

# The Motor Fuel Tax: A System at Risk

Framing the Problem for America

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# The Motor Fuel Tax

- The motor fuel tax has been the primary source of funding for transportation for close to 100 years
  - It's simple and efficient, but...
  - It's probably doomed to fail in the future!
- What's the problem?
  - With continuing increases in fuel efficiency, and a coming shift to all electric vehicles, tax revenue will be decreasing while travel is increasing
- The **Ultimate Policy Contradiction**: Transportation Funding is based almost entirely on the taxation of a commodity that our nation is aggressively trying to reduce the use of:
  - **GASOLINE**
- It's a serious problem for transportation funding if we stick primarily or exclusively with the gas tax going forward
  - States will need new sources of transportation revenue in the future

# The Trend Has Already Begun

- Average new car fuel efficiency increased 22% between 2008 and 2014
  - Trend moderated in last few years due to lower gas prices, but will resume
- The trend will accelerate as automakers try to achieve compliance with CAFE standards
  - Even though they have been moderated by President Trump
- Perhaps the biggest impacts will come when fully electric vehicles become more viable and less costly
  - Expected to occur in the early 2020's
  - Unprecedented “pre-orders” of Tesla 3 suggests it could even be sooner... Tesla struggling to keep up with demand

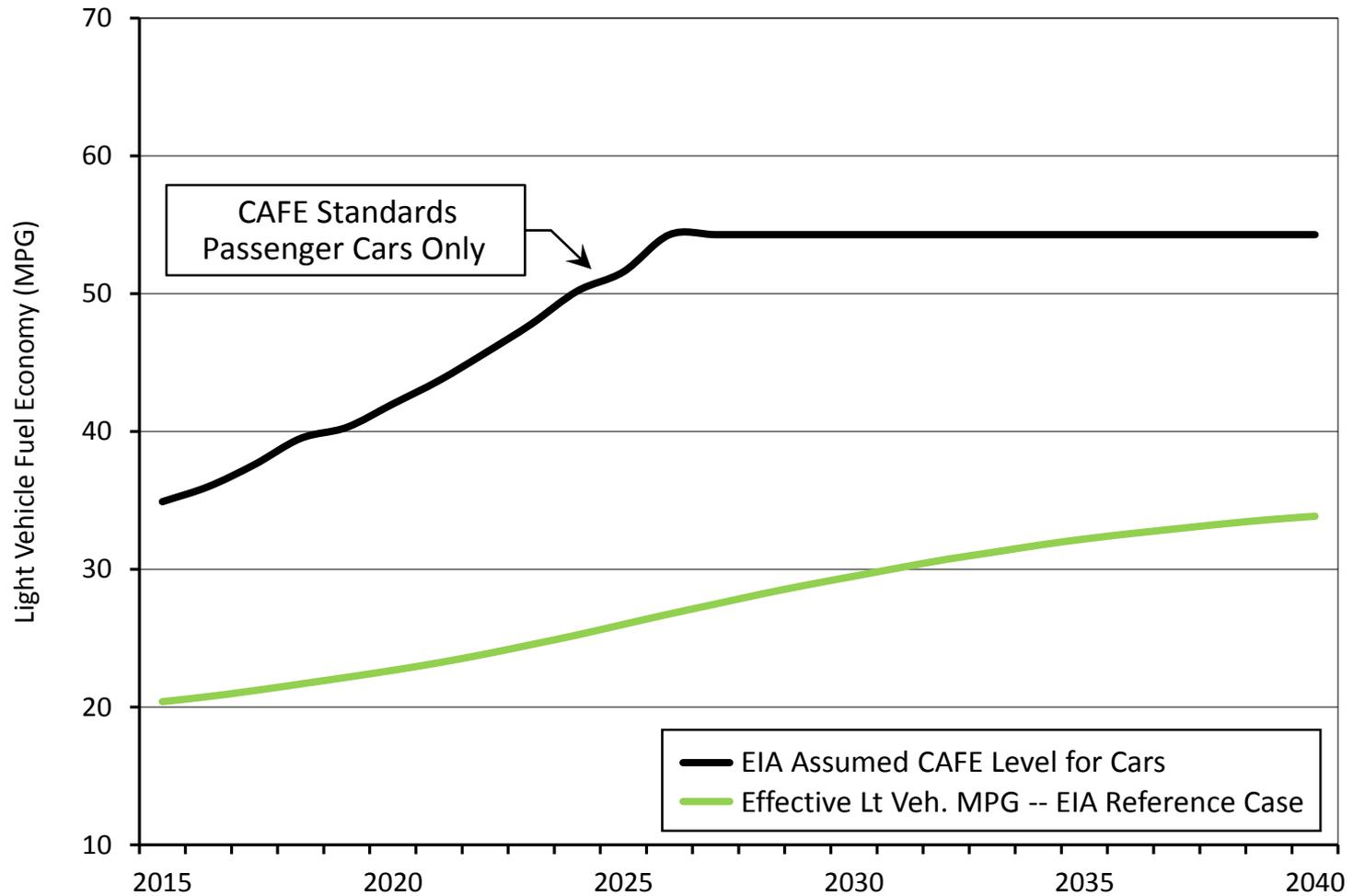
# Some Initial Context for Today's Remarks

