

E-bikes, Electric Assist Bikes, and Transportation Policy

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November 19, 2014



Association of Pedestrian and Bicycle Professionals
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More information on this topic

Boulder's Electric Bike Pilot Project

<https://bouldercolorado.gov/goboulder/electric-assisted-bikes-policy-review>

Portland State University webinar "E-Bikes: Generating the Next Wave of Cyclists" <http://www.pdx.edu/ibpi/e-bikes-generating-the-new-wave-of-cyclists>

National Institute for Transportation and Communities (NITC) report, "Regulations of E-Bikes in North America" (NITC-RR-564; August 2014) http://ppms.otrec.us/media/project_files/NITC-RR-564_Regulations_of_E-Bikes_in_North_America_3.pdf

Portland State University's Research Project page for e-bikes (includes link to NITC report and other documents): <http://trec.pdx.edu/research/project/564>

League of American Bicyclists survey: Electric Bike Perceptions and Policy <https://www.surveymonkey.com/s/2HKSVP>

Light Electric Vehicle Education and Research Center (LEVER) at University of Tennessee (Knoxville) <http://tesp.engr.utk.edu/lever.php>

Today's presenters

John MacArthur, Sustainable Transportation
Program Manager, TREC at Portland State
University

Marni Ratzel, Senior Transportation Manager, City
of Boulder



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Today's presenters

John MacArthur is the Sustainable Transportation Program Manager for the Transportation Research and Education Center (TREC) at Portland State University. He is active in research related to sustainable transportation, particularly in the areas of transportation electrification, climate adaptation, and the relationship between transportation and public health. John is focused on exploring how technology can get more people biking and biking more often in more safe ways. Before joining the OTREC staff, John was the Sustainable Transportation Coordinator for HDR Inc. and worked on Oregon's OTIA III State Bridge Delivery Program, replacing or retrofitting over 200 state bridges. He has worked for 18 years in the environmental and sustainability field. He earned a B.S. in Civil Engineering from Lehigh University and a M.S. in Environmental Health Sciences from the University of Michigan, School of Public Health.



Today's presenters

Marni Ratzel is a senior transportation planner with the City of Boulder Colorado. Her primary responsibilities are focused on bicycle and pedestrian transportation planning - utilizing a comprehensive approach comprised of the Five E's, which she will briefly discuss in her presentation today, to increase biking and walking trips in Boulder. A regular bus and bicycle commuter, Marni encourages others to integrate bicycling and walking into their daily routine as, fun viable and efficient transportation modes. She received her master's degree in City and Regional Planning from Rutgers University in 1994 and has served city government as a planner in the transportation field for over 19 years.



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ARE YOU READY FOR E-BIKES?

APBP Webinar – November 19, 2014

John MacArthur

TREC at Portland State University



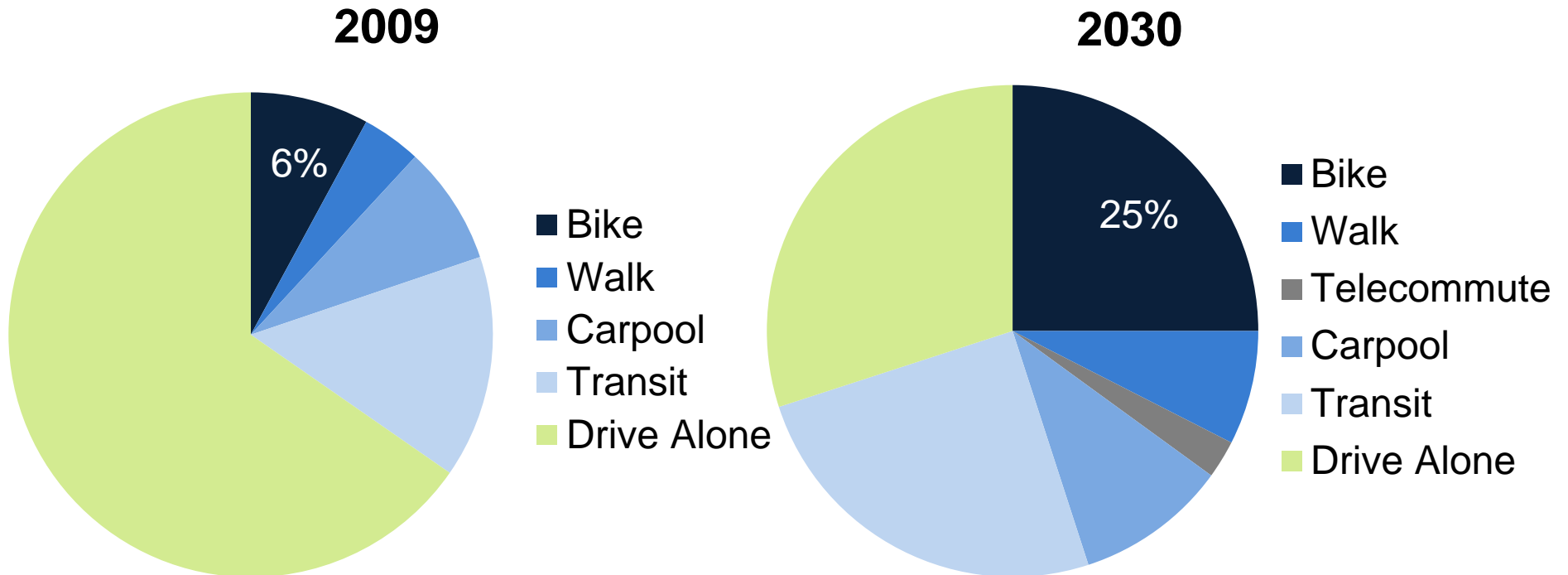
Presentation Outline

- Why do e-bikes matter?
- What is an e-bike?
- U.S. regulations review
- Conclusions

WHY DO E-BIKES MATTER?

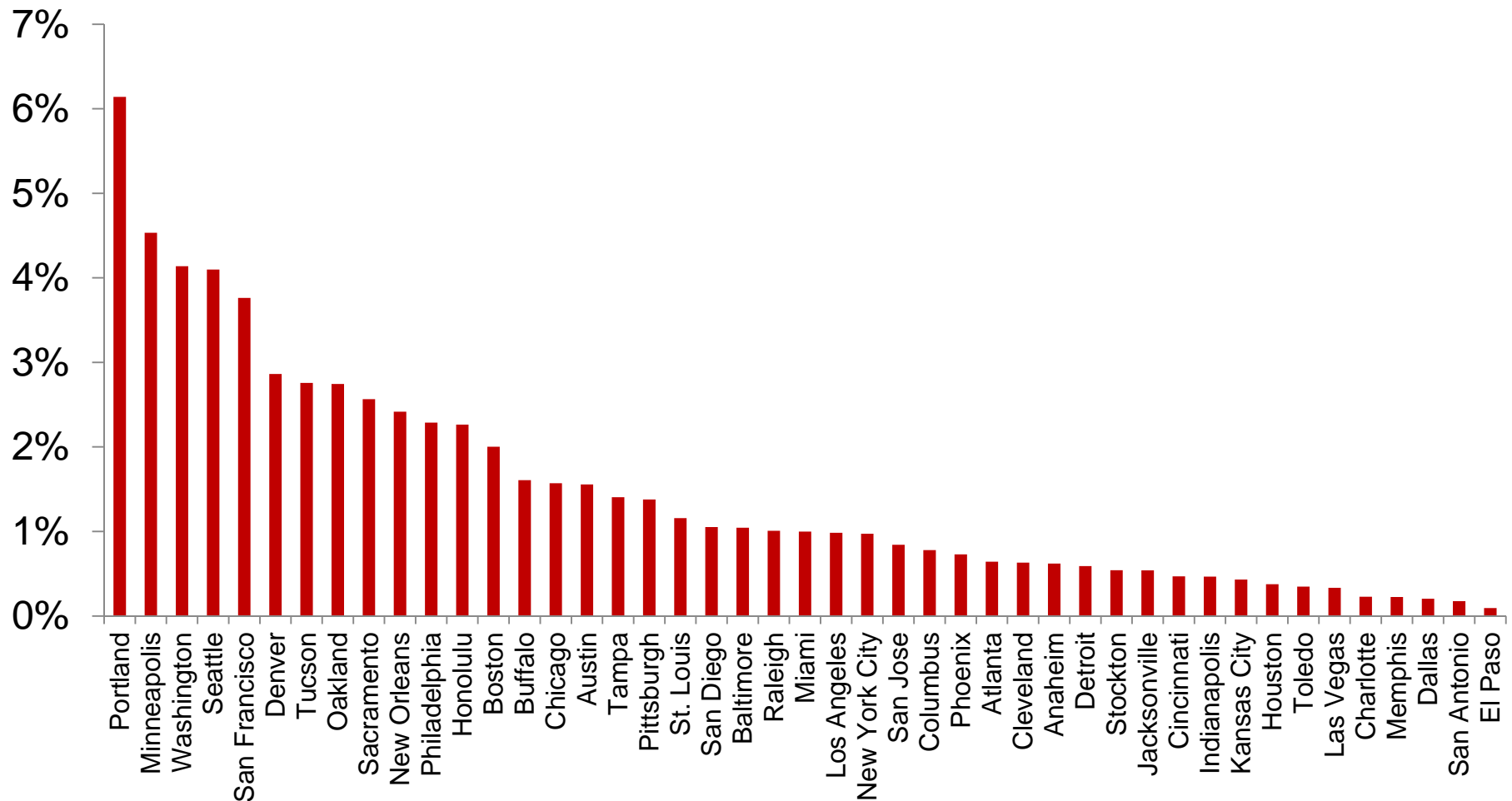
Commute Mode Share for Portland

Reduce per capita daily vehicle-miles traveled (VMT) by 30 % from 2008 levels.



