

**Synopsis  
of the  
National Tire  
Efficiency Study**

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**TRB**

Special Report 286

TIRES AND PASSENGER VEHICLE FUEL ECONOMY

**TIRES AND  
PASSENGER  
VEHICLE FUEL  
ECONOMY**

**SPECIAL  
REPORT  
286**

Informing Consumers,  
Improving Performance

**TRANSPORTATION RESEARCH BOARD  
OF THE NATIONAL ACADEMIES**

# CHARGE

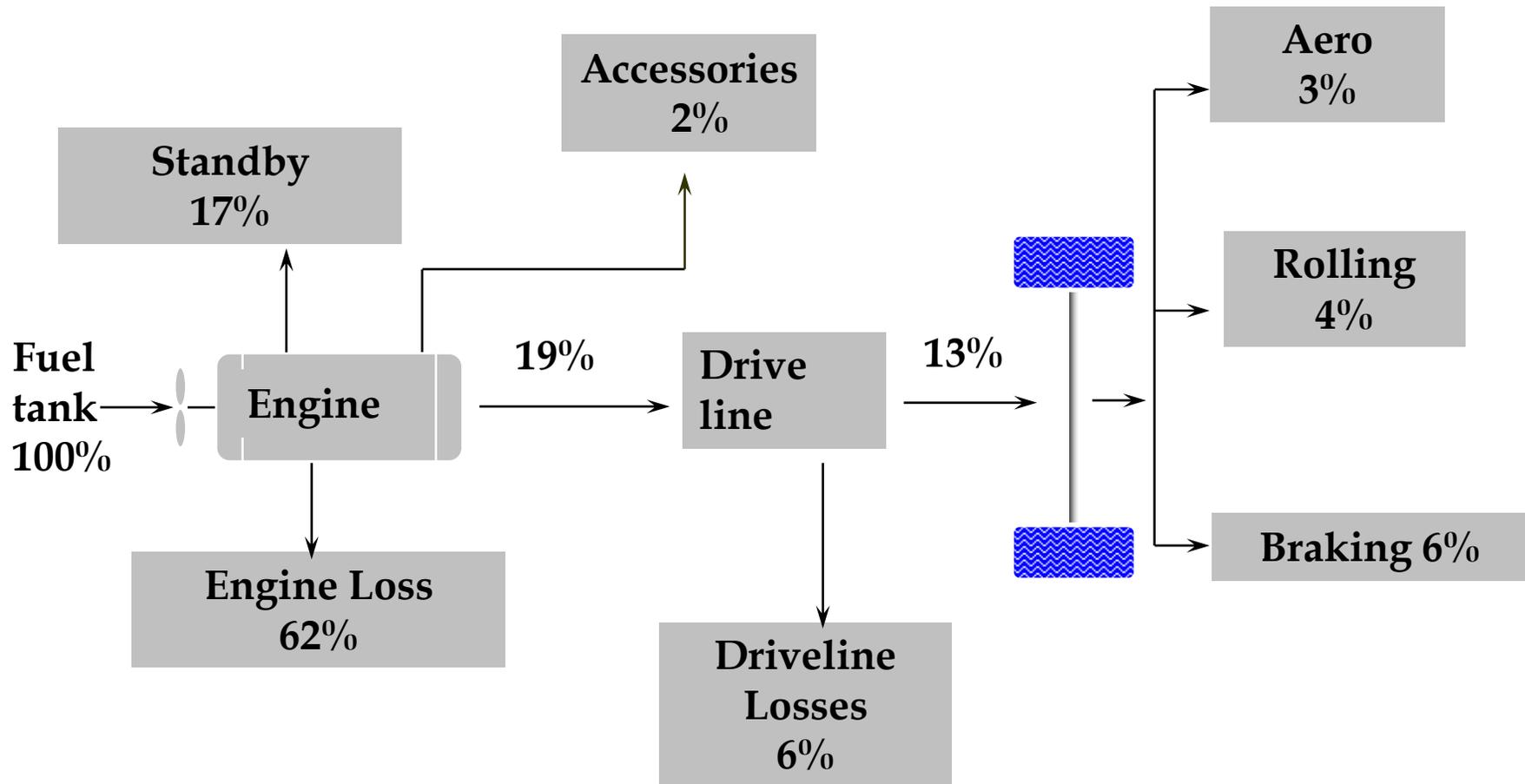
- Evaluate effects of lowering rolling resistance of replacement passenger tires on:
  - Vehicle fuel consumption
  - Tire wear and scrap tire generation
  - Tire performance characteristics and highway safety
  - Consumer spending on tires and fuel