- Based on a paper I wrote about a year ago
  - But the underlying message is even more true today than in 2016
- I used EIA forecasts of future fuel consumption developed in 2016 – before recent changes in CAFÉ standard delivery dates by President Trump
  - But still generally valid
- Actual timing of the coming problem may well be worse than my “worst case” scenario
  - Rapid advances in battery technology and declines in cost are accelerating the shift to plug in electric vehicles
  - The emergence of autonomous vehicles will further accelerate the shift to electric vehicles
  - The change in CAFE standards is becoming less relevant

# U.S. Energy Information Administration (EIA) Forecasting

- EIA Produces 25-year forecasts of future energy consumption, including all forms of motor fuel
  - Projections extend from 2016-2040
- EIA national forecasts used as benchmark in this analysis
  - Forecast of vehicle miles of travel (VMT)
  - Baseline “reference case” forecast of average fuel efficiency by vehicle category
  - Forecasts of motor fuel consumption

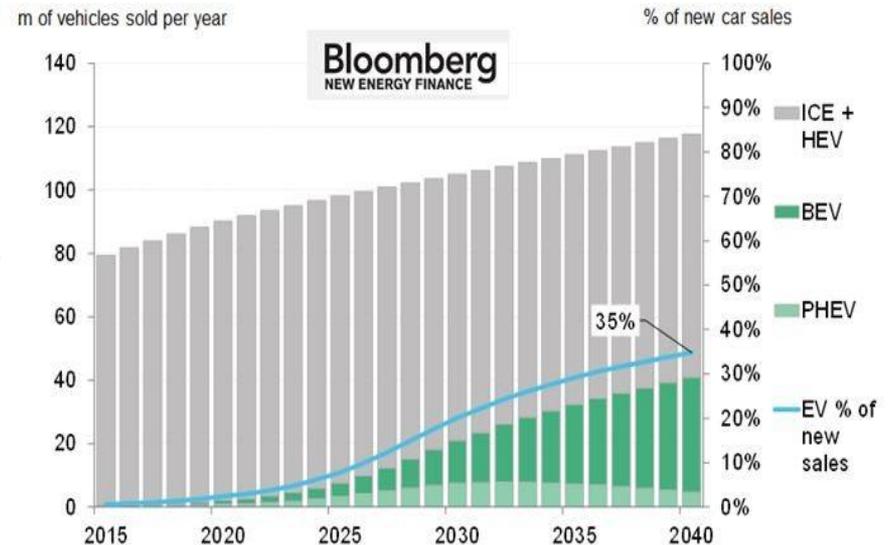
# Estimated Light Vehicle Fuel Efficiency (MPG)



