ECONorthwest
ECONOMICS • FINANCE • PLANNING

Congestion and Road Finance

Presentation to Subcommittees of the Joint Committee on Transportation Preservation and Modernization

Oregon Legislature

February 22, 2017

CAUSES OF ROAD CONGESTION

- Demand:
  - Growing too fast? ‘Bad’ travel habits?
- Supply:
  - Insufficient funds to build capacity fast enough? Building the wrong kinds of capacity?
- Utilization:
  - Are we wasting existing capacity?

SOME STANDARD REMEDIES

Remedies we have tried:

- Demand: Growth controls, parking restrictions, advertising campaigns
- Supply: Have tried both building and not building roads; building public transit systems
- Utilization: Subsidizing transit rides, authorizing car-pool-only lanes

The problem persists

- Some would say it is growing, everywhere

ROAD FINANCE: THE PAST

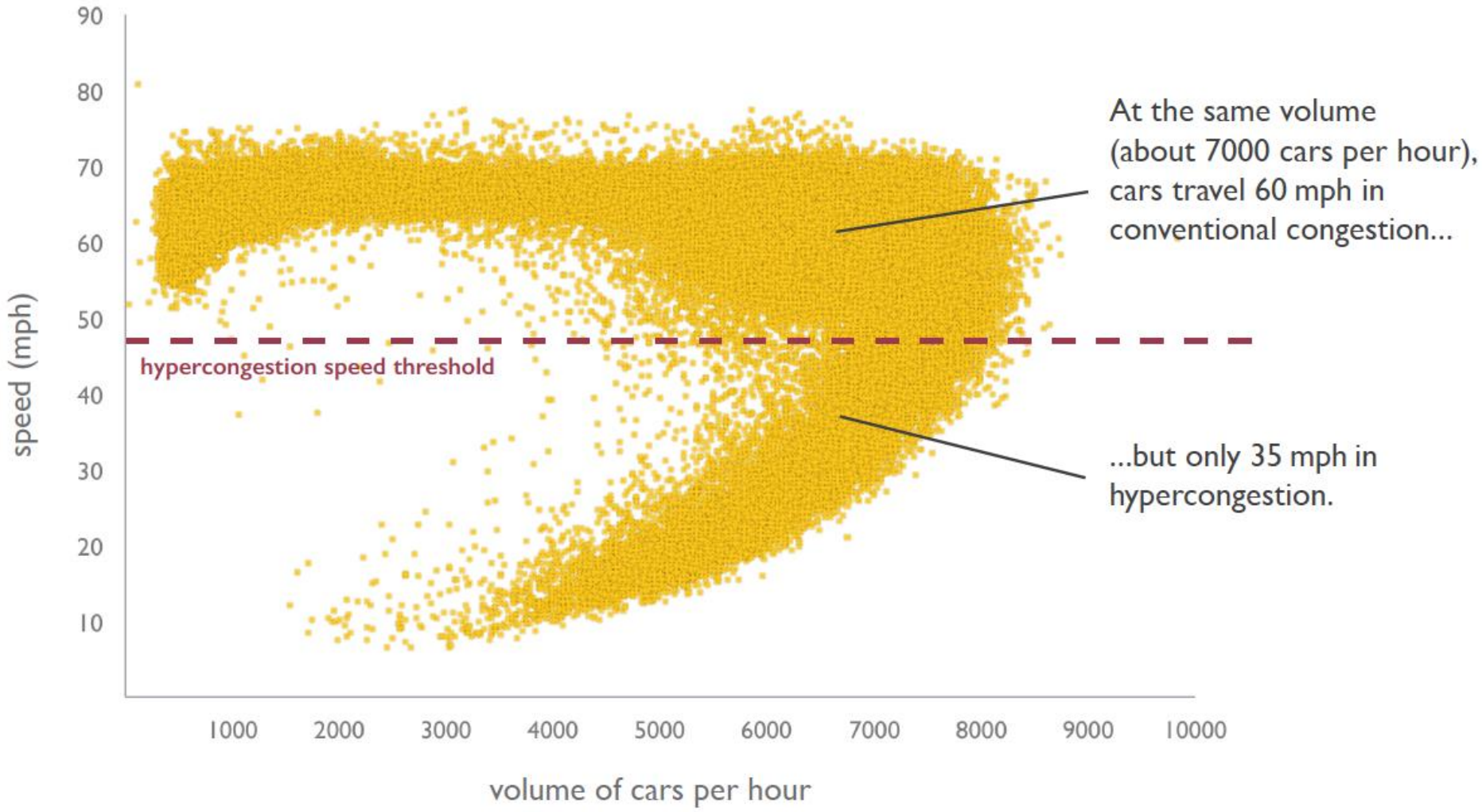
- Early Finance
  - Most roads built by “private” companies and funded with tolls
  - Public investments funded through general taxes
  - In 1901 New York City imposes a vehicle registration fee
  - By 1914 all states collect vehicle registration fees
- Federal Aid Road Act of 1916
  - Federal grants to States to improve public roads system
  - Led to the formalization of State Road Authorities
  - Prohibited tolls on Federal Aid facilities
- A Tax on Fuels
  - Oregon is the first; 1919
  - By 1929 all 48 states impose a tax on fuels
  - Federal fuel taxes imposed in 1932