# OUTLINE OF PRESENTATION

- Fuel energy utilization in driving.
- Tire energy usage.
- Committee conclusions.
- Committee recommendation.

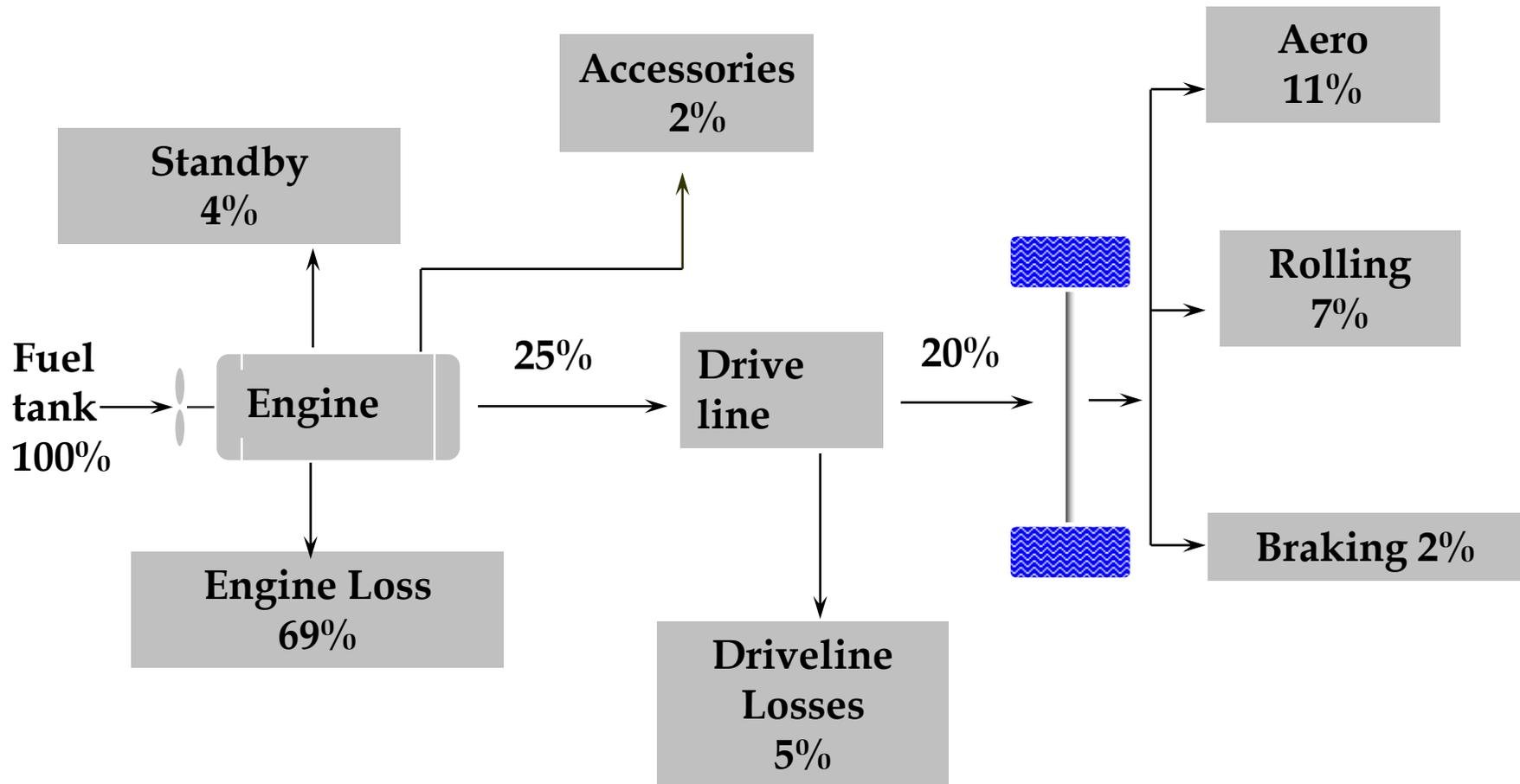
# Where the energy goes

Urban Driving



# Where the energy goes

Highway Driving



# Characterizing Tire Energy Usage

$$\begin{aligned} F_{RR} &= \text{POWER} / \text{VELOCITY} \\ &= \text{N-m/sec} \cdot \text{sec/m} = \text{N} \end{aligned}$$

$$\text{RRC} = F_{RR} / \text{LOAD} = \text{N/N}$$

$$\text{RRC} = f(\text{P}, \text{LOAD})$$

Velocity matters at speeds above the legal speeds in the USA.