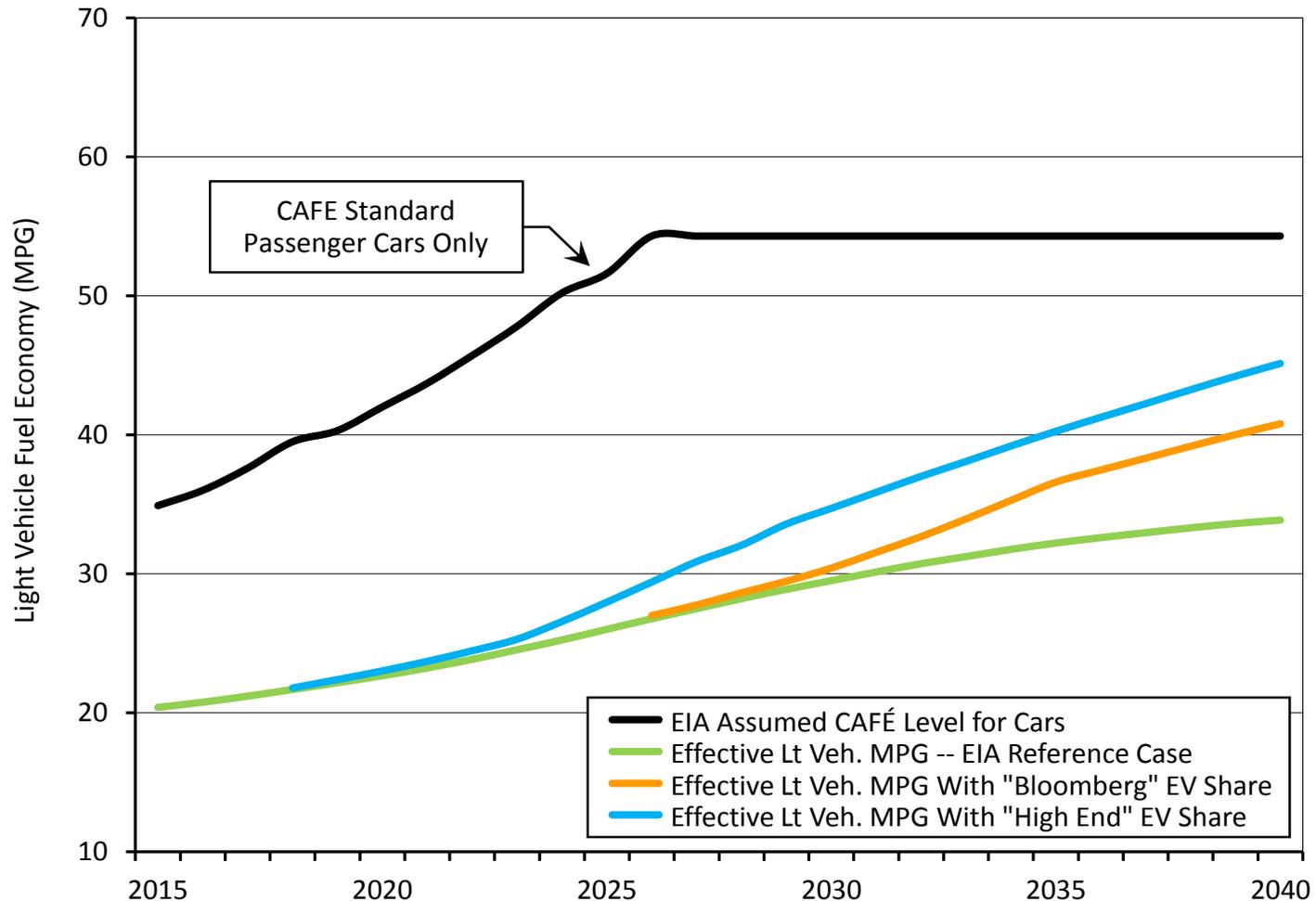
Source: Adapted from Energy Information Agency 2016 "early" Forecast. Also, Bloomberg New Energy Finance.  
Note: CAFÉ standards apply only to passenger cars. Light vehicles include cars, SUV's and pickup trucks.

# The Future Emergence of Electric Vehicles

- Battery performance is increasing as prices are coming down
- Bloomberg Energy estimates EV performance and price point will be comparable with ICE vehicles by around 2023
  - Estimates 35% of worldwide new auto sales will be fully electric vehicles by 2040
- Tesla 3 has already reached this point by end of 2017
  - 225 miles between charges
  - \$35,000 price
  - Over 500,00 people have ordered one;
- In addition to the EIA Forecast, 2 Additional Scenarios on EV
  - Bloomberg forecast
  - More accelerated EV forecasts

