

THE LAW OF DIMINISHING RETURNS

or.....

ALL MODELS ARE WRONG, BUT SOME ARE USEFUL

**Lucian Pugliaresi
Energy Policy Research Foundation, Inc.
Washington, DC**

CEE 21st Annual Meeting, December 7, 2016

emitte lucem et veritatem

About EPRINC

- Founded 1944
- Not-for-profit organization
- Studies intersection of petroleum economics and public policy
- Provides independent and technical analyses for distribution to the public
- Funded largely by the private sector, foundations and U.S. government
- Supports USG projects, e.g. Quadrennial Energy Review, DoD strategic outlook
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- Engagement with Washington's energy policy community
- Collaboration among diplomatic community provides interesting venue and constructive policy discussion
- Series offers opportunity to gain greater understanding of U.S. energy policy in an era of expanding U.S. supplies of oil and gas



“You are part of the problem. You and your friends will die of old age and I’m going to die from climate change.”

DNC Staffer identified as Zach at post-election meeting with with Donna Brazile, Acting Chairman of the DNC. November 10, 2016 (two days after the Presidential election)

The U.S. is producing record amounts of biofuel, and because of this increase, gas prices are 80 cents to \$1.30 less than what they would be otherwise

Statement by Secretary of Agriculture, Tom Vilsack, to the Lexington, North Carolina newspaper, "The Dispatch," April 12, 2012.

Understanding American Political Comments vs. Reality

“So by the time we get through all of my conditions, I do not think there will be many places in America where fracking will continue to take place.”

— Hillary Clinton, March 6, 2016

“The Marcellus Shale, the nation's largest play, will yield in March 2016 nearly 2 bcf/d more than EIA forecast just 30 days ago. New production from Pennsylvania caused the change from improvements in productivity and pipeline capacity.”

—Josef Lieskovsky (EIA), March 9, 2016



**In God we trust, everyone
else must bring data**

***William Edwards Deming, (October 14, 1900 – December 20, 1993), engineer,
statistician, professor, author, lecturer, and management consultant.***

Steve McQueen, a San Francisco detective in the iconic thriller, ***Bullitt***, chases the bad guys in his 1968 [Ford Mustang GT](#) fastback with a 325 horse power V8.



How do the cars of today compare with McQueen's Mustang?

Answer:

1968 Mustang, 1 ton of criteria pollutants per 100,000 miles

2016 Mustang, 10 pounds of criteria pollutants per 100,000 miles

Estimate of CARB Gasoline Costs Above Texas RFG**

	Per Gallon Cost	*Annual Cost in \$Billions
CARB Difference to Texas RFG of which	0.32	
Cost of CARB Formulation	0.11	\$1.65
CCA Cap & Trade	0.11	\$1.65
Cost of LCFS	0.10	\$1.50
Total		\$4.80