ROAD FINANCE: THE PRESENT

Current road finance methods are relatively easy and efficient to administer, but…

- Road Finance System is financially weak: poor fiscal elasticity of gas tax while costs are rising
- System performance is declining: congestion; deteriorating roads; land use and transit not obviating the problems
- Gas tax (and other tax-based) finance perceived as unfair: benefits are local while the taxes are broadly applied
- Conventional road finance is a vicious circle: low charge per mile fails to address peak loads which prompts road building without fiscal resources

SLOWER SPEEDS AND LESS “WORK”

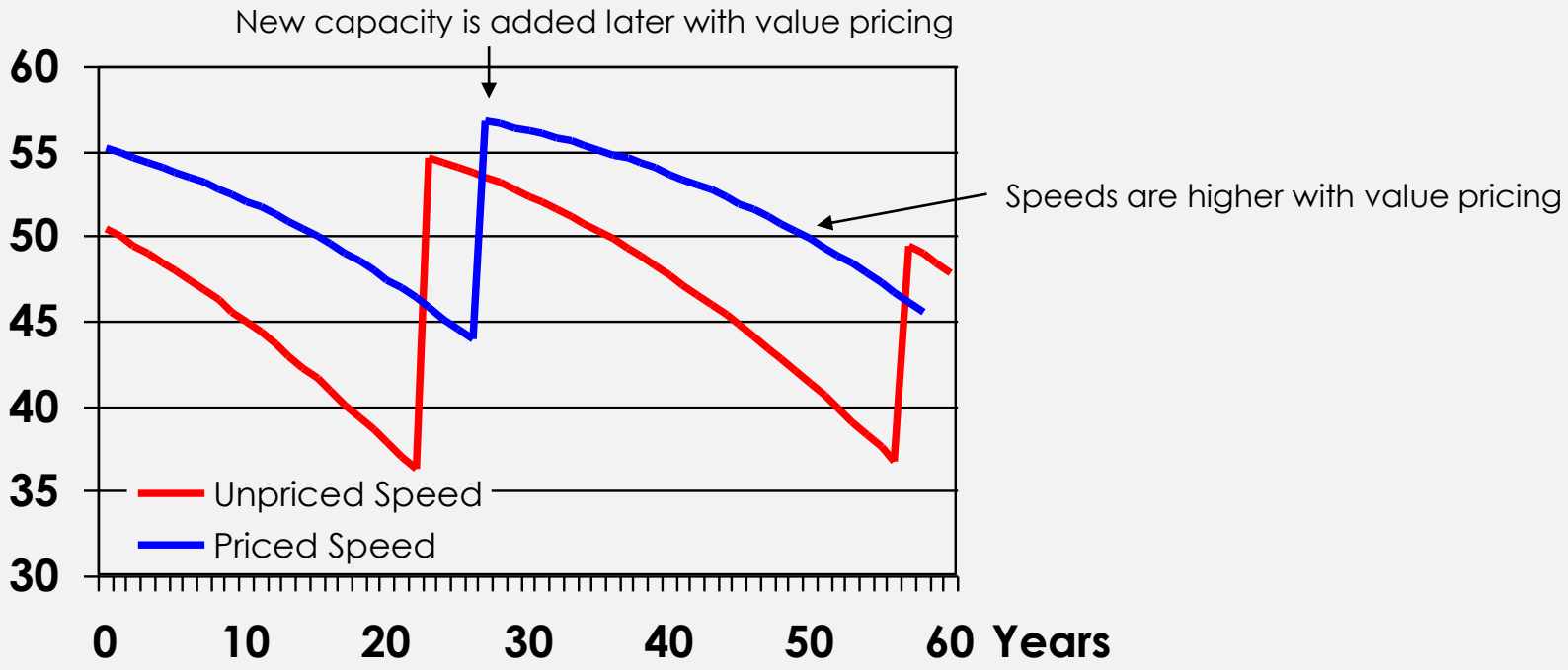


CONGESTION IS HARMFUL TO THE ECONOMY

- Congestion represents real resources that are lost
- Labor compensation must be higher to offset employee time lost to congestion
- Freight is delivered on congested roads
- High-occupancy vehicles share the same road space
- Highway performance is a defining factor for urban form
- Congestion costs are evident in land markets
- There are attendant environmental costs

ROAD PRICING HELPS, IN THEORY…

- Charges are levied selectively on certain vehicle-miles
- Controls excessive congestion during peak periods
- Road pricing generates the revenue to build capacity when it is really needed
- Revenue is collected from those who burden capacity



RECENT TRENDS IN ROAD PRICING

- Toll Managed Lanes
- Variable (time of day) Facility Tolls
- Private Sector Involvement
- Area or Zone Charges (mostly in Europe)
- Mileage Fees

MANAGED LANES

- Conversion of HOV lanes to toll management
- Facility performance must already be compromised
- Single lanes with lots of “free” alternatives
- Extremely sensitive to overall corridor demand and economic conditions
- Movement toward systems of managed lanes
- Variable pricing; often constrained by legacy operating rules
- Managed lanes revenues can often cover implementation and operating costs, and sometimes partially support capital investments

SAMPLE MANAGED LANES REVENUE ANALYSIS

HOV 2+ Free: Annual Toll Revenue by Toll Policy, Corridor, and Time of Day