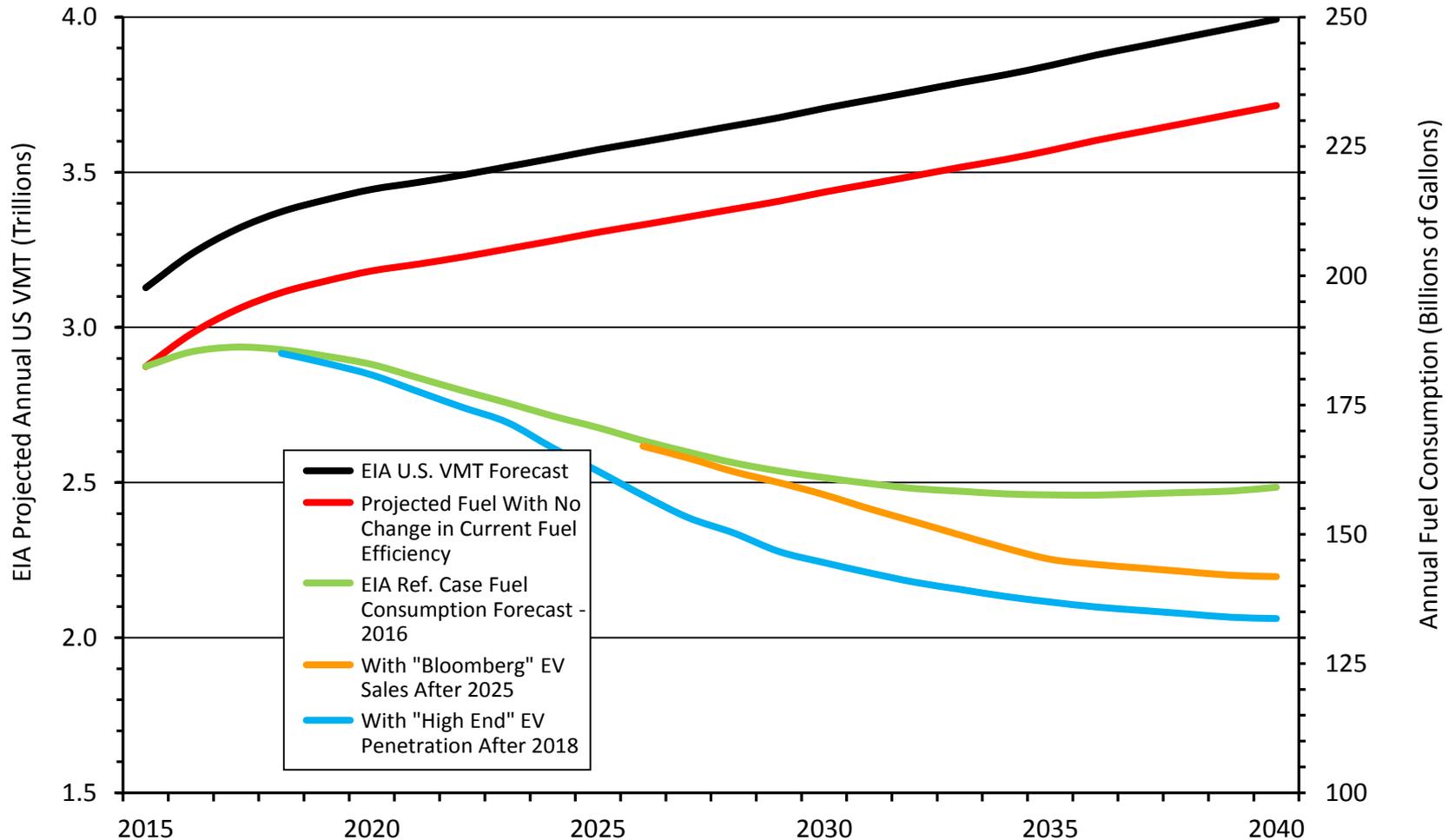


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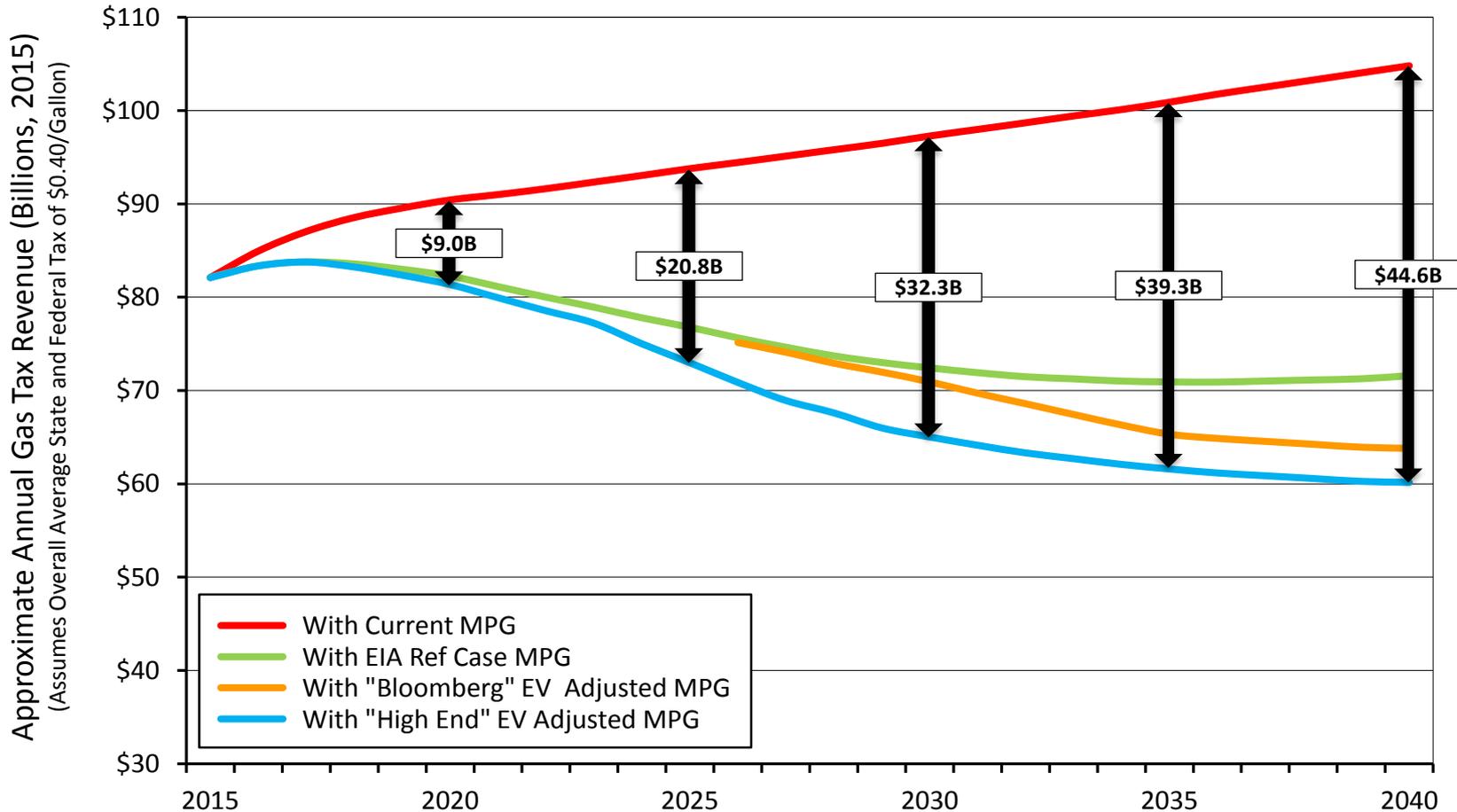
# Estimated Annual U.S. VMT and Fuel Consumption



