Urban Freight:
Transitions and Opportunities

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Our Vision

URBAN FREIGHT LAB
UNIVERSITY of WASHINGTON

The Urban Freight Lab is an innovative partnership bringing together private industry, academic researchers, and public transportation agencies to solve urban freight management problems bringing benefits to customers, carriers, and community.

Diverse and Relevant Membership –
covering a wide range of urban freight stakeholders

Seattle Department of Transportation

City of Bellevue

NEW YORK CITY DOT

Frontier MPO

How We Work

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- Engage with private sector executives and operations staff
- Engage with public sector planning and engineering
- Financial commitment from private sector
- Problems are jointly defined
- Academic analyses *and* ground-truthed tests
- Ideas *and* evaluations, analyses, and tests

Areas of Research

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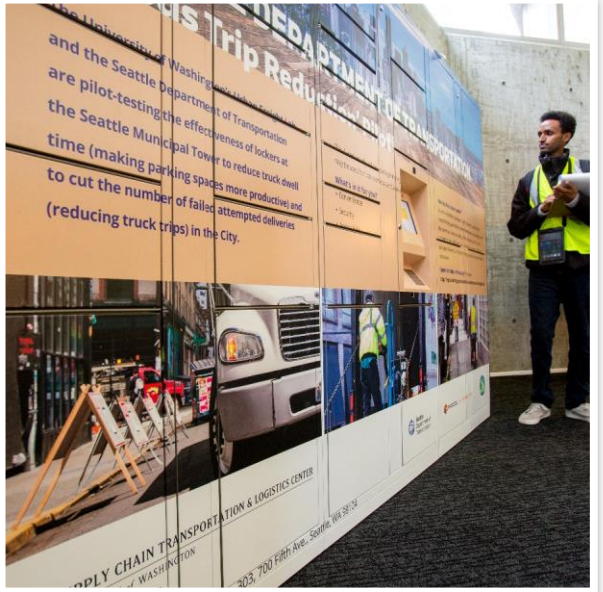
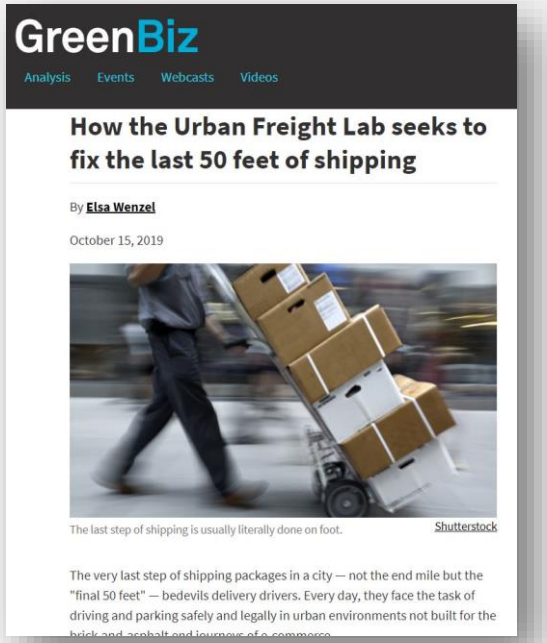
1. Urban Goods Delivery
2. Sustainable Urban Freight
3. Curbspace Management
4. Zero Emissions Freight



Architects of the Final Fifty Feet

UFL originated the term “Final Fifty Feet”

- Identified this as a costly, understudied area
- Conducted research that has provided a foundation for the industry
- Inspired follow-on research and exploration
- Changed the phrase “illegal parking” to “insufficiency of alternatives”


GreenBiz

Analysis Events Webcasts Videos

How the Urban Freight Lab seeks to fix the last 50 feet of shipping

By Elsa Wenzel

October 15, 2019

The last step of shipping is usually literally done on foot. Shutterstock

The very last step of shipping packages in a city — not the end mile but the "final 50 feet" — bedevils delivery drivers. Every day, they face the task of driving and parking safely and legally in urban environments not built for the