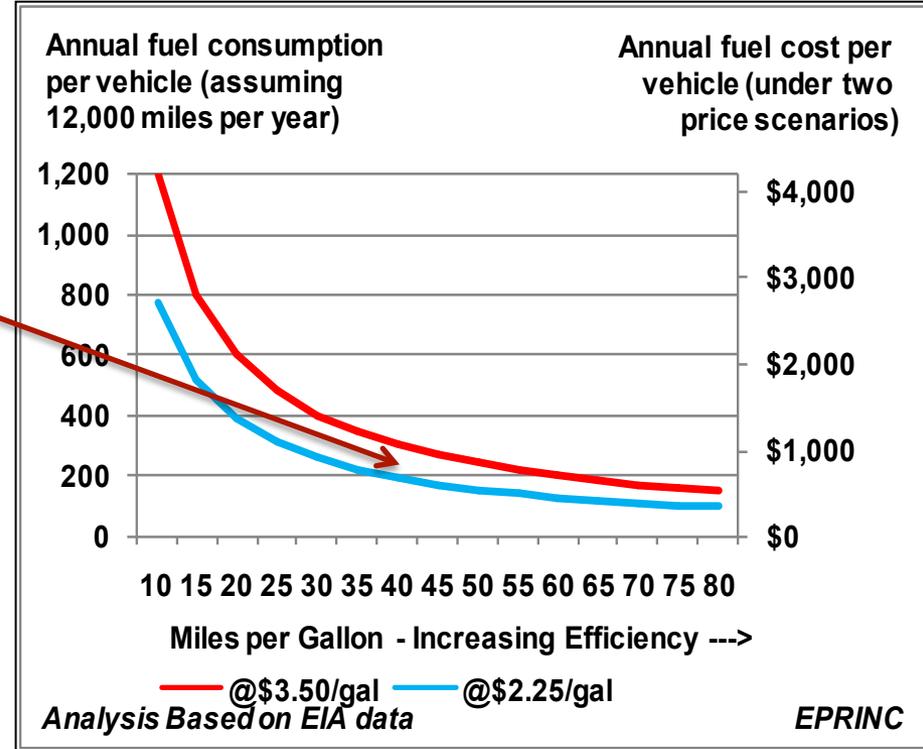
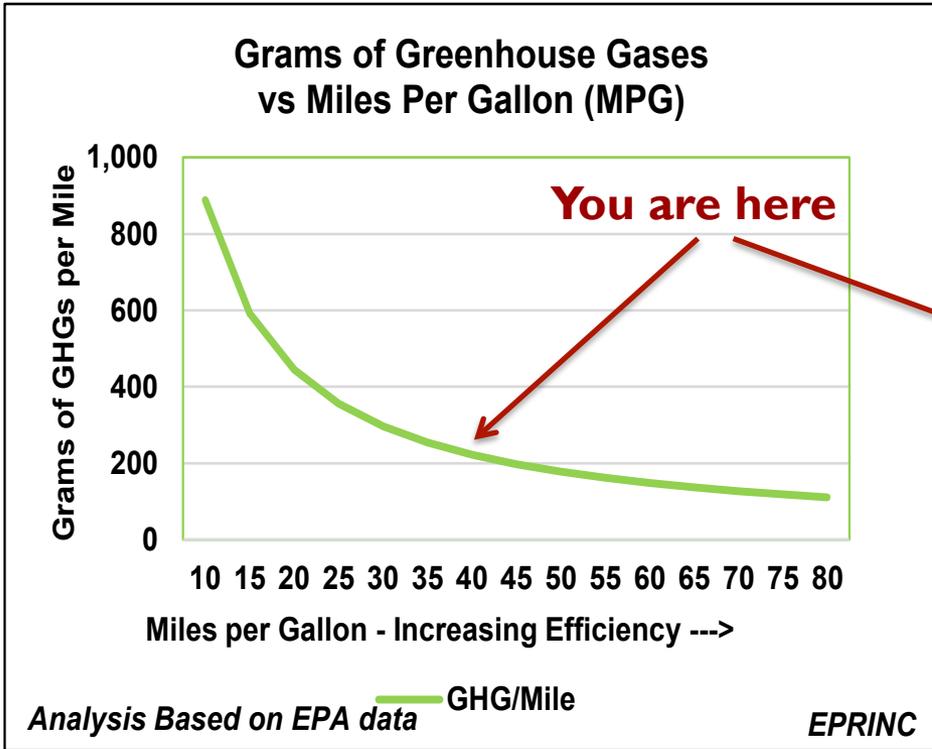
* Based on 15 billion gallons of gasoline consumption annually

** EPRINC estimates that the RFS adds another \$0.10/
gallon. In California this is an additional \$1.5 billion in
annual cost

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A Comment on Environmental Regulation