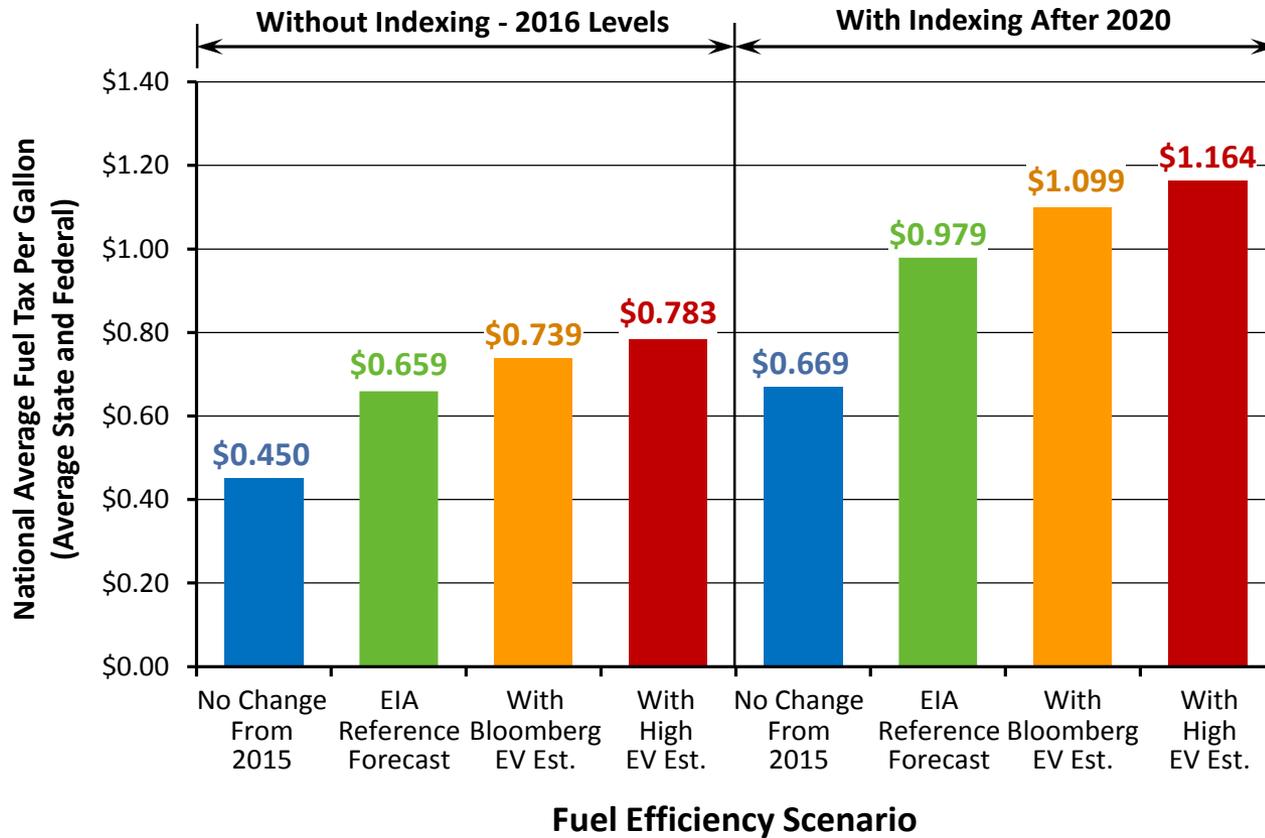
Source: Adapted from Energy Information Agency 2016 "early" Forecast. Also, Bloomberg New Energy Finance.