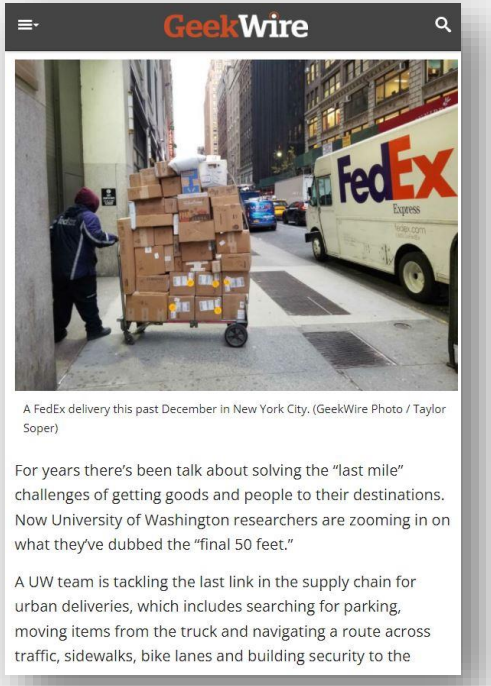

GeekWire

Researchers tackle the ‘final 50 feet’ of delivery challenge as online shopping spikes

BY LISA STIFFLER on January 18, 2020 at 10:00 am

Underwritten by Singh Family Foundation

This special series focuses on important community issues, innovative solutions to societal challenges, and people and non-profit groups making an impact through technology.


GeekWire

A FedEx delivery this past December in New York City. (GeekWire Photo / Taylor Soper)

For years there’s been talk about solving the “last mile” challenges of getting goods and people to their destinations. Now University of Washington researchers are zooming in on what they’ve dubbed the “final 50 feet.”

A UW team is tackling the last link in the supply chain for urban deliveries, which includes searching for parking, moving items from the truck and navigating a route across traffic, sidewalks, bike lanes and building security to the


Seattle Department of Transportation

THE FINAL 50 FEET
URBAN GOODS DELIVERY SYSTEM

Research Scan and Data Collection Project

FINAL REPORT January 19, 2018

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College of Engineering

Quantifying Urban Freight

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- First to quantify parking cruising for commercial vehicles
  - On average a commercial vehicle spent 2.3 minutes cruising per trip. This corresponds to a 28% of the total trip time on average. A parcel delivery vehicle spends on average 1.1 hours a day cruising.
- First to quantify required space around commercial vehicles required for safe operations
  - 3 feet at front and sides of vehicle
  - 3 feet beyond extension of ramp or lift-gate at rear of vehicle

Quantifying Urban Freight (Cont'd)

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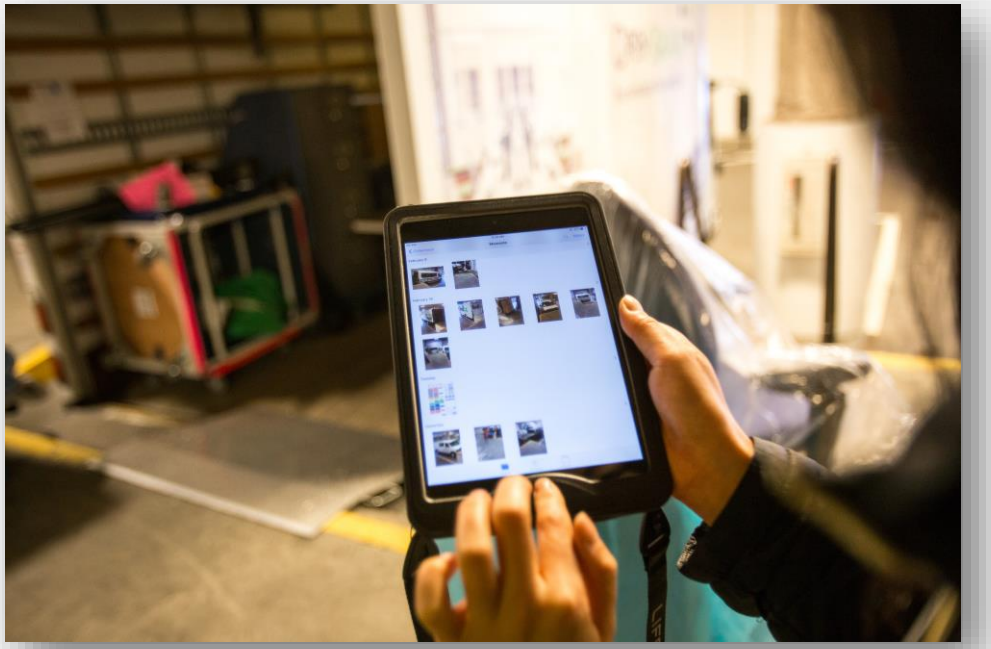
- Bring fleet data to inform policy makers:
  - In Seattle, the vast majority of commercial vehicles are relatively small:
    - 54% are commercial pick-ups and work-vans
    - Additional 30% are single-unit 2-axle vehicles
  - Services account for 30% of all commercial vehicle traffic
- Measuring parking capacity:
  - There is about as much capacity in off-street loading bays and loading docks as there is at the curb in Greater Downtown Seattle