Objective	Facility	Year	Corridor	Distance	AM Peak (6-9am)	Midday (9am-3pm)	PM Peak (3-7pm)	Evening (7-9pm)	Night (9pm-6am)	Corridor Annual Rev.	Annual Rev.
Cost Min.	XX	2035	NB	89.56	426,833	352,477	4,886	153,432	3,514	941,141	
Cost Min.	XX	2035	SB	90.02	172,992	365,763	32,172	121,619	25,867	718,412	**1,659,553**
Rev. Max.	XX	2035	NB	89.56	658,851	681,376	69,601	345,040	106,455	1,861,322	
Rev. Max.	XX	2035	SB	90.02	208,174	636,470	45,655	292,610	155,507	1,338,416	**3,199,738**

HOV 3+ Free: Annual Toll Revenue by Toll Policy, Corridor, and Time of Day

Alternative	Facility	Year	Corridor	Distance	AM Peak (6-9am)	Midday (9am-3pm)	PM Peak (3-7pm)	Evening (7-9pm)	Night (9pm-6am)	Corridor Annual Rev.	Annual Rev.
Cost Min.	XX	2035	NB	89.56	8,554,558	6,535,702	27,743,182	855,352	4,322	43,693,116	
Cost Min.	XX	2035	SB	90.02	16,480,079	7,462,558	26,814,151	740,010	32,509	51,529,307	**95,222,423**
Rev. Max.	XX	2035	NB	89.56	12,062,417	10,474,901	31,860,580	1,570,635	160,847	56,129,380	
Rev. Max.	XX	2035	SB	90.02	20,453,084	11,785,012	30,348,551	1,562,451	246,102	64,395,200	**120,524,580**

* Annual revenue forecasts assume 260 weekdays per year and that weekend revenue is 20% of weekday revenue.

ECONorthwest from Dynamic Toll Optimization Model
This is not an investment-grade forecast.

WHOLE FACILITY TOLLS

- Tolls can be designed to minimize congestion or to raise revenue
- Tolls are often combined with other investments
- These are often high risk projects
- The best projects involve few diversion opportunities

- **New projects:** financial requirements may lead to high toll rates that undermine demand.
- **Existing projects:** traffic diversion harms mobility unnecessarily and toll rates rarely respond to changing demand

TOLLING IN WASHINGTON STATE

Existing Tolling

- Tacoma narrows Bridge – flat rate tolls
- SR167 Hot Lanes – variable tolls
- SR520 Floating Bridge – whole facility, variable tolls
- I-405 Managed Lanes

Future Consideration

- SR99 Alaskan Way Viaduct Replacement
- SR509 Extension Project
- SR167 Extension Project
- I-5 Express Lanes
- Others to come…?