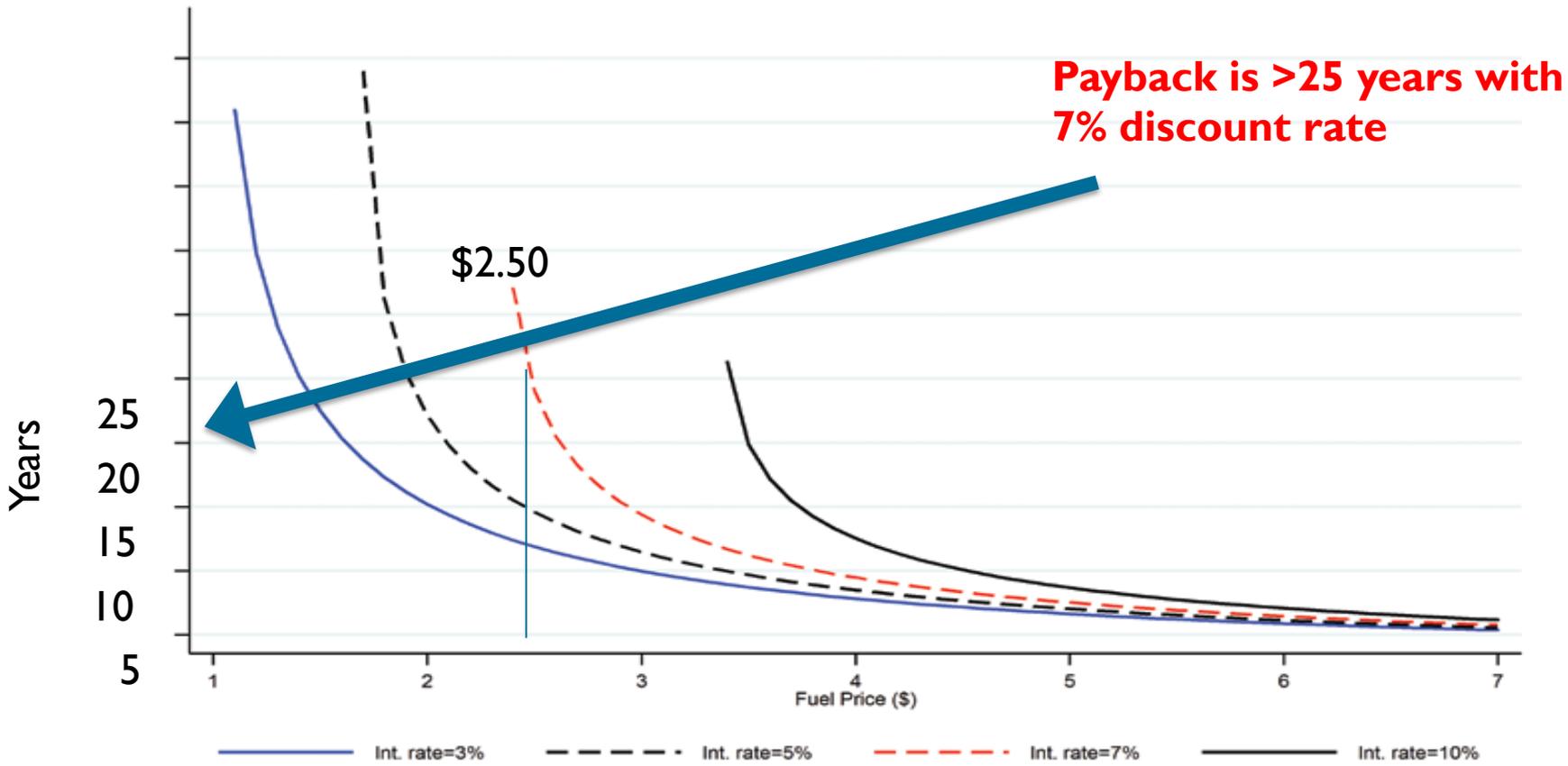
How Much Should We Pay for the Last 10 Yards?



Source: Pugliaresi, L. and Max Pyziur, *CAFE, Gasoline Prices and the Law of Diminishing Returns*, March 2016, EPRINC

Payback Period

Consumer payback (in years) analysis for a PEV with an incremental price of \$10,000



Source: Indiana University School of Public and Environmental Affairs, "Rethinking Auto Fuel Economy Policy"

This is not a Defense of VW's Clean Diesel violation, but...

- Fuel economy is better than advertised for 2.0-liter diesel, averaging 45 miles per gallon on highway and 30 in city
- Output of GHG emissions, averaged at 50 percent or more below federal standards, but VW violated the NOx standard, at a level of at least **15 times the standard**
- But the average gasoline-powered pickup truck puts more NOx pollution than the typical Volkswagen diesel—and there are more than 10 million such trucks on the road
- Security delays on vehicles waiting to enter San Diego from Mexico produce 157 tons of extra NOx pollution—**VW's entire violation (for California) is approximately 90 tons of Nox**
- Next year, the average new car will have cut pollution by **99.4 percent** compared to 1963 models

Methane Controls on Natural Gas Wells & Field Operations

- On Sept. 18, 2015, EPA published its proposed new source performance standards for methane and VOC emissions for the oil and gas sector
- EPA estimates the total annualized engineering costs of complying with will be \$180-200 million in 2020 and \$370 -500 million in 2025.
- But EPA claims the rule pays for itself through natural gas savings, but others (including oil & gas industry disagree)
- Unclear yet of the magnitude on U.S. natural gas production, but could raise well costs from \$5,000 to \$20,000.
- Under agreement with PM Trudeau, EPA is now pursuing more methane controls on existing sources