Measuring Urban Freight Solutions

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- Carried out the first pilot of a common locker, and the only studies of common carrier lockers and their impact on regional transportation.
  - 50% drop in average time spent in the building
  - 33% drop in delivery vehicles' dwell time at the curb
- Quantify the benefits of cargo bike deliveries replacing truck deliveries
  - E-bikes halved VMT per package compared to trucks
  - E-bikes reduced tailpipe emissions by 30% compared to trucks
  - E-bikes maintained time spent per package
  - 10 trucks could be replaced by seven e-bikes

Urban Freight Lab Common Microhub Pilot

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As one of the US's first zero-emissions last-mile delivery pilots, the Seattle Neighborhood Delivery Hub served as a testbed for innovative sustainable urban logistics strategies on the ground in Seattle's dense Uptown neighborhood.

Background/Motivation

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- UFL Members voted in early 2020 and collaboratively chose the microhub as next pilot project
- Opportunity to test and evaluate urban logistics strategies on the ground in Seattle's Uptown neighborhood
- Identify the benefits and costs of hubs in urban delivery systems:
  - Does the hub reduce CO_2 emissions per package?
  - Does the hub reduce the number of truck miles required for delivery?
  - Is the hub's shared cost model cost effective?
- Guide the future development of similar sustainable city logistics solutions around the world

Partners and Products

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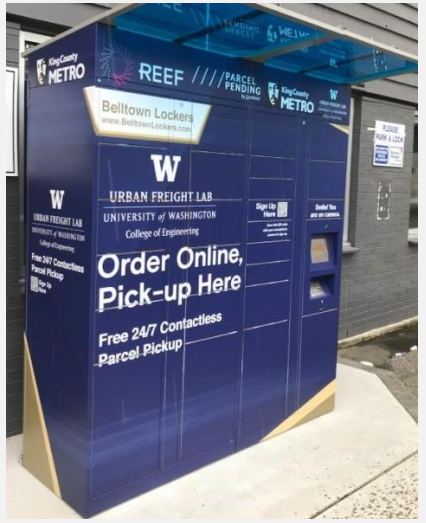
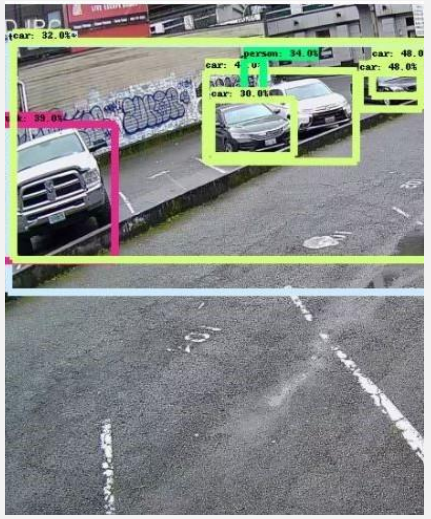
- Common Carrier Parcel Lockers: **UFL**
  - ✓ Available for neighborhood residents and commuters
- Ghost Kitchen and MicroHub infrastructure: **REEF**
  - ✓ On-site food preparation and delivery staging
- Last Mile Deliveries: **AxleHire**
  - ✓ Provides last mile services using Microhub as a transshipment point
- Electric-Assist Cargo Bike Fleet: **Coaster Cycles**
  - ✓ Customized electric-assist cargo bikes to carry electric pallets
- Electric Pallet (EP1): **Bright Drop (GM)**
  - ✓ Provides a propulsion-assisted electric pallet for moving goods from a delivery vehicle to a customer's door.
- MUST Sensors: **UW STAR Lab**
  - ✓ Comprehensive edge-computing based sensing and communication device for data collection
- Data Sharing: **SDOT**
  - ✓ 30% zero emission delivery by 2030