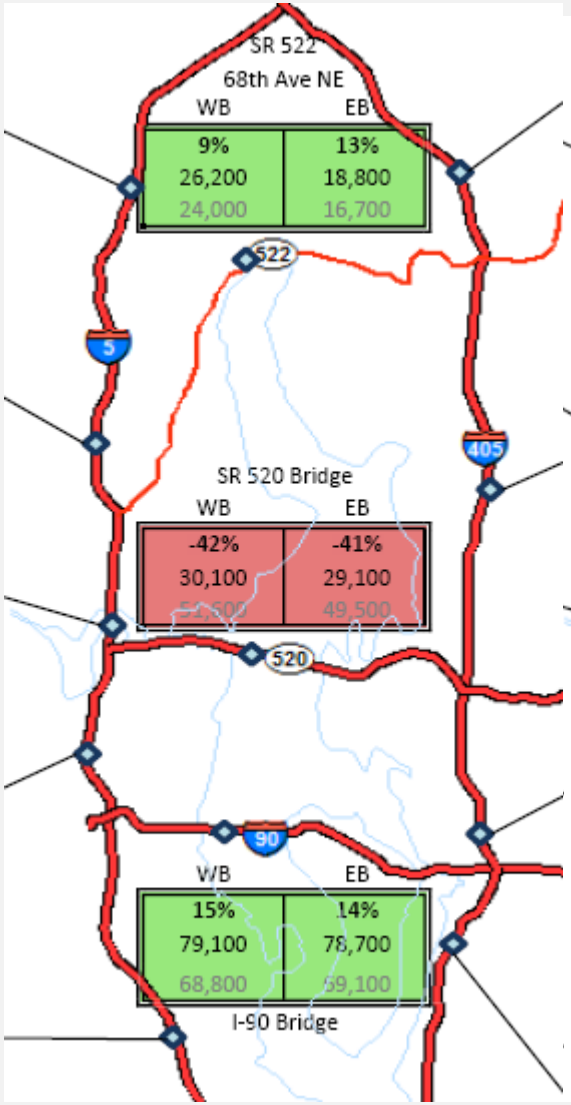
SR520 BRIDGE REPLACEMENT

- Traffic and Revenue Study
  - An initial drop of 45% from pre-toll volumes on SR520
  - Within 5 years SR520 volumes will be only 30% lower than pre-toll volumes
- A Dynamic Environment
  - Ramp up/adjustment period
  - Economic growth
  - Real income growth/value of time
  - Changing locational decisions

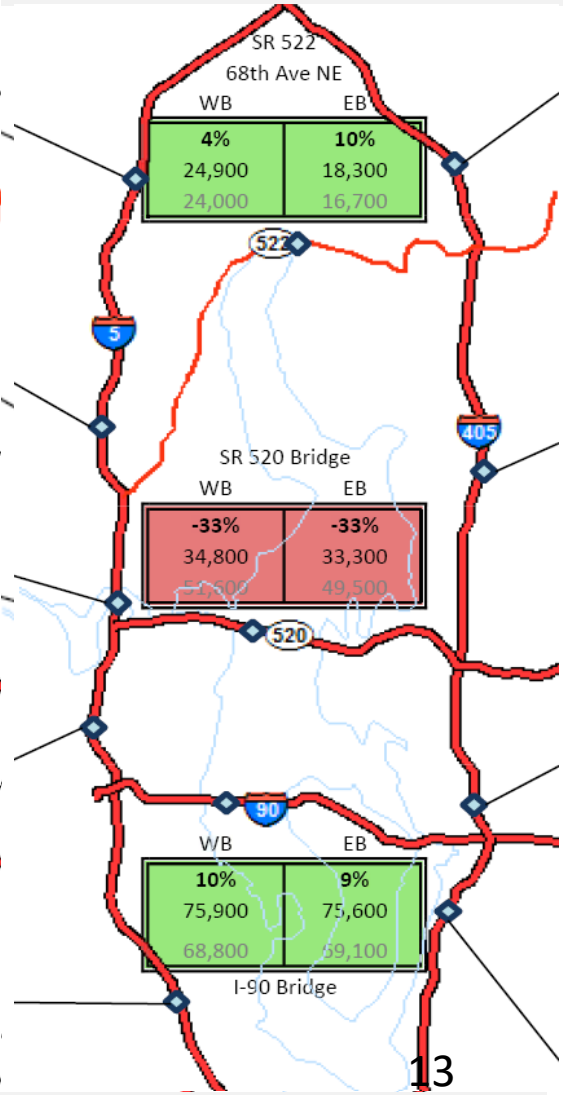
Central Question:

How do we best manage for public benefit over time?