# Conclusions

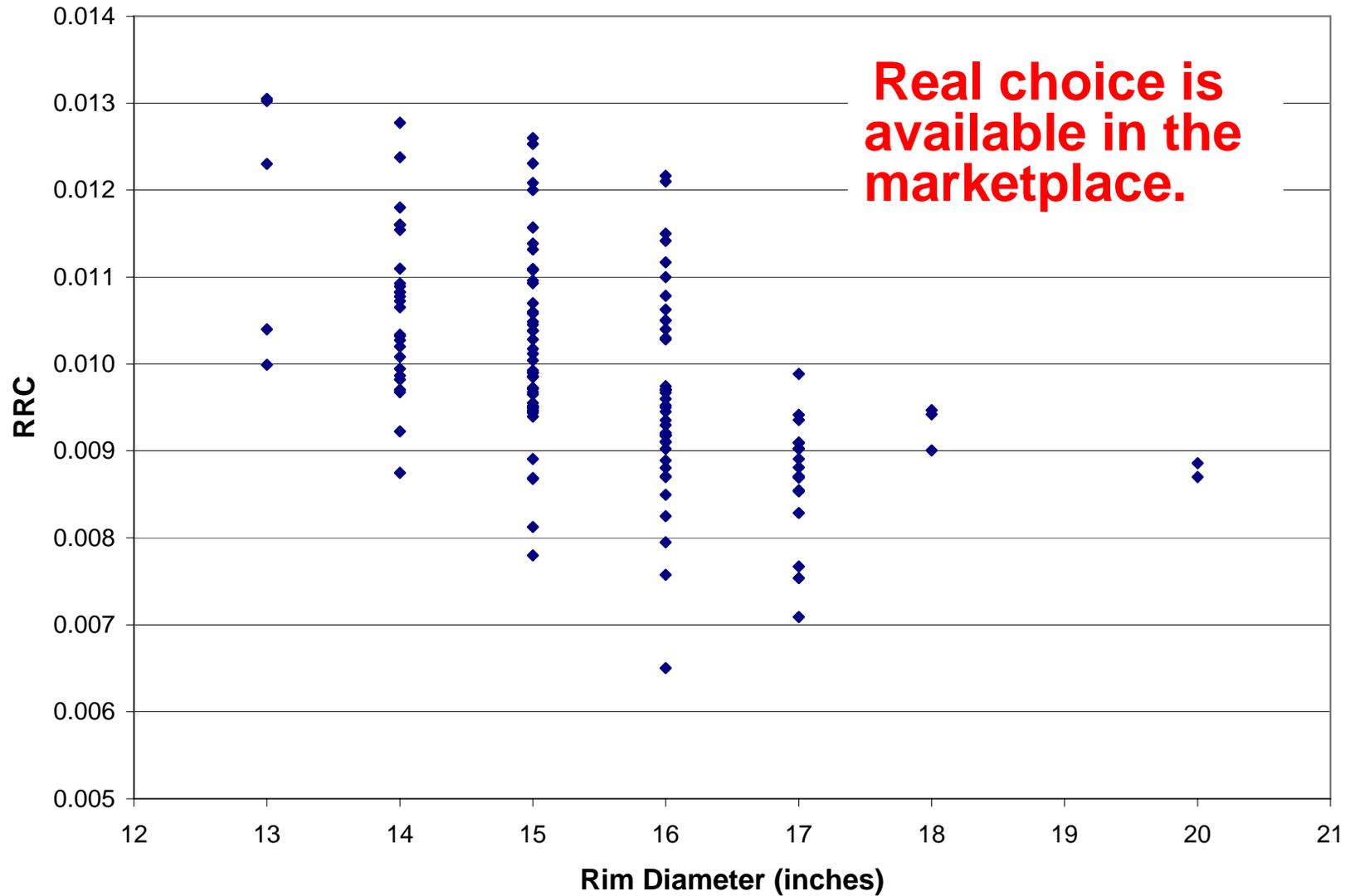
1. REDUCING ROLLING RESISTANCE OF REPLACEMENT TIRES IN FLEET BY 10% IS FEASIBLE

# Conclusions

1. REDUCING ROLLING RESISTANCE OF REPLACEMENT TIRES IN FLEET BY 10% IS FEASIBLE

- **Can change the mix of existing tires purchased.**

# -RRCs for "A" Traction Rated Tires

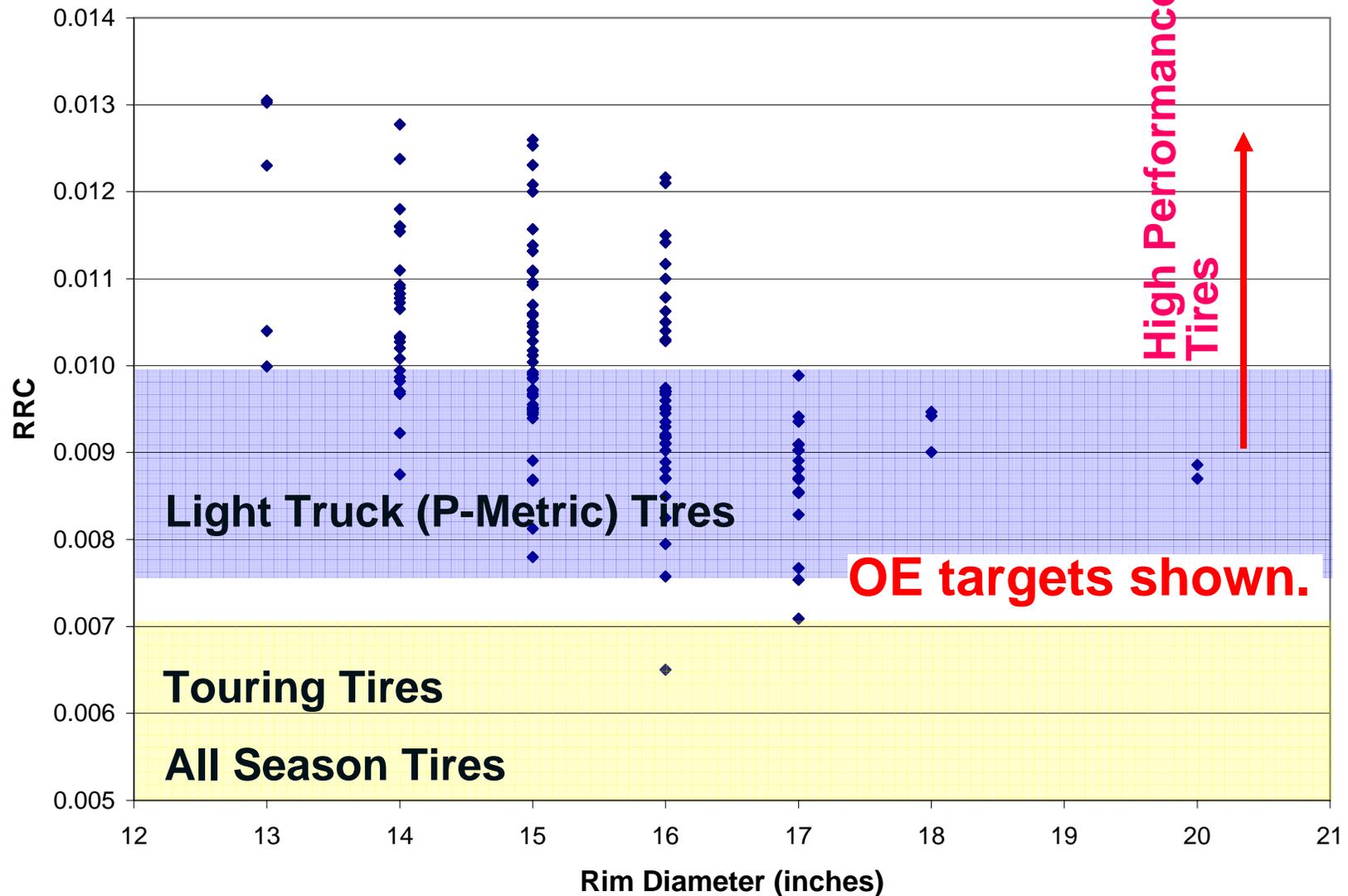


# Conclusions

## 1. REDUCING ROLLING RESISTANCE OF REPLACEMENT TIRES IN FLEET BY 10% IS FEASIBLE

- Changes in mix of existing tires purchased
- **Migration of OE tire technologies**