Site Selection Process & Criteria

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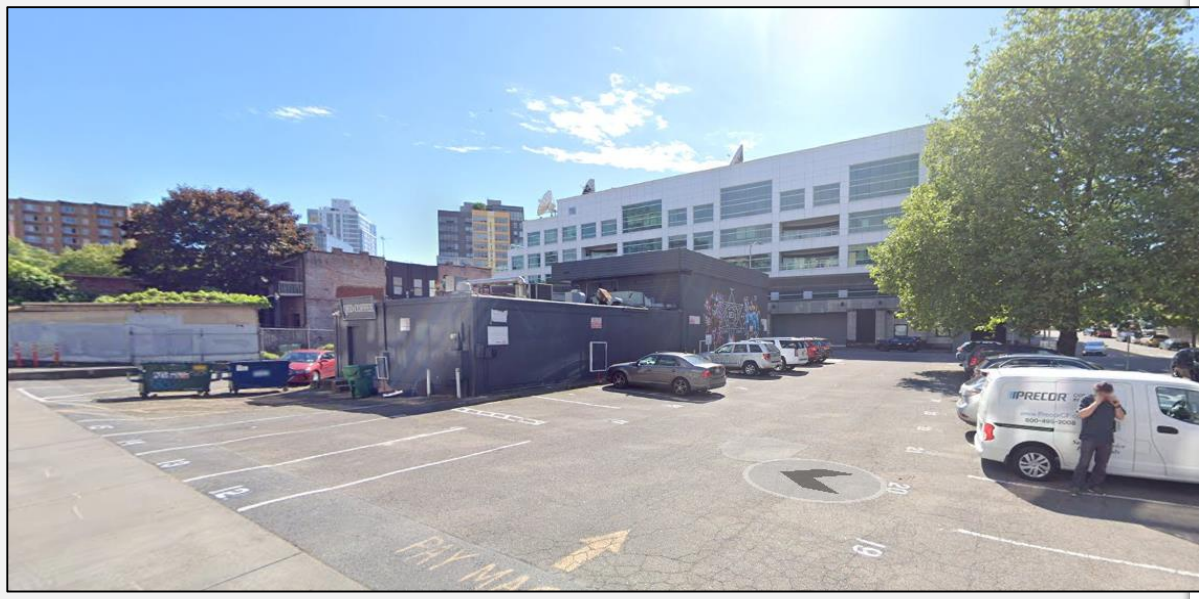
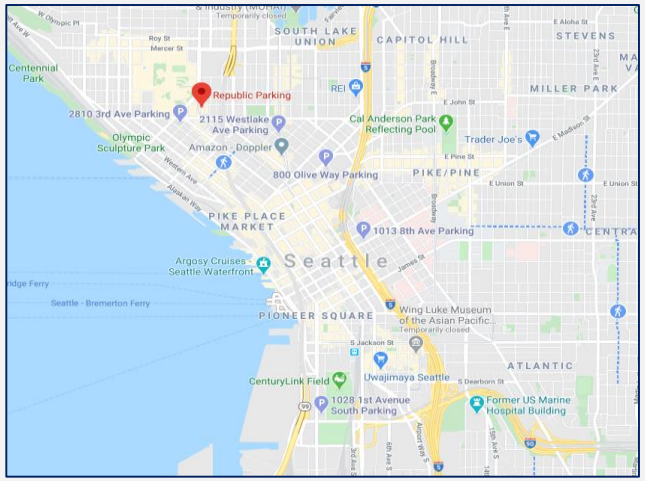
- Surveyed partners on requirements and preferences for participation
- Identified top requirements:
  - Height Clearance
  - Infrastructure: electricity, WiFi, security, signage
- Identified top preferences:
  - Customer access
  - Proximity to transit, located in mixed use neighborhood
- Utilized information from surveys to conduct site analysis from existing REEF Seattle real estate portfolio





Project Timeline

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Summer 2020
Project partners established & site selected

