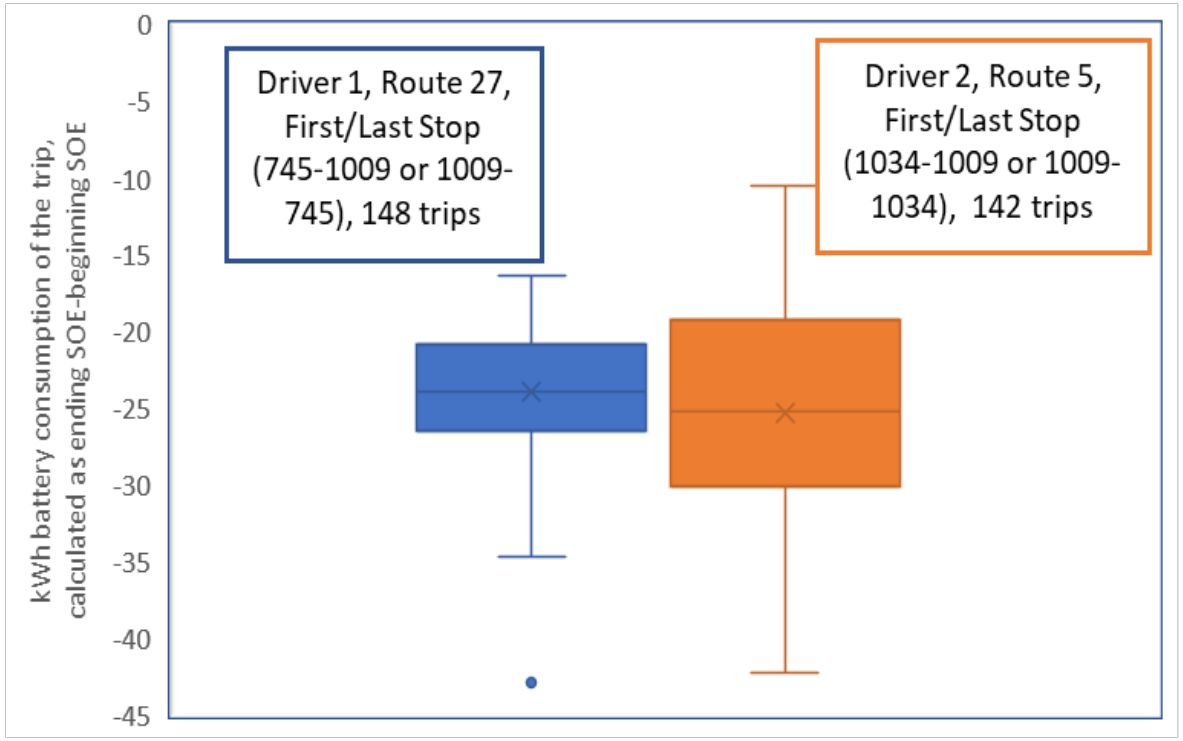
Assumption:

The battery capacities among buses of the same size are the same



Value of Embedded Evaluation: Ensuring Program Can Be Evaluated

- Identified 2 drivers who logged over 140 trips each on a particular route, with each trip having the same distance during the baseline data collection period



Value of Embedded Evaluation: Ensuring Program Can Be Evaluated

- Ran a regression model
  - Model 1 DV= The battery kWh usage data for Driver 1 on Route 27
  - Model 2 DV= The battery kWh usage data for Driver 2 on Route 5
  - Explanatory variables=40-foot Bus IDs
  - R-square values and Bus ID coefficients were *not* significant in either model
    - Which supports assumption that the buses of the same size do not explain variability in bus battery kWh usage

Evaluation of 3 EV Pilots in PNW

Evaluation Type: Formative external evaluation measuring the effect of:

Infrastructure deployment on adoption

Marketing and Outreach on adoption

Value of Embedded Evaluation: Documenting Expected Outcomes

Adaptive/ embedded components:

3 interactive 60-90 minute logic model sessions to:

1. help utility staff document intended outcomes
2. develop KPIs

KPI	Description	Goal
Built chargers work	Chargers fully tested and operating, and continue to work	100% functioning during the first year
Customers aware of charging stations	Increase in awareness Baseline: 5% of customers aware where to charge in public prior to the pilot	Awareness increases to 7-8%
Downtime minimized	Downtime by station	7% downtime
% lift in MWh connected charge	MWh data collected by the charging station payment vendor	2% lift per year
EV registrations	~40,000 registered EVs in the program administrator's territory by 2020	~40,000

Value of Embedded Evaluation: Early Market Feedback

- PNW Pilot Administrator offered employees a rebate for buying an EV
  - Those who bought an EV completed a survey
  - Survey responses revealed
    - 23% had an issue with one of the dealerships they visited, such as:
      - Inaccurate or dishonest pricing on EVs (43%)
      - General poor customer service or communication on EVs (40%)
      - Lack of knowledge of or interest in selling EVs (20%)
  - This feedback helped the administrator think through the strategies focused on dealerships

What is next

- Electric Bus project
  - Final results publicly available February 2020
- PNW 3 EV Pilot Project
  - 2020 data collection and analyses
    - Surveys (Gen. Population, EV drivers, etc.)
    - Charging utilization load profiles and grid impacts
    - In-depth interviews/focus groups with Pilot partners & TNC drivers
  - Results available at the end of 2020
  - Research continues in 2021 and 2022

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