Portland Climate Action Plan, 2009

Large US Cities Ranked by % Bicycle Commuting



Source: US Census Bureau, 2012 American Community Survey



People that are older



People who live in
areas that are hilly



People who commute
distances greater than
5 miles



People that have a physical limitation that makes cycling difficult



Women tend to bike less than men. Women make up approx. 25% of all bike trips in the US.



People who don't want to sweat or wear special clothes to commute



People who need to carry or haul items or people

Can e-bikes...

- Get more people to bike, and
- Get people to bike more often.

Bike Use

- 94% indicated they had rode a standard bike as an adult
- **55%** rode their standard bike weekly or daily prior to e-bike purchase --this went up to **93%** after purchase
- Of the **6%** that hadn't rode a bike as an adult, of those **89%** ride their e-bike daily or weekly
- Over 90% use their e-bikes weekly or daily



*“To replace 95% of car trips and make commuting fun” –
Survey Respondent*

MacArthur, Person & Dill 2013

Getting around

- 45% indicated that they take a different route on their e-bike than a standard bike
- 35% don't avoid hills on e-bike and 31% will take more direct or higher traffic route on e-bike but 30% say they take lower traffic or less direct route
- Three quarters (73%) ride to different destinations on their e-bikes than they did on a standard bike



“I live in a hilly town and would never commute to work on a standard bike -- I wouldn't be able to make it up the hills. My electric assist bike makes commuting by bike possible.” – Survey Respondent

MacArthur, Person & Dill 2013

WHAT IS AN E-BIKE?

What is an electric bike?



Come in all shapes and sizes



Even more shapes, sizes, & types



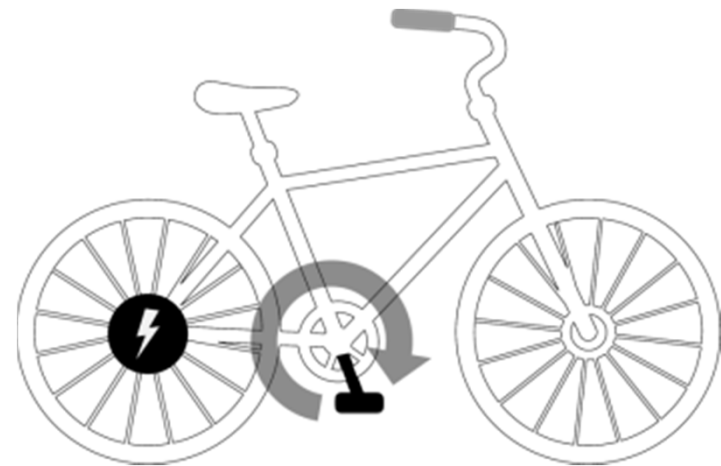
Different types of the e-bikes

Throttle



Powered bicycle (PB)

Pedelec



Powered-assisted bicycle (PAB)

Not considered “low speed e-bikes”

Moped



Scooter



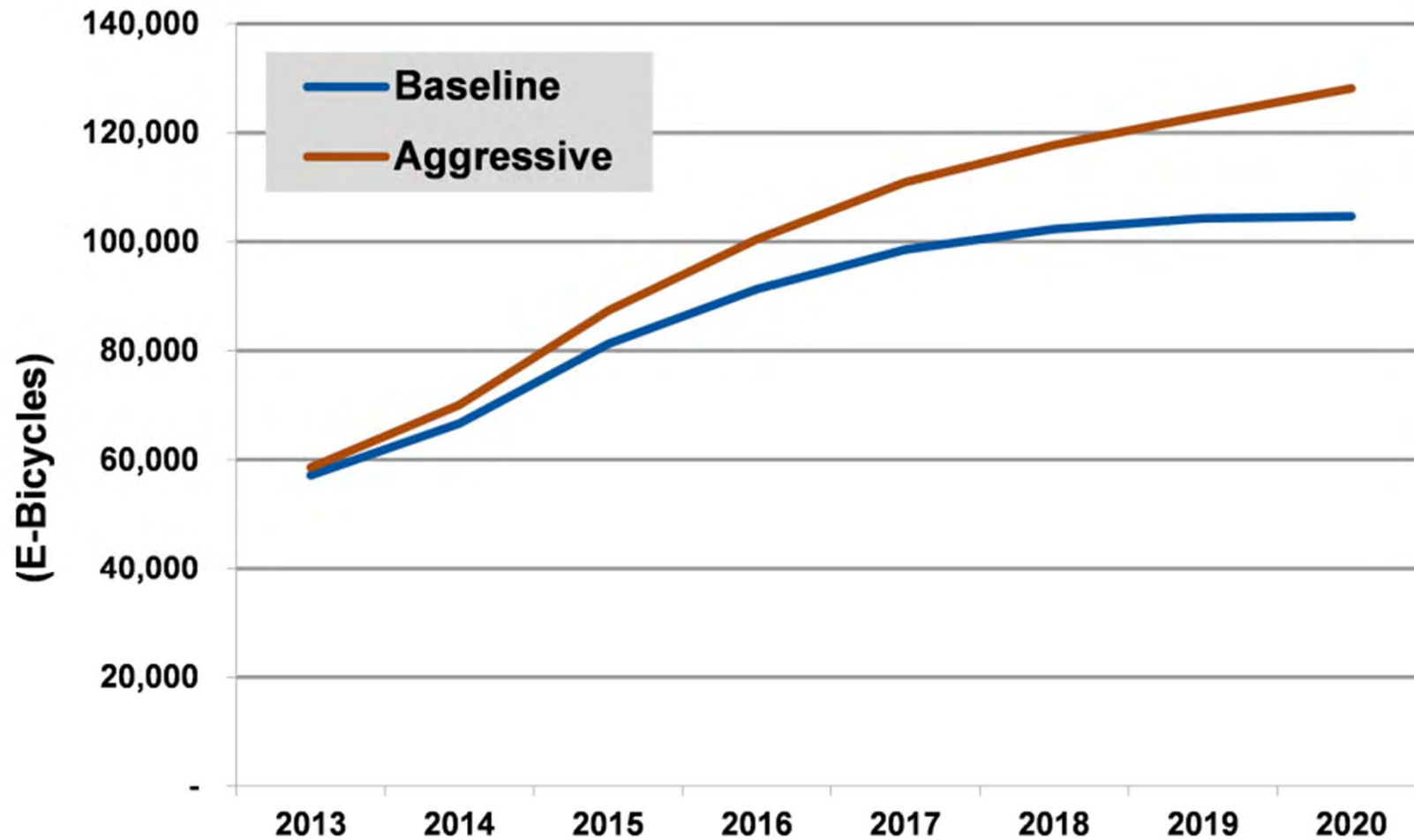
Market for E-bikes

Electric Bicycle Sales by Region, World Markets: 2012-2018



Source: Navigant/Pike Research

Projected US Growth



Source: Navigant/Pike Research

U.S. REGULATIONS REVIEW

Definition of an E-bike (Federal)

- Consumer Product Safety Commission (CPSC) – Low-Speed Electric Bicycle definition
- The Consumer Product Safety Act regulates the use of low-speed electric bicycles to “**two-or three-wheeled vehicle with fully operable pedals and an electric motor of less than 750 watts (1 horse power), whose maximum speed on a paved level surface, when powered solely by such a motor while ridden by an operator who weighs 170 pounds, is less than 20 mph**” Sec. 38 [15 U.S.C. § 2085]
- Regulation only pertains to manufacturing and first sell
- *Now for the confusing part:*
 - d) This section shall supersede any State law or requirement with respect to low-speed electric bicycles to the extent that such State law or requirement is more stringent than the Federal law or requirements referred to in subsection (a).