# -RRCs for "A" Traction Rated Tires



# Conclusions

## 1. REDUCING ROLLING RESISTANCE OF REPLACEMENT TIRES IN FLEET BY 10% IS FEASIBLE

- Changes in mix of existing tires purchased
- Migration of OE tire technologies
- **If we all watched our inflation pressure, we could reduce operating rolling resistance by an average of about 5% right now.**

## 2. ROLLING RESISTANCE HAS A MEANINGFUL EFFECT ON FUEL ECONOMY

- **10% reduction in rolling resistance will improve fuel economy by 1 to 2 %**

# Models of Effect on MPG from 10% Change in RRC (base = 0.008)

	RRC down 10%		RRC up 10%	
	City Mpg	Hwy Mpg	City Mpg	Hwy Mpg
GM	+1.1	+1.6	-1.4	-1.9
NETL	+0.7	+2.0	-0.7	-1.7
Ross	+1.0	+1.9	-1.0	-1.9
EEA	+1.3	+2.0	-1.3	-1.9

1 to 2% change in mpg is reasonable rule of thumb.

## 2. ROLLING RESISTANCE HAS A MEANINGFUL EFFECT ON FUEL ECONOMY

- 10% reduction in rolling resistance will increase fuel economy by 1 to 2 %
- **80 percent of passenger vehicles have replacement tires.**
- **Each 1% improvement in fuel economy of these vehicles will save ~1 billion gallons (23.8 million barrels) of fuel annually.**
- The 10% reduction in replacement tire rolling resistance would have an effect like reducing the number of cars and light trucks on the road by about 2 to 4 million vehicles.