Thursday, January 5, 2012



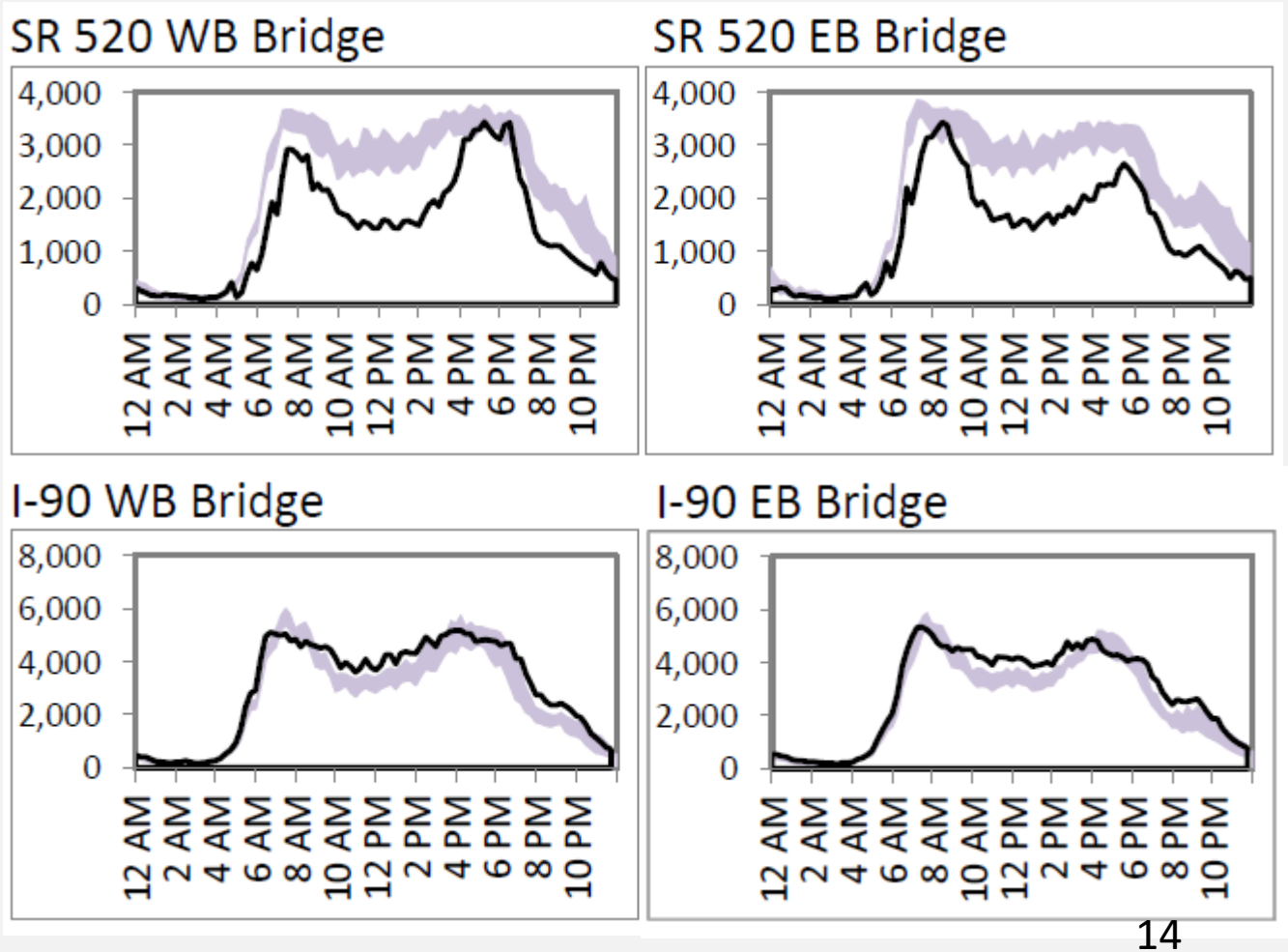
March 26-30, 2012



SR520 TIME OF DAY TOLLING

Two-Axle Vehicle Toll Rates

Monday through Friday	*Good To Go!* Pass
Midnight to 4:59 a.m.	$0.00
5 a.m. to 5:59 a.m.	$1.90
6 a.m. to 6:59 a.m.	$3.25
7 a.m. to 8:59 a.m.	$4.10
9 a.m. to 9:59 a.m.	$3.25
10 a.m. to 1:59 p.m.	$2.55
2 p.m. to 2:59 p.m.	$3.25
3 p.m. to 5:59 p.m.	$4.10
6 p.m. to 6:59 p.m.	$3.25
7 p.m. to 8:59 p.m.	$2.55
9 p.m. to 10:59 p.m.	$1.90
11 p.m. to 11:59 p.m.	$0.00



AN ALTERNATIVE FINANCIAL FUTURE

- Retain what is good about Public oversight
  - Safeguard the public against monopolists
  - Ability to price externalities: pollution, congestion
  - Dampen shocks from sudden shifts in capital allocation
  - Consider distributional issues: fairness
- While reintroducing (or replicating) some market forces
  - Competition (prices, innovation, choices)
  - Recapitalize the transport system
  - Focus on the “value proposition”
- What could this look like?
  - It depends…
  - …but certainly it would involve pricing-based road finance
  - There would be lots of questions to resolve

ELEMENTS OF A NEW AGENDA

- Tolls rates would be based on the costs the users impose.
- Opportunities would be sought to increase the extent of the road network that has tolls so that diversion is minimized and the revenue yield is improved.
- The toll revenues would be used as a guide that cues investment decisions
- Toll rate policy would allow for the adjustment of rates that respond to new capacity and demand conditions.