S-Pedelecs

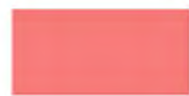


- Speed or Fast Pedelec
- 45 km/h or 28 mph
- Only peddle-assist
- No throttle
- US regulatory determination is gray

State & local regulations

- States define the device & determine where it can be used
- Many states use regulations in place governing "moped", "motorcycle", "motorized bicycle", "motorscooter", "scooter", and/or "motor-driven cycle."
- Oregon - ORS 801.258 "Has a power output of not more than **1,000 watts**" but ORS 807.020(15) "A person may operate an electric assisted bicycle without a driver license or driver permit if the person is **16 years** of age or older."
- Many cities defer to the state regulation and classification
- Some cities are addressing e-bikes: Boulder, Eugene, Bloomfield (CO), Toronto, Chicago, Tucson, New York City

E-bike-specific definition



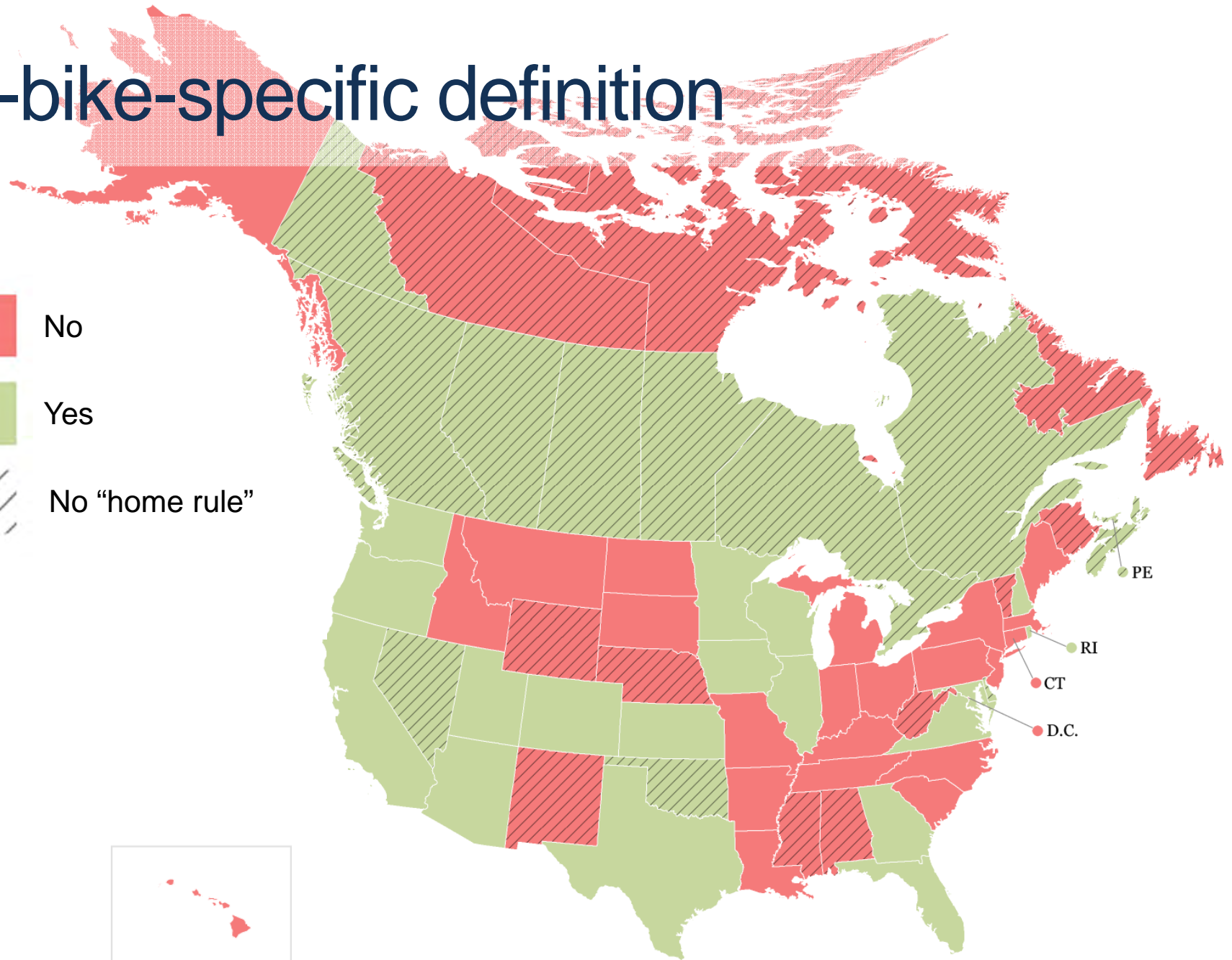
No



Yes



No "home rule"