# Approx. Combined State and Federal Fuel Tax Revenue

2016 Dollars; Assumes Nominal \$0.45/Gal. Combined Average Tax



# Estimated 2040 National Average Total Fuel Tax Rates



# What it all Means

- The motor fuel tax is becoming increasingly unsustainable due to increased fuel efficiency and future shifts to electric vehicles
- This will exacerbate transportation funding problems throughout the country, including your midwestern states
  - At the very time there is a need for increased transportation funding, gas tax revenue will be declining
- And it will happen
  - Increasing CAFE standards
  - Rapid decline if battery prices decline and battery capacity increases
  - Transition to autonomous vehicles

# What Can States Do About It

- In the short term, increase gas taxes
  - And/or index gas tax rates to inflation
  - But gas tax increases/ indexing will not solve the long term problem of increasing fuel efficiency.
- Almost all states are looking for new sources of revenue for transportation investment
  - The long term focus will likely be on some form of **direct user fees** (such as Mileage Based User Fees aka MBUF)
  - **Adding electronic tolls to existing interstate routes** seems to be gaining interest among many states
  - Recent Trump Infrastructure Plan calls for Congress to reduce federal restrictions on tolling existing interstate routes

# Interstate Route Tolling

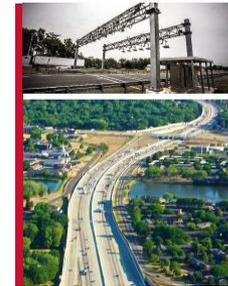
- Generally prohibited on existing free Interstates routes, with exceptions:
  - New capacity .. New routes or new lanes on existing routes
  - Reconstructed bridges and tunnels
  - Interstate System Reconstruction and Rehabilitation Pilot Program (ISRRPP) – three existing slots may come available
- Most interstates are over 50 years old;
  - Collectively the states spend more every five years on interstate system maintenance, reconstruction and expansion than the entire \$130 billion federal investment to build the 48,000 mile system in the first place (so much for... “they’re already paid for”)

# White House Infrastructure Plan & Economics Report

- Released in two steps over last two weeks
- **Infrastructure Plan** calls for Congress to relax current Federal prohibition of tolling
  - *“Provide States flexibility to toll on Interstates and reinvest toll revenues in infrastructure... Providing States flexibility to toll existing Interstates would generate additional revenues for states to invest in surface transportation infrastructure.”*
- **Economics Report:**
  - *Stresses need to shift to users fees; tolling and eventually road user charging*
  - *“Allowing prices to have a larger role in guiding consumption and investment decisions will be key to achieving the positive growth and productivity effects that infrastructure assets can provide.”*

# Several States Already Moving Toward Interstate Tolling

- Rhode Island DOT : Implementing “truck only” tolls on 14 bridges that are in urgent need of repair;
  - Tolling at first two sites begins in next 30-60 days
- Connecticut DOT is requesting legislative approval to add electronic tolls to over 500 miles of freeways and parkways in the state
  - CT is one of 13 states designated under the FHWA VPPP program which overcomes Federal toll prohibition
- Midwest States showing interest
  - Indiana – legislation passed to add tolls to I-65 and I-70 and some other routes – strategic plan and NEPA work now beginning
  - Wisconsin – detailed statewide study performed in 2016; still under consideration
  - Minnesota – statewide toll study recently completed
  - Other proposals being discussed in Michigan, Illinois and Iowa



Prepared for:  
Indiana Department of Transportation

## Tolling Feasibility Study

In Accordance with Indiana  
House Enrolled Act No. 1002

October 31, 2017



FEASIBILITY OF INTERSTATE TOLLING

## Traffic and Revenue Summary Document

December 30, 2016

**m** DEPARTMENT OF  
TRANSPORTATION

### Minnesota Tolling Study Report

Modern Tolling Practices and Policy Considerations

January 2018

# Estimated Average Annual Toll Revenue From Interstate Route Tolling in Midwest States (millions)

State	Average Toll Rates Per Mile		
	Cars: \$0.04 Trks: \$0.10	Cars: \$0.06 Trks: \$0.15	Cars: \$0.08 Trks: \$0.20
Illinois	\$1,330	\$1,911	\$2,448
Indiana	\$1,307	\$1,889	\$2,430
Iowa	\$468	\$670	\$851
Kansas	\$316	\$457	\$588
Michigan	\$1,009	\$1,426	\$1,794
Minnesota	\$709	\$1,040	\$1,357
Missouri	\$1,090	\$1,563	\$1,988
Nebraska	\$304	\$425	\$524
North Dakota	\$169	\$242	\$308
Ohio	\$1,930	\$2,801	\$3,612
South Dakota	\$229	\$327	\$413
Wisconsin	\$545	\$769	\$967
<b>Regional Total</b>	<b>\$9,406</b>	<b>\$13,520</b>	<b>\$17,280</b>
<b>U.S. Total</b>	<b>\$39,679</b>	<b>\$56,835</b>	<b>\$72,341</b>