- Toll rates, toll policies, and investment policies would be clear to the customers so they understand the long-term direction and can make sensible choices.

WHAT ABOUT ROAD PRICING IN OREGON?

- Toll Managed Lanes
  - I-5 HOV lanes often operate below 45mph
  - Short extent is a limiting factor
  - Adding lanes to existing corridors (partial funding from tolls)
- Tolling Existing Facilities
  - Bridge crossings (I-5 and I-205 are strong substitutes)
  - Highway corridors (I-5, I-405, I-84, SR217, others)
  - Tolling partial network requires special (Ramsey) pricing to minimize traffic diversion
- Non-traditional Approaches
  - Area charge in Portland (could be an economic deterrent)
  - Congestion charges on a larger network (the gold standard)

THE VALUE PROPOSITION

- The value proposition involves a tight link between costs to the users (taxes, tolls) and the benefits (mobility, use of revenues).
  - Tolls are directly linked to the demand for road infrastructure
  - If toll revenue is used to benefit the toll payers then the circle is complete

THE REVENUES…

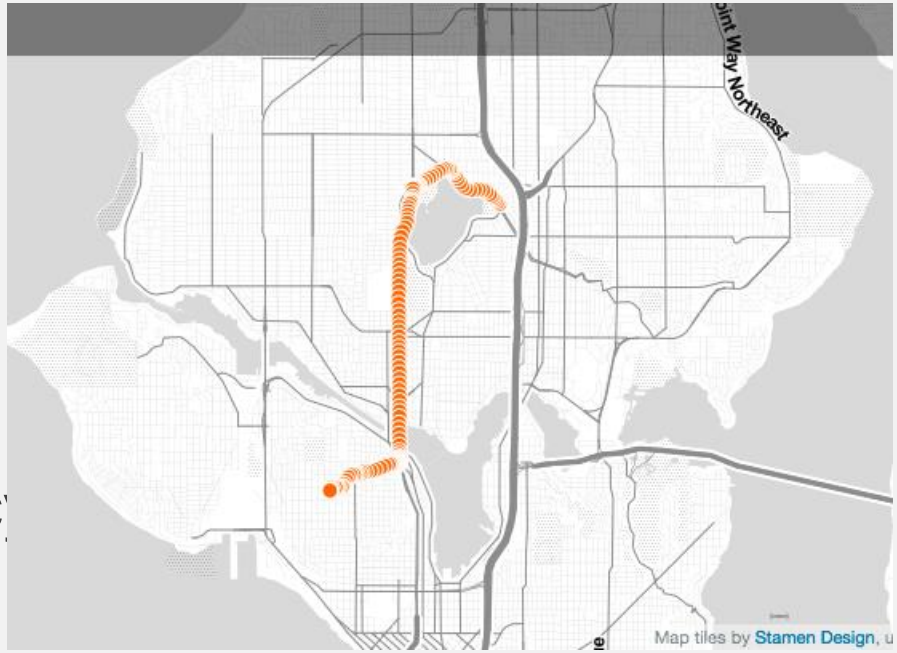
- The Benefits are Tied Up in the Revenues
  - Even when tolls manage traffic the revenues are usually larger than the user benefits
  - How revenues are spent determines the overall usefulness of tolling
- Revenues Guide Investments
  - Revenues are a signal for investment
  - Knowing which roads generate revenues can help set investment priorities
- Tolls Minimize Effects on Other Markets
  - Raising general taxes for transportation distorts behavior elsewhere in the economy