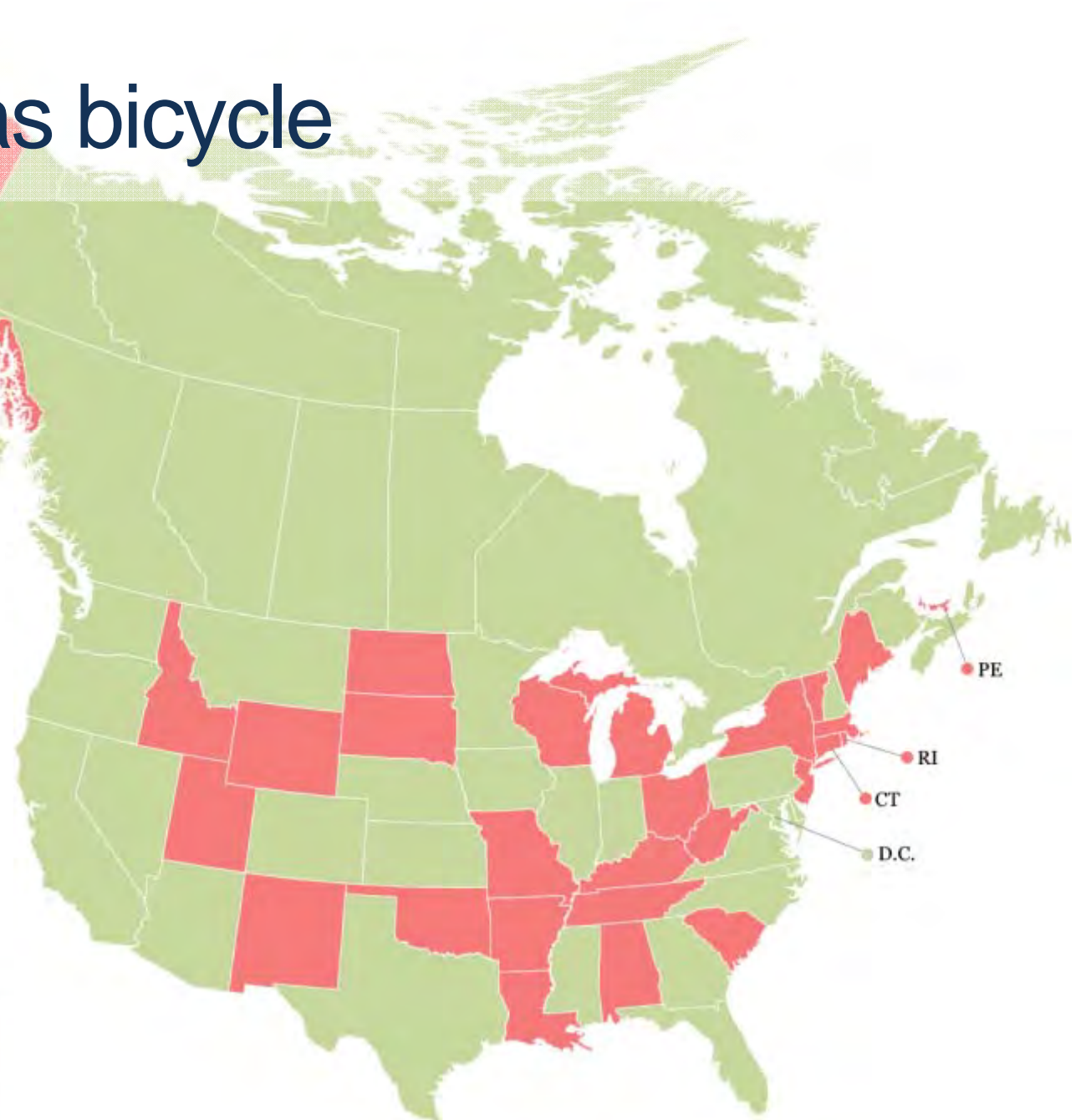


Classified as bicycle

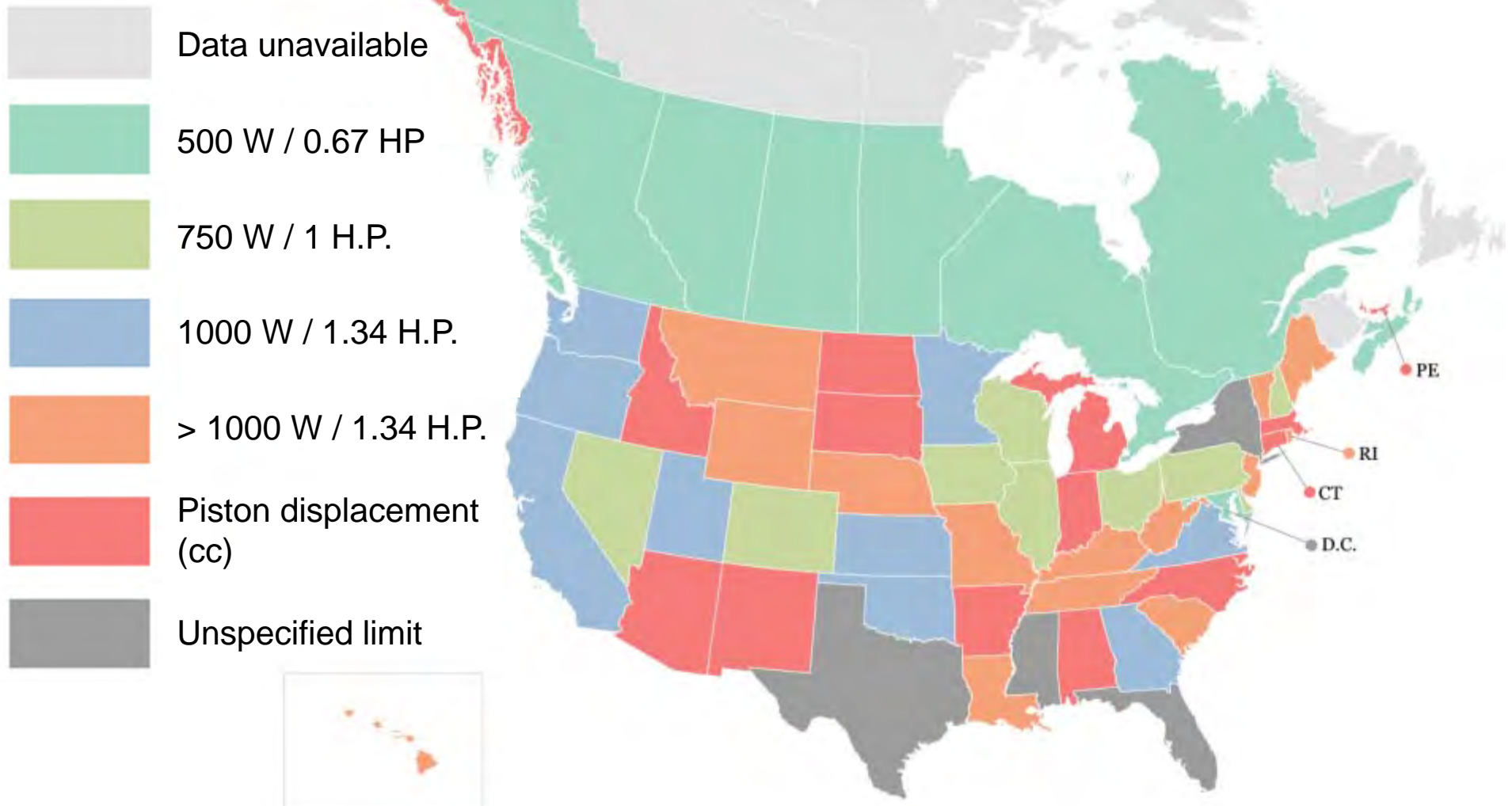


No

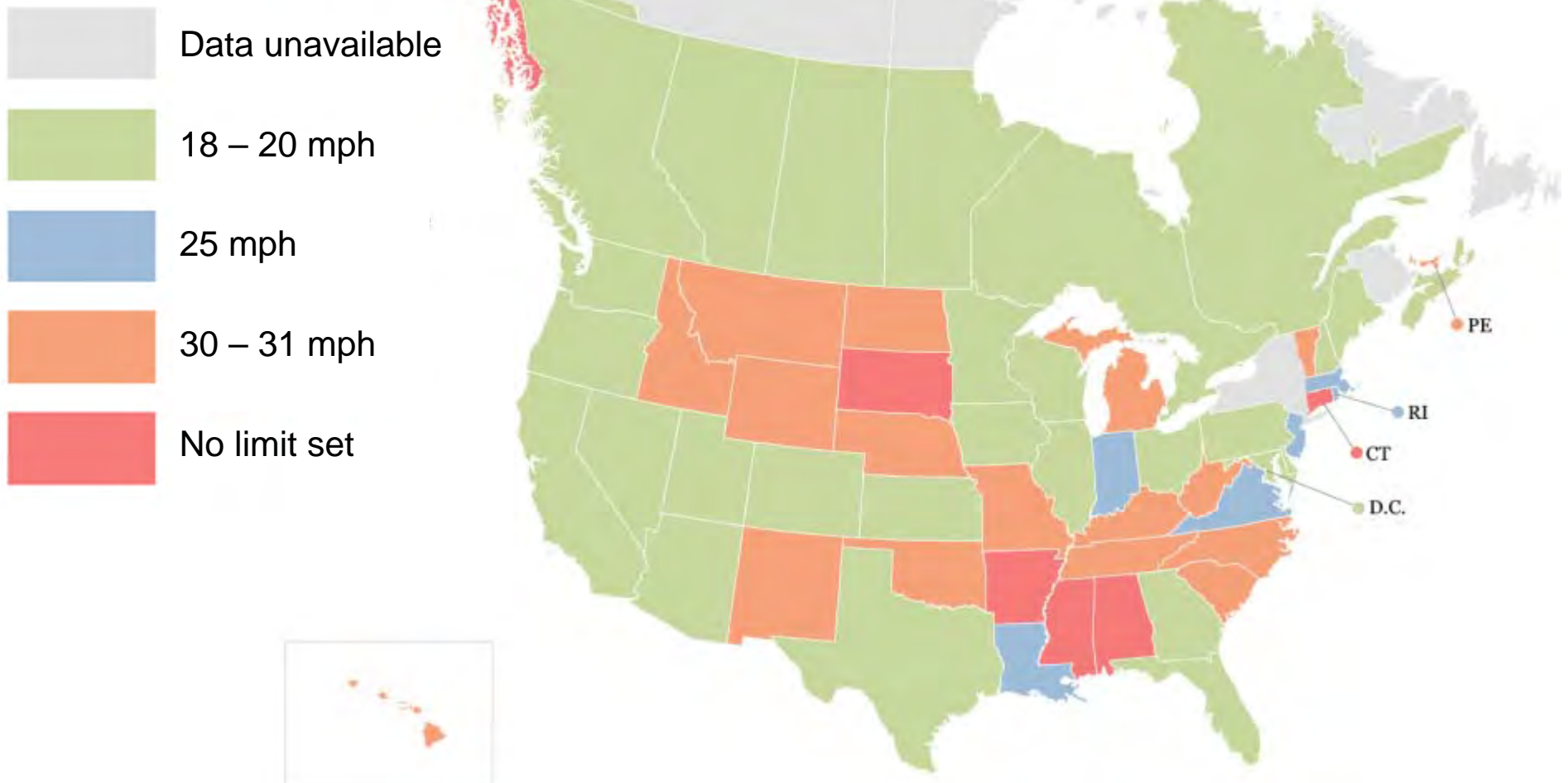
Yes



Maximum power output specified



Speed limit



How Much Faster Are E-bikes?