2020-2030  
Average  
Per Year

Source: FHWA  
National Interstate Tolling  
Analysis Tool, Developed  
By CDM Smith

# Estimated Average Annual Net Revenue From Interstate Route Tolling in Midwest States (millions)

State	Average Toll Rates Per Mile		
	Cars: \$0.04 Trks: \$0.10	Cars: \$0.06 Trks: \$0.15	Cars: \$0.08 Trks: \$0.20
Illinois	\$968	\$1,568	\$2,119
Indiana	\$1,088	\$1,687	\$2,243
Iowa	\$388	\$595	\$782
Kansas	\$226	\$370	\$506
Michigan	\$788	\$1,222	\$1,606
Minnesota	\$560	\$898	\$1,223
Missouri	\$890	\$1,378	\$1,817
Nebraska	\$261	\$386	\$488
North Dakota	\$133	\$209	\$276
Ohio	\$1,527	\$2,424	\$3,258
South Dakota	\$186	\$287	\$375
Wisconsin	\$454	\$686	\$889
<b>Regional Total</b>	<b>\$7,468</b>	<b>\$11,709</b>	<b>\$15,583</b>
<b>U.S. Total</b>	<b>\$31,808</b>	<b>\$49,525</b>	<b>\$65,550</b>

2020-2030  
Average  
Per Year

Source: FHWA  
National Interstate Tolling  
Analysis Tool, Developed  
By CDM Smith

# Comparison with Other U.S Toll Rates

<b>Category</b>	<b>Passenger Cars</b>	<b>Heavy Trucks</b>
<b>All U. S. Toll Roads*</b>	<b>\$0.097</b>	<b>\$0.402</b>
<b>Major Interstate Toll Roads*</b>	<b>\$0.074</b>	<b>\$0.315</b>
<b>Interstate Tolling Rates Tested</b>	<b>\$0.040</b>	<b>\$0.100</b>
	<b>\$0.060</b>	<b>\$0.150</b>
	<b>\$0.080</b>	<b>\$0.200</b>

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**\*Simple unweighted average of all toll routes**

# Why Is Tolling Interstates a Good Short Term Solution?

- In the near term, Interstate tolling is a good option to supplement the motor fuel tax in individual states
- Although interstates represent less than 2% of all highway mileage in the nation, they carry over 25% of the nation's total VMT
- More than a third of all State DOT expenditures are on Interstate Highways
  - When considering major future capital investment requirements, over half are typically on interstate highways
- If interstate toll revenue could be used to fund rebuilding and maintaining interstate routes, revenue from the gas tax can then be used to support work on other state highways

## In the Longer Range: Mileage Based User Fees (MBUF)

- Eventually America will likely move from a “per gallon” basis of taxation to a “per mile” basis
  - Several states have done, or are doing, pilots programs
  - Includes several in the Midwest Region
- Concept arose out of research at the University of Iowa
  - Major federal grant for nationwide pilot led by the University
- MinnDOT has been a research leader in MBUF
- This is probably the ultimate solution for states to deal with the declining sustainability of motor fuel taxes

## With GPS Technology; MBUF could enable a New Paradigm in Funding and Demand Management

- A more direct linkage between road usage and road charges
- Variable rates in congested areas to manage demand
- Local additives in different jurisdictions (such as transit subsidies but only in urban areas served by transit)
- More direct allocation of revenue on certain routes to those routes.