STATES AND REGIONS MUST LEAD

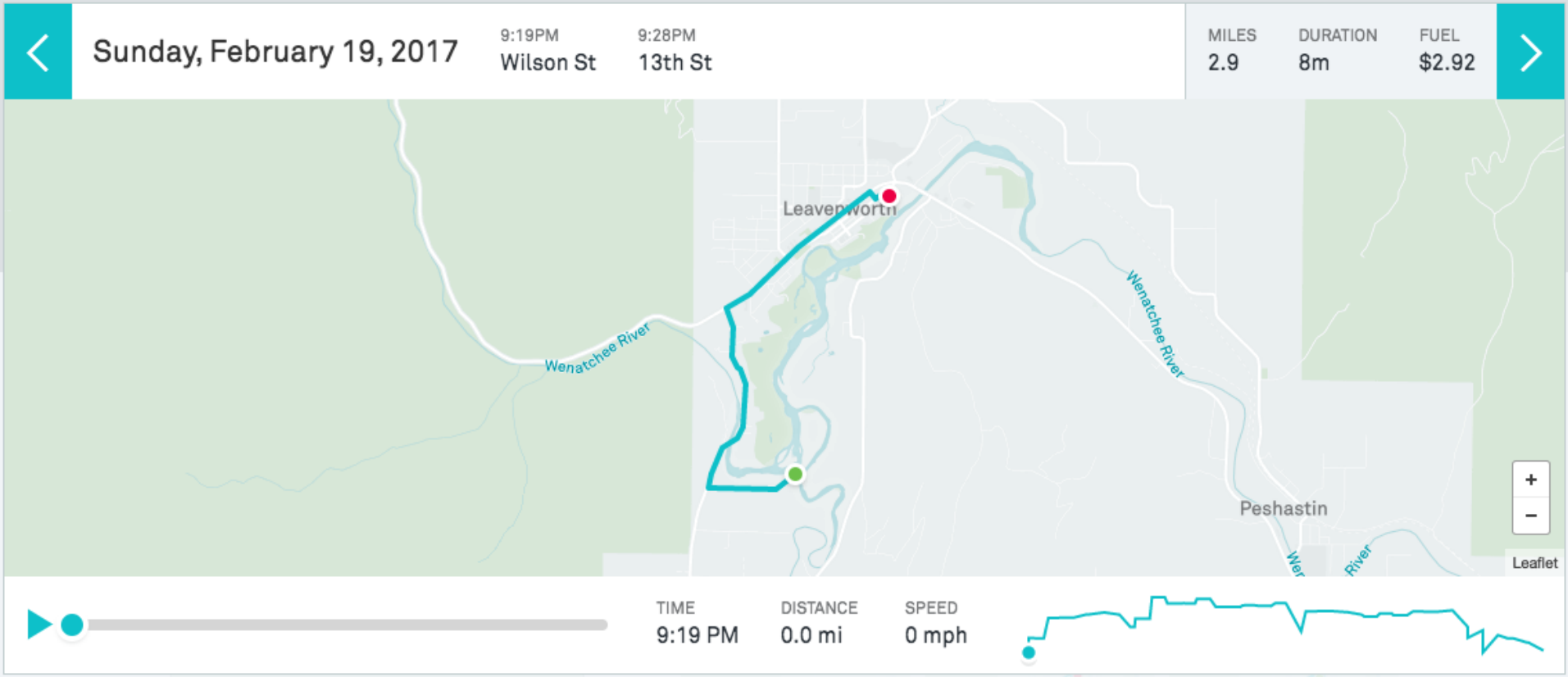
- Metro places are the scale of the new economy
  - Economies of place are metro specific
  - Labor markets
  - Many metro and state economies are export oriented
- The federal government won't
  - Lack of strategic focus in federal aid programs
  - Political consensus for national initiatives is difficult
- A fiscal and economic imperative
  - Congestion is a "tax" in the range of 1%-2% of gross product
  - Toll revenue opportunity is in the range of 3%-5% of gross product
  - The combined effect of eliminating the congestion "tax" and the fiscal stimulus from "spending" is large