- Speeds of bikes

Facility	Mean (mph)	Max (mph)	Min (mph)
Bike path	12.6	24.4	2.7
Bicycle lane	15.5	25.4	2.5
Sidewalk	11.5	18.7	2.1
No facility	11.8	22.9	5.0

Opiela et al ., 1980

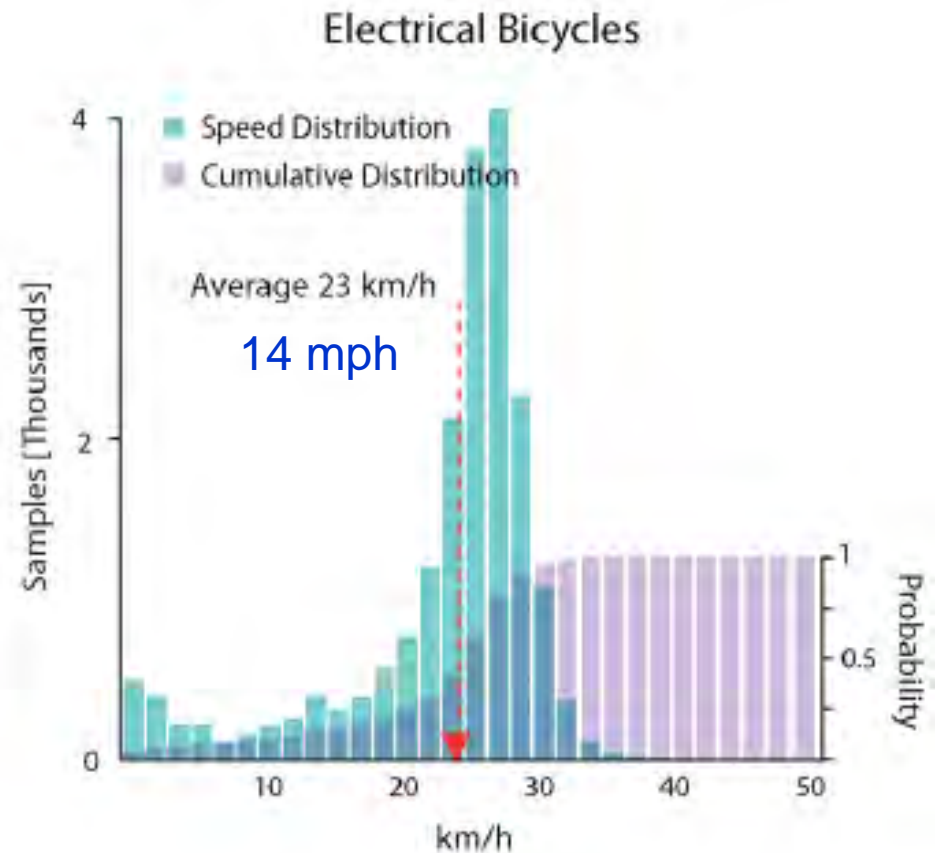
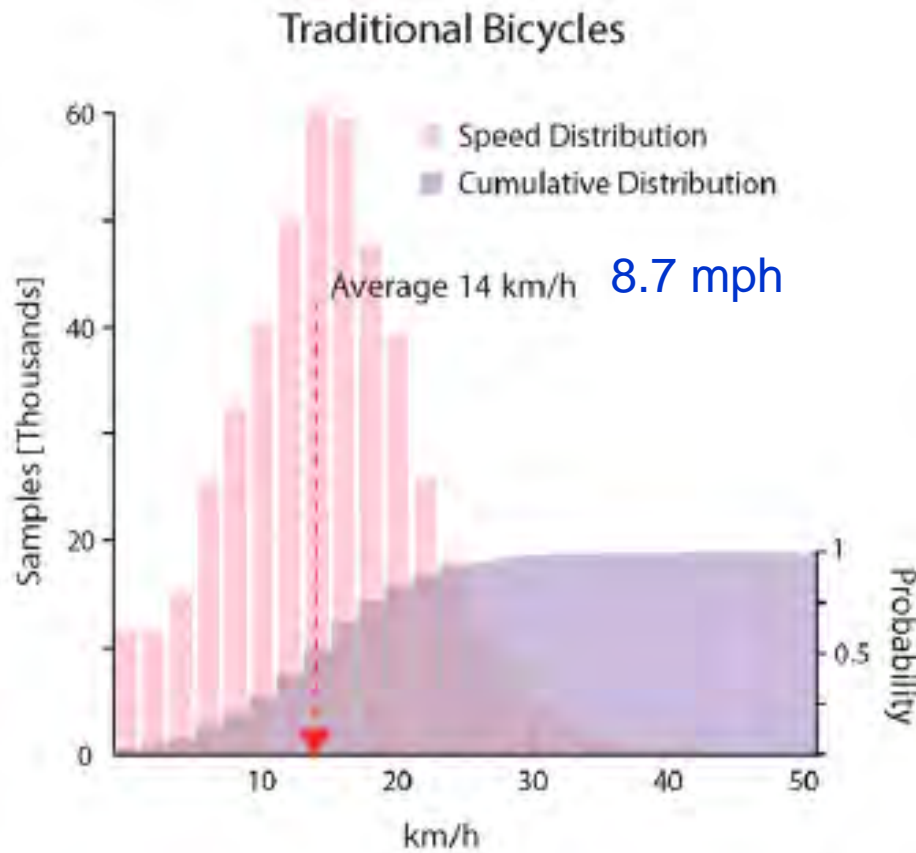
	Mean (mph)	85 th Pert.
E-bikes	8.3	12.4
Conventional bikes	6.5	10.6

Langford & Cherry 2013

- AASHTO 2012 design criteria – bike facilities

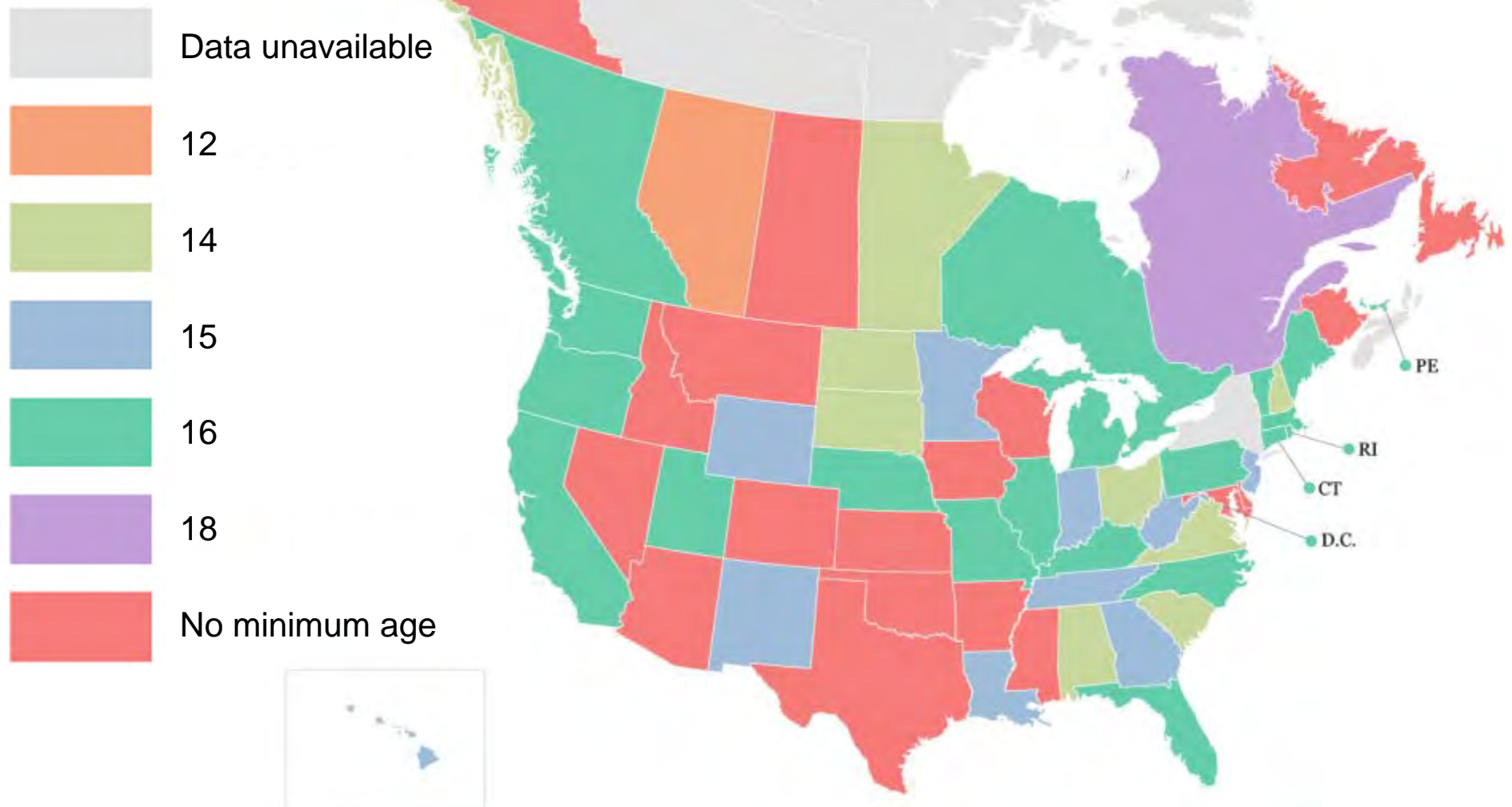
- 8-15 mph pave level terrain; 20-30 mph downhill; 5-12 uphill; 15 mph avg. operational speed