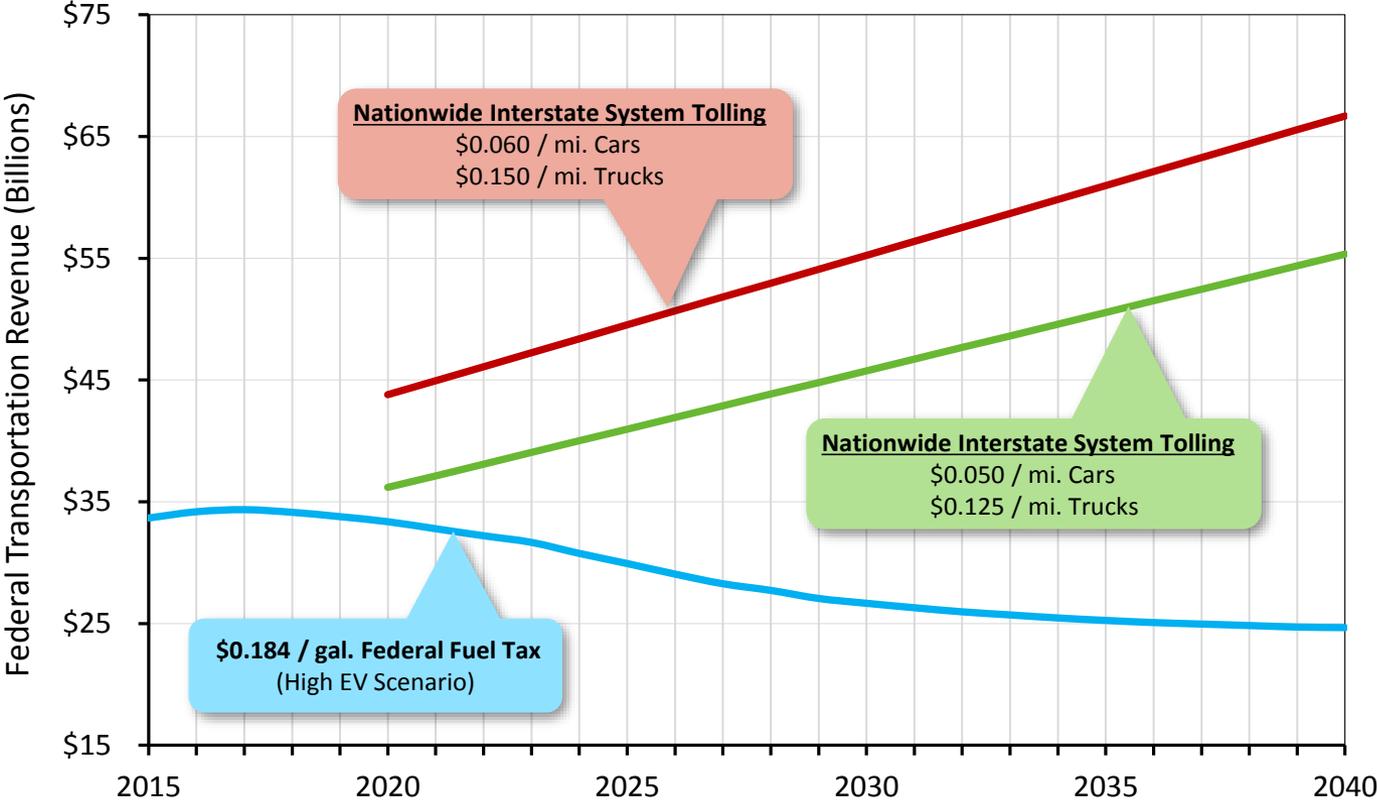
# Major Challenges with MBUF

- Privacy concerns: there is a real fear of “big brother” – technically solvable– but will people believe it
  - Most of the “pilots” undertaken to date have largely “avoided” this critical issue by offering non-technology options
  - We should be using part of the \$95 million Federal funding to challenge industry to come up with (and prove) true technology solutions to privacy concerns
- More costly and complex than gas tax... most people don't even realize there is a problem with the gas tax
- Enforcement challenges
- Difficult to implement one state at a time; national framework of some sort is needed

# How Interstate Tolling Might Help with MBUF

- Let's consider a crazy idea: Replace the \$0.184 per gallon Federal gas tax with a direct user fee on the interstate system
  - At just \$0.05 per mile for cars and \$0.125 per mile for trucks it would generate more net revenue than the federal gas tax
  - But unlike the gas tax, it would keep on growing in proportion to growth in travel, regardless of coming technology change
  - It would restore the federal role in transportation funding to the interstate system, freeing other state transportation funding for non-interstate routes
- But it wouldn't be cheap
  - Our national interstate tolling model found that if done with current all-electronic tolling more than 17,000 toll gantries would need to be constructed on 44,000 miles of currently untolled interstates
  - Including transponders for almost 200 million vehicles, the total one time investment in tolling and roadside technology would likely exceed \$50 billion
- For the same amount or less, we could equip every vehicle in America with GPS-based technology that could be used for charging interstate route tolls (user fees) without constructing any toll gantries
  - And it would enable the establishment of a framework and accounting system for collecting charges for miles on interstates that can later be “tapped into” by individual states who wish to replace their own gas taxes with mileage based user fees (MBUF)

# Estimated Annual Federal Transportation Revenue



# Thank You



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