FEASIBLE AND EFFICIENT ROAD PRICING

- There are no real technological barriers to pricing all roads properly.
- GPS-based devices are accurate, cheap, tamper proof, and can used in a manner that protects privacy
- Such devices are already supporting insurance products.



ENTERPRISE USE OF INEXPENSIVE GPS DEVICES



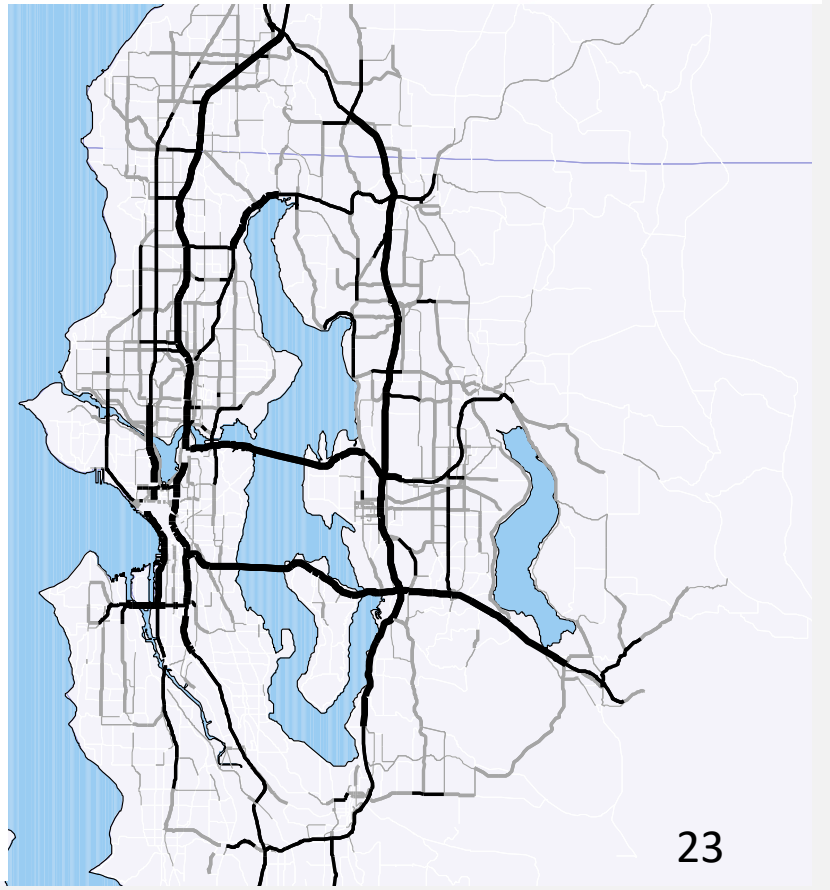
- Customer has secure access to driving history and how the billing was calculated.
- The device detects if it has been tampered with or removed.
- No roadway infrastructure is needed (gantries, road-side equipment, policing, etc.)
- Your vehicle provides the primary information on your speed and distance of travel, as well as the type of vehicle

TOLL REVENUES ON THE ROAD NETWORK

Results from a regional road pricing experiment in the central Puget Sound region

- 5% of centerline miles produced 50% of toll revenues
- Next 50% of revenues spread broadly across the core urban network
- 25% of the centerline miles produced less than 1% of total revenues

Traffic Choices Study



KEY FACTORS IN ACCEPTABILITY

- Relationship between fee and cost responsibility (who pays)
- Relationship between fee and investment policy (who benefits)
- Administrative burden (efficiency)
- Intrusiveness (privacy)
- Ability to Deliver (enterprise)

A central question in public acceptability will be whether there is an opportunity to significantly “improve” enough factors, while keeping others from getting significantly “worse”.

Portland

Eugene

Seattle

Boise

ECONorthwest

ECONOMICS • FINANCE • PLANNING

Matthew Kitchen
Project Director
kitchen@econw.com