A Naturalistic Cycling Study in Sweden

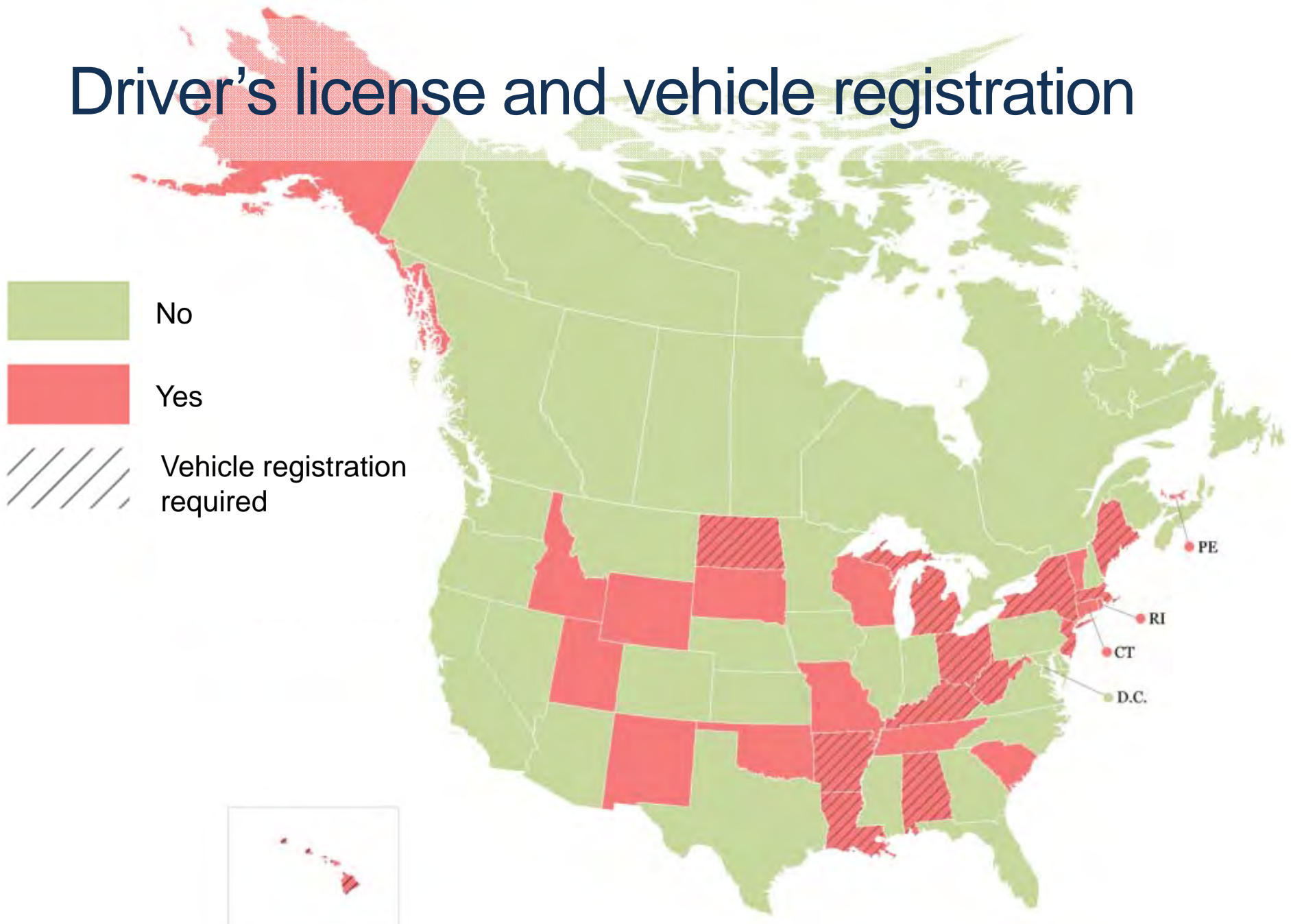


Dozza, et al. 2013

Minimum age



Driver's license and vehicle registration



Policy Questions & Implications

- Technology
 - Motor size; Speed; Weight; Dimensions; Pedals (Functional?), Size/Shape
- Rider/Passenger
 - Age; Helmet; License; Registration
- Use
 - Separated/protected bike path; Bike lane; Shared use path; Sidewalk & Trails

CONCLUSIONS

Some questions moving forward

- Is an e-bike a bicycle? When is it not?
- Create new classifications of electric bicycles?
- Differentiate between electric bicycles, mopeds, motorized bicycles, scooters?
 - Classes of electric bicycles
 - Throttle
 - Pedelec
 - Dual modes
 - S-pedelec
- Should there be flexibility for future technologies and devices?
- Design vs. Performance standards?

Conclusions

- Market data shows that e-bikes are becoming more prevalent in North America.
- E-bikes can help get more people biking and biking more often.
- The federal & state regulatory landscape should be standardized to decrease confusion and help the market grow in the right way.
- Transportation agencies need to be aware of emerging technologies and their implications for how the transportation system should be designed, regulated and operated.
- More research needs to be conducted on the safety implications of these new emerging technologies.

Contact Information

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For more information and reports:
ebike.research.pdx.edu

For US E-bike Regulatory Review:
<http://nitc.us/research/project/564/>

References

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- Opiela, Kenneth S., Snehamay Khasnabis, and Tapan K. Datta, "Determination of the Characteristics of Bicycle Traffic at Urban Intersections," *Transportation Research Record* 743, 1980.



Living Laboratory Electric-assist bicycle use on multi-use paths

**APBP webinar
November 19, 2014**



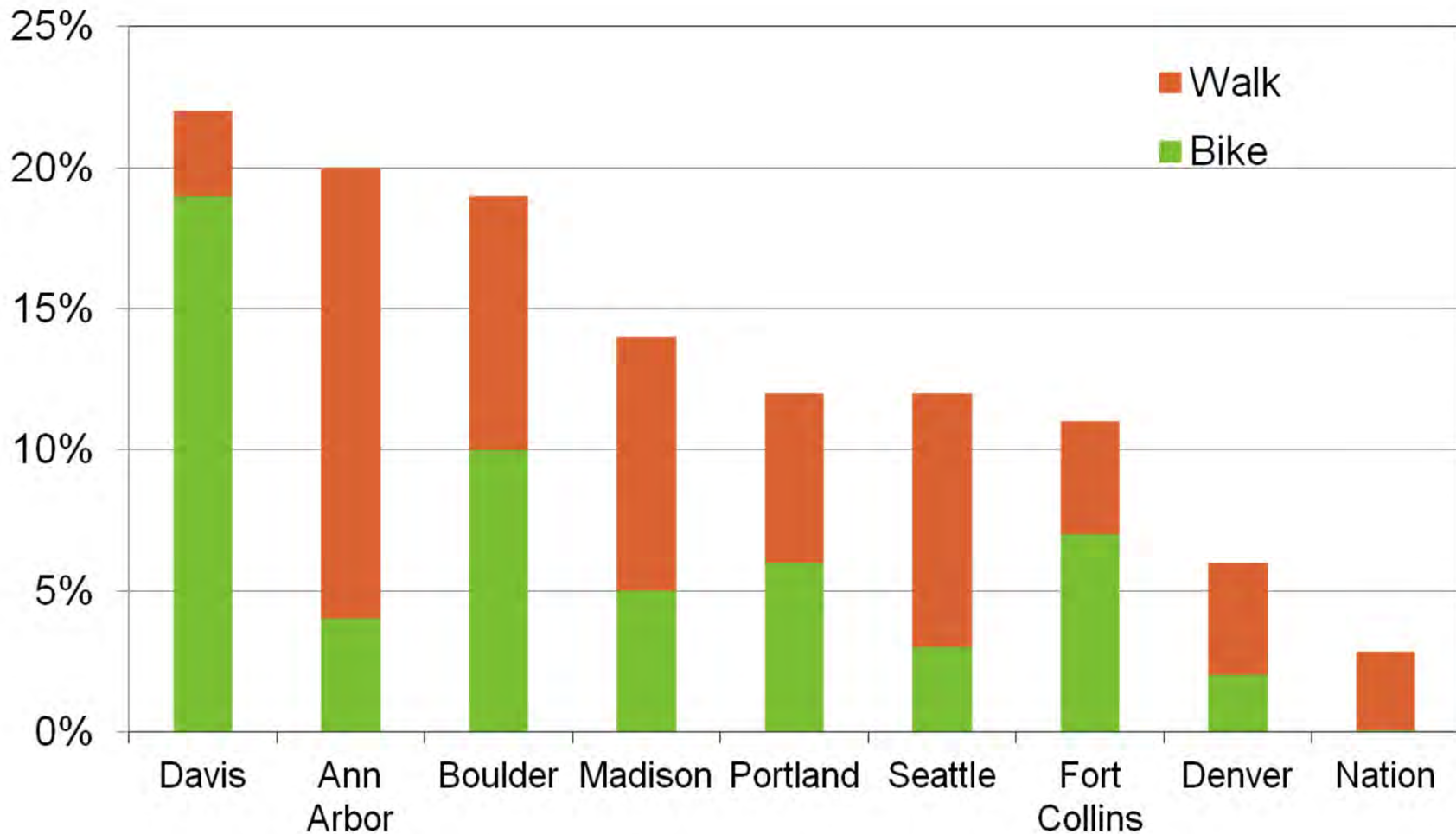
About Boulder....