April 5, 2021
E-bike deliveries started

Early 2020
UFL members identify project

March 2021
UFL locker started operation

May 26, 2021
Microhub Launch

July 23, 2021
Closing date

Empirical Results from the Pilot Test

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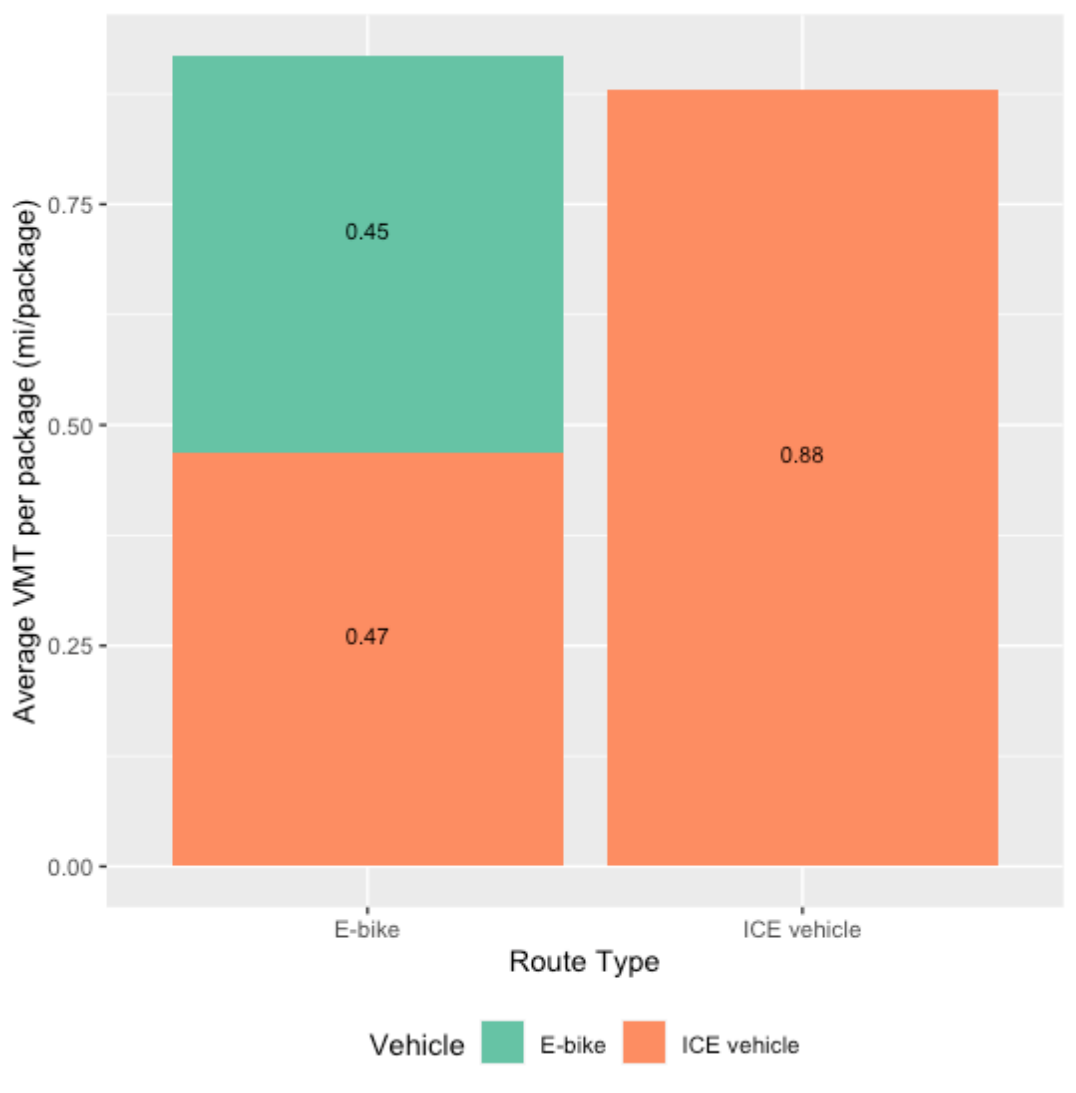

50%

E-bike solution produces half the ICE vehicle miles travelled per package

Empirical Results from the Pilot Test (cont'd)