- 100,000 residents
- 100,000 jobs
- University of Colorado, 30,000
- 13,000 acres of urbanized area
- 45,000 acres of open space
- 25 sq mi (64 sq km)
- 1 mi (5,430) high, 4 seasons

Work Mode Share

2008-2012 (5 yr avg.)

American Community Survey



Transportation Master Plan

Goals

- > Provide mobility through transportation choices
- > Pedestrian has priority
- > Hold Vehicle Miles Traveled at 1994 levels
- > Single Occupant Vehicle trips drop to 25% by 2025



E-bike Pilot Project

- > E-bike pilot is Living Lab phase I project
- > In place since Feb 2014
- > Authorized by Ordinance 7491



Living Laboratory E-bike Pilot Project

- > Amended the definition of an e-bike
- > Tests the use of e-bikes on multi-use paths as part of the TMP update Living Laboratory
- > Does not include sidewalks and OSMP trails



Options for Regulating E-bikes

Option 1:

No change to City of Boulder definition

- > "Electric assisted bicycle" means a bicycle with a battery powered electric motor with a capacity of no more than four hundred watts continuous input power rating which assists the person pedaling and which is not capable of propelling the bicycle and rider at more than twenty miles per hour on level pavement.

Option 2:

Adopt Colorado State Law Definition

Colorado State Law* CRS 42-1-102 (28.5)
"Electrical assisted bicycle" means a vehicle having two tandem wheels or two parallel wheels and one forward wheel, fully operable pedals, an electric motor not exceeding seven hundred fifty watts of power, and a top motor-powered speed of twenty miles per hour.

*** Denver and Fort Collins use this definition**

Ordinance 7491

- > Excludes e-bikes from definition of a motor vehicle
- > Adds section 7-5-26
 - Enable City manager rulemaking authority
- > Establishes a sunset date of Dec. 31, 2014



Key Findings from Public Input

Against testing E-Bike

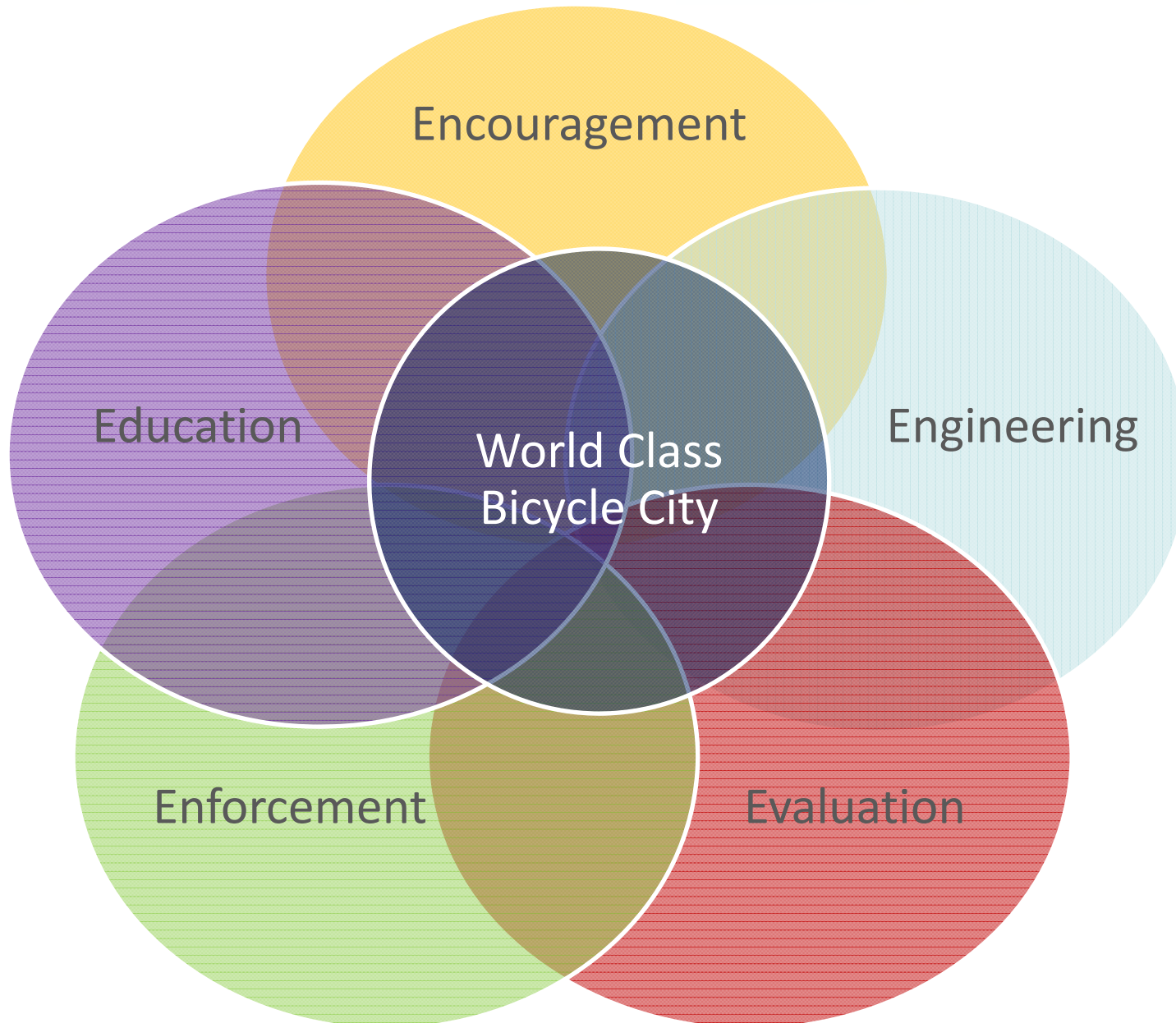
- Paths are too congested
- Speed and safety
- Behavior and Enforcement

Support testing E-Bike

- Helps aging generations stay active and healthy
- Makes longer distance commutes viable by bike
- Economic & Less Polluting alternative to automobiles

-
- Separation between Pedestrians and Bicyclists
 - Support amending definition of e-bike

Success Lies at the Intersection





The Five Es

Engineering. Evaluation. Enforcement. Encouragement. Education

Living Laboratory

Evaluation methods for e-bike pilot

- Modal traffic volume, vehicle speeds, and collision experience
- Field observations
- Intercept surveys
- Bike and Walk Audits / Focus Groups
- Community Feedback Panel / Inspire Boulder

Observational study



> Evaluations

- Includes e-bikes and non-motorized bicyclists
- Evaluated speed, volume, and gender
- Interactions between multiuse path users



> Study Completed

- 7 hours of field observation
 - Weekday and weekend observations
- 4 locations
 - Two locations along Boulder Creek Path
 - Broadway Boogie
 - South Boulder Creek Trail
- Confidence level based on sample size: 95%



Observational study

- Over 1,000 cyclists
 - 67% male cyclists
 - 33% female cyclists
- 16 MPH 85th Percentile Speed
- 82% of cyclists were traveling at or below the 15 MPH speed limit
- 10% wearing a “full lycra cycling kit”
- 7% were children
- Over 500 pedestrians observed



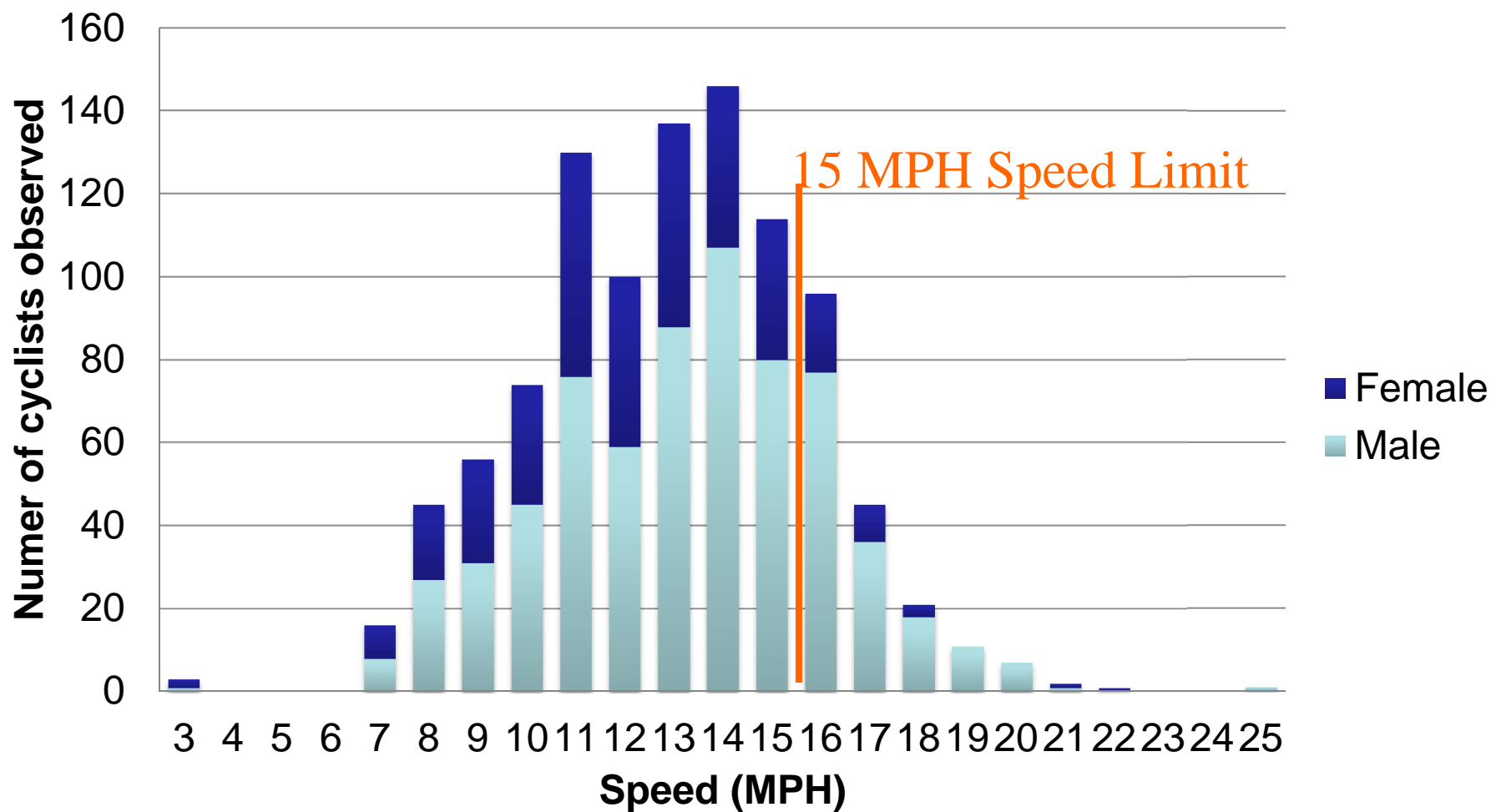
Observational study

- > Minimal “conflicts” between trail users
 - No crashes observed
 - No negative verbal interactions
 - Most trail users passing with 1’- 2’ of buffer space
 - Less than 1% had “hard breaking” interactions



Observational Study

All Locations



E-Bike Pilot Study - Findings

- > Less than 1% of all cyclists were riding e-bikes
 - Only seen on Boulder Creek Path (weekend)
 - Wearing casual clothing and not riding in a group
 - Recorded speed was below 15MPH speed limit



E-bike pilot

Multi-use path observations

Key Findings

- > Less than 1% of all cyclists were riding e-bikes
- > 16 mph is the 85th percentile speed
- > Minimal “conflicts” between trail users

By the numbers

- > 4 locations
- > 7 hours
- > Weekday and weekend
- > Over 1,000 bicycles
- > Over 500 pedestrians

Etiquette campaign

- > Over 330 pledges
- > Online blog
- > Weekly surveys
- > Ambassador appearances

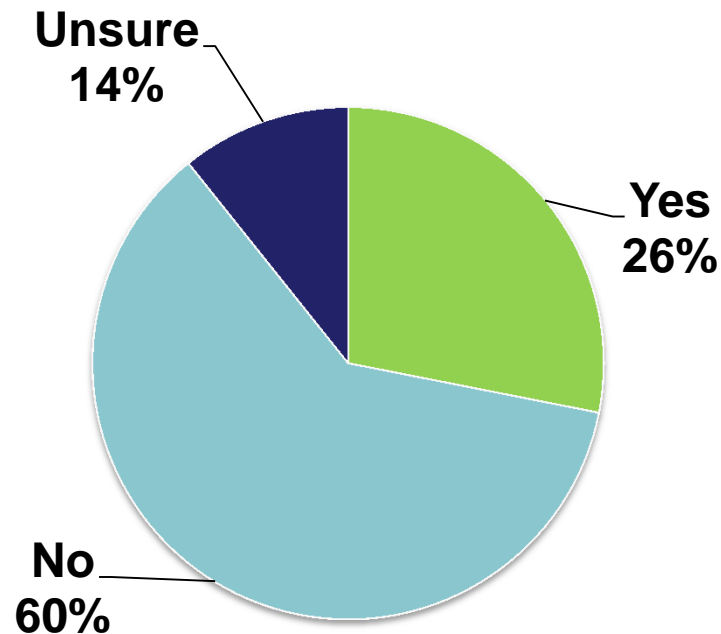


Know the rules. Accept your responsibilities. **Be part of The Boulder Way to GO.**

Intercept Survey responses

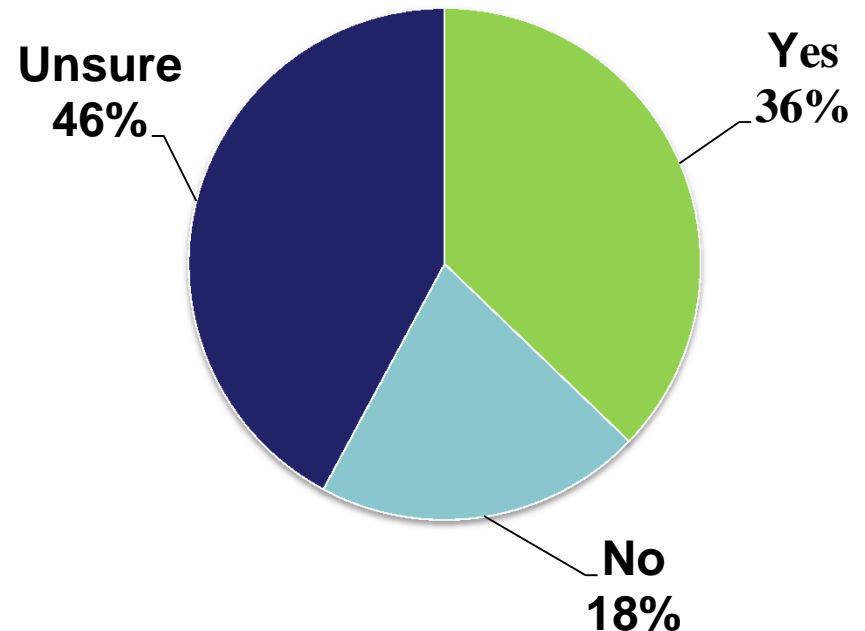
Have you encountered an e-bike on multi-use paths?

Yes: 34 • No: 74 • Unsure: 13



Do you support e-bike use on multi-use paths?

Yes: 45 • No: 25 • Unsure: 51



Local Retailer information

- > Less than 100 e-bikes have sold in 2014
- > Typical buyer is
 - 40's ~ 50's
 - Back into exercise
- > Not increase in sales when pilot project began
- > E-bike sales increasing each year



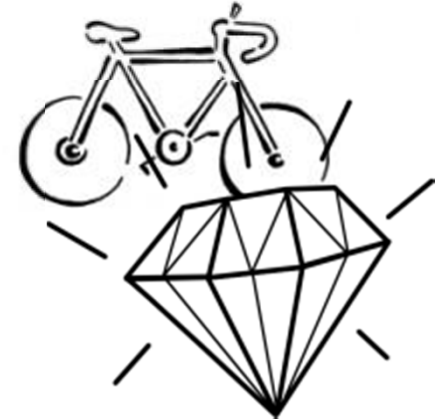


Staff recommendation

- > Remove sunset date to Ordinance 7491
 - > E-bike use on the following would continue to be prohibited:
 - OSMP trails, including those that currently allow bikes
 - Sidewalks, except those designated as multi-use paths
-

TMP objectives for biking

- Bicycle Mode Share of more than 15%
- Bicycle Friendly Community in support of our modal goals
- Attract interested but concerned cyclists
- Increase trips by older adults, women and families with children





Transportation Advisory Board

- > Unanimously approved recommendation to City Council to remove sunset date to Ordinance 7491
- > Expressed desire to continue monitoring



Next Steps

- > **Dec. 18:** New e-bikes ordinance enacted, approved by Council on Nov. 18
- > Continue Way of the Path Campaign
- > Outreach on e-bikes benefits and use
- > On-going monitoring of e-bike use

Thank you!

For more information:

GOBoulder.net
BoulderTMP.net
SafeStreetsBoulder.net

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