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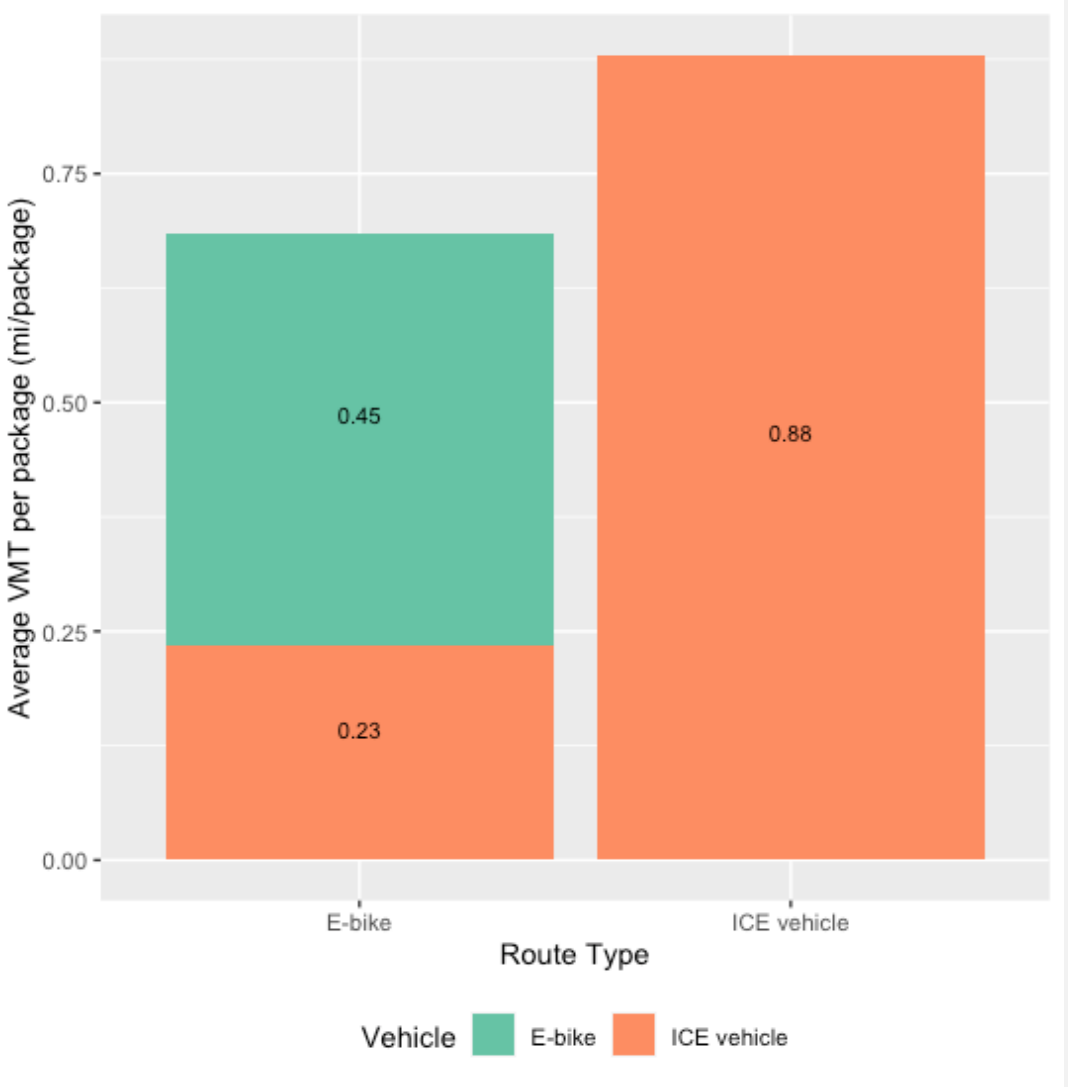
1 bike mile = 1.4 truck miles



*If e-bikes were operating 8 hours a day (completing 4 routes)

Empirical Results from the Pilot Test (cont'd)

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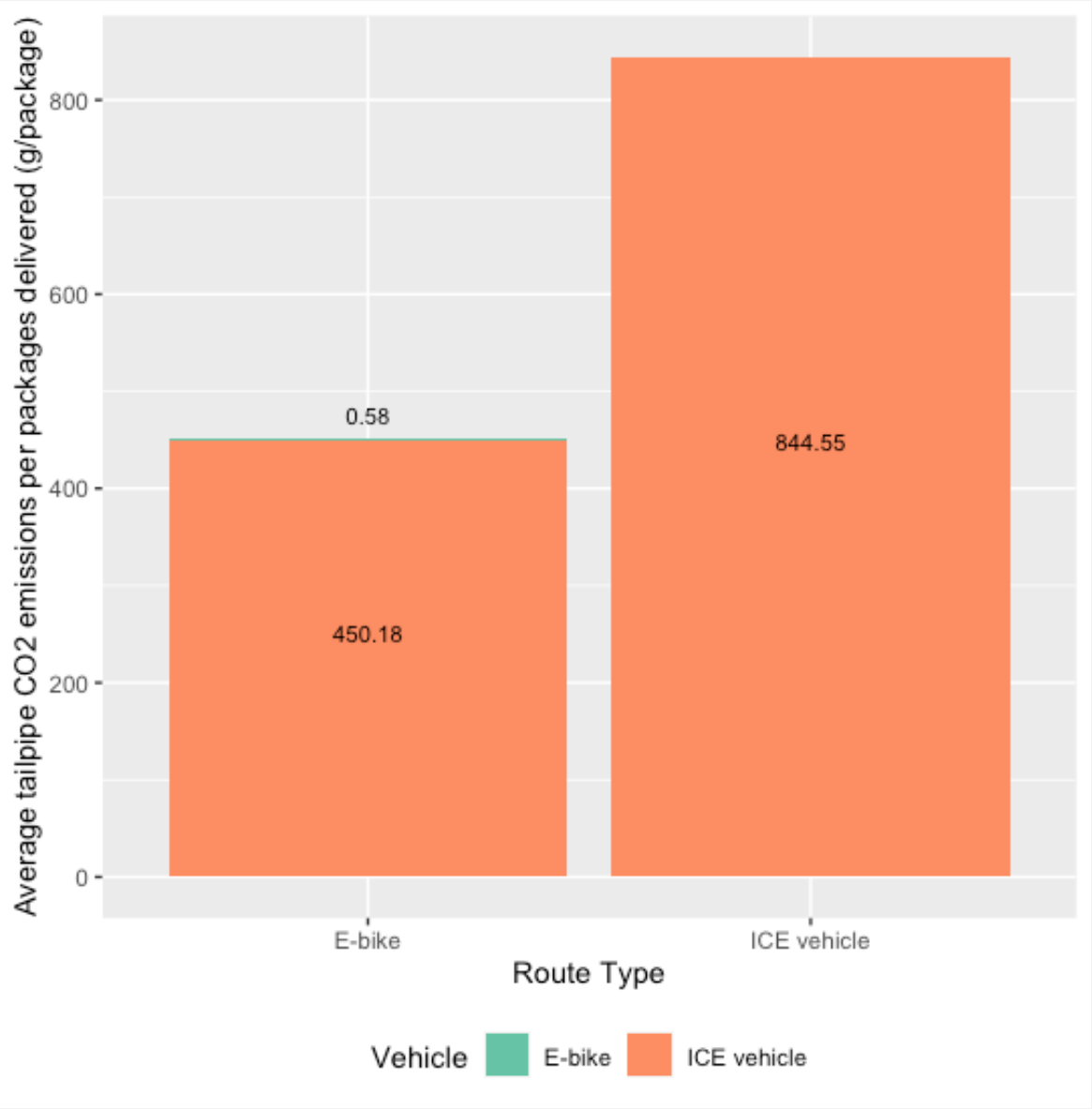
30%

Reduction in tailpipe emissions per package using E-bike solution.



Empirical Results from the Pilot Test (cont'd)

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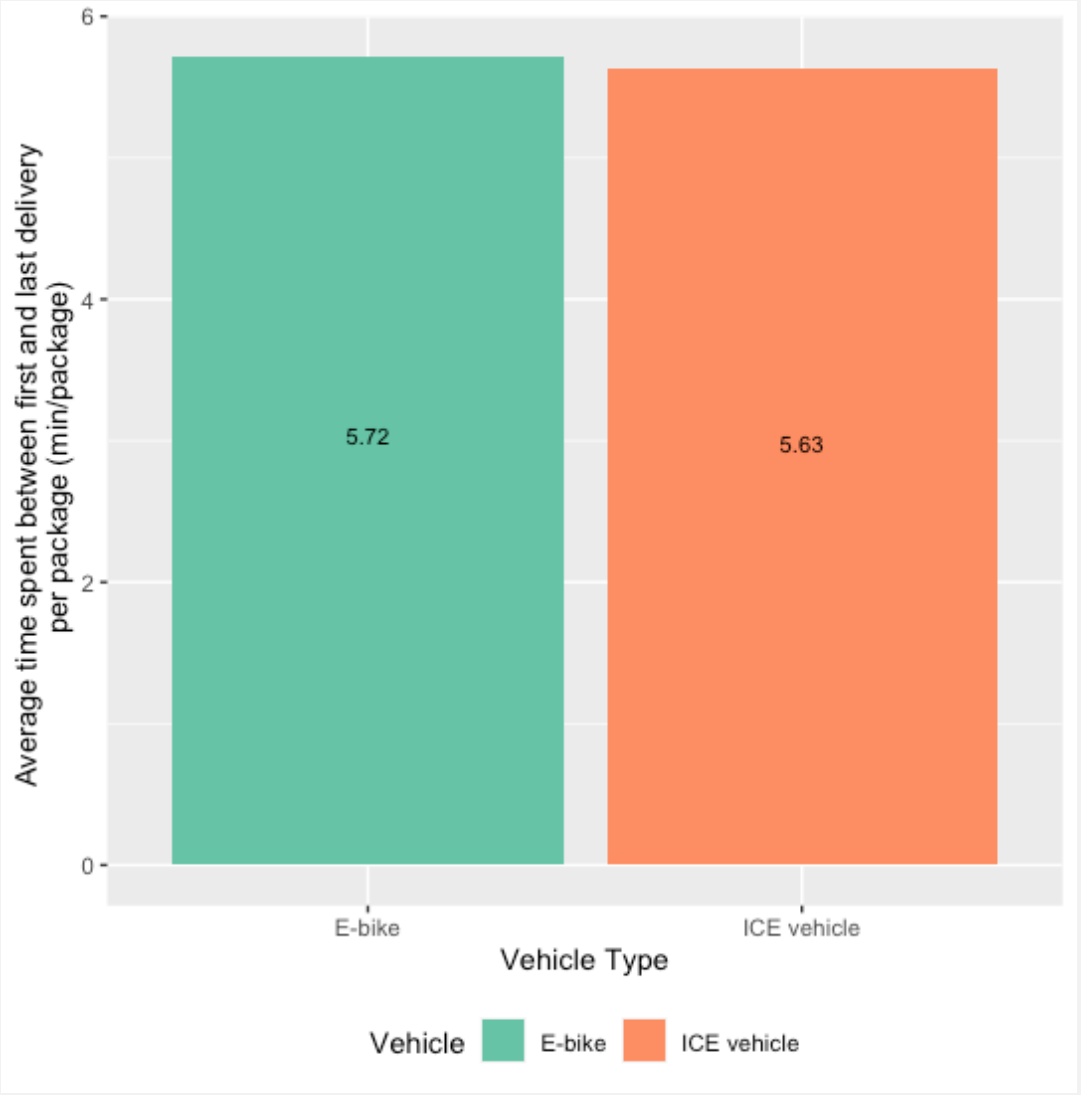
Increase in time per package



* excludes the trip duration to and from the microhub

We pilot tested a common-carrier parcel locker in a residential building in downtown Seattle.

Sponsored by the U.S. Department of Energy | 2019-2021

Locker provider partner: PARCEL //// PENDING

We collected data before and after locker installation from the study building, as well as a similar nearby building as a control building.

- ✓ Similar floor area ratio
- ✓ Similar number of units and residents
- ✓ Similar nearby loading zone availability
- ✓ Same neighborhood and similar traffic patterns

Data Collection

- ➢ Before: Summer 2020
- ➢ After: Winter 2021

Findings

Empirical Analysis

The locker resulted in …

%50 in average **time spent in the building**

%33 in delivery vehicles' **dwell time** at the curb

Changing the way people think about freight

- UFL has raised the profile of urban freight and its potential to improve urban living
  - Defined the unique characteristics of urban freight as **separate from heavy freight** and an **integral part of neighborhood function**
  - Framed freight transportation as **interconnected with passenger travel**
  - **Educated policy makers** about urban freight at the international, national, and regional level
- UFL has demonstrated that a long-lasting collaboration between academia, private and public sectors is possible and productive
  - UFL has provided a **trusted impartial ground to pursue the mutual goal** of improving urban freight operation and management

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Questions?

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