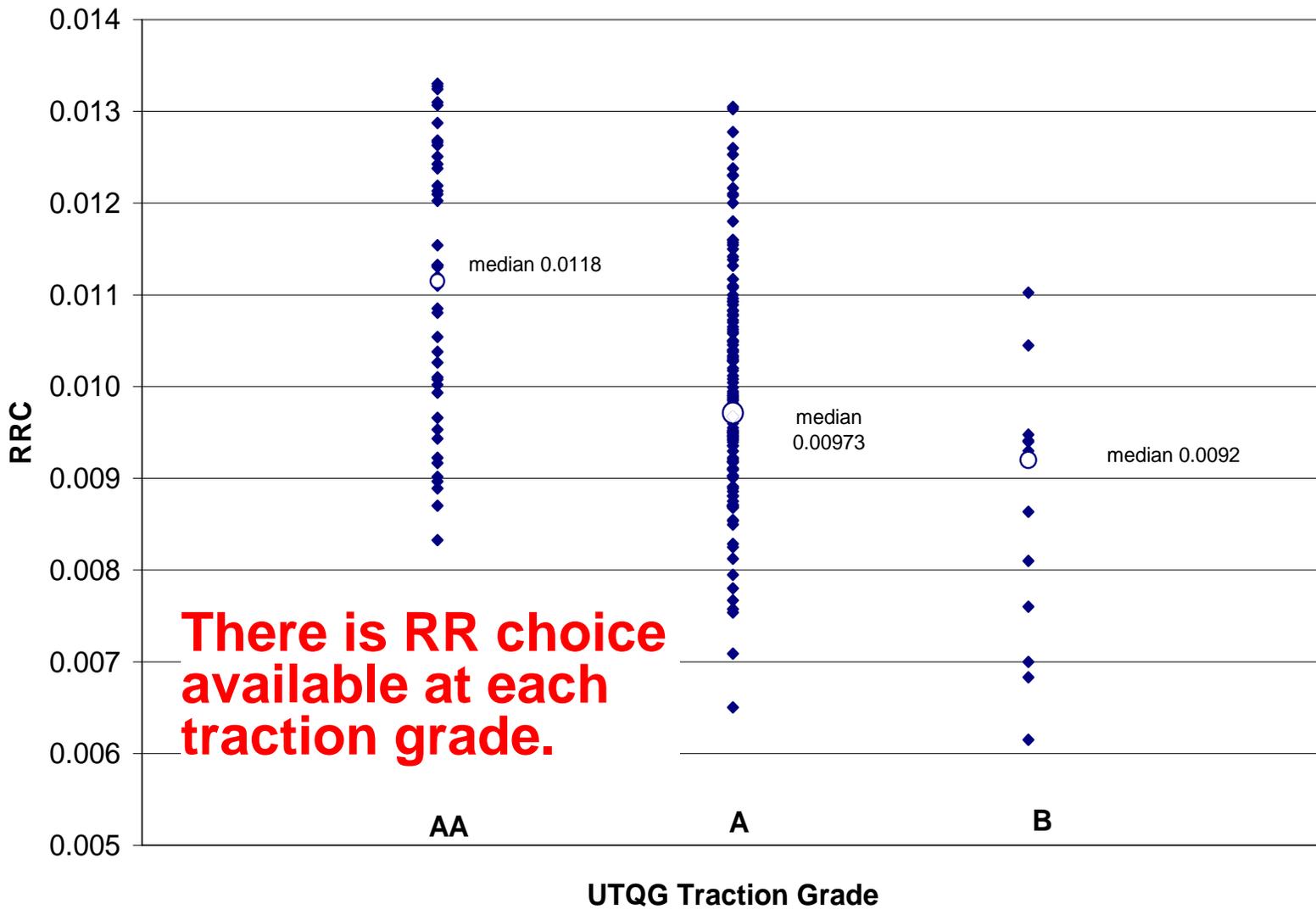
### 3. EFFECT ON TIRE WEAR LIFE UNCLEAR: *BECAUSE ROLLING RESISTANCE CAN BE REDUCED IN DIFFERENT WAYS*

- **Tread compound and mass are major determinants of rolling resistance**
- **Promising:** Improved tread compounds that reduce rolling resistance without reducing wear life.
- **Not promising:** Building tires with less tread material is not a good idea in general.

#### 4. TRACTION CHARACTERISTICS MAY BE AFFECTED, BUT SAFETY CONSEQUENCES UNDETECTABLE

- **Changes are routinely made to tires that can affect traction to some extent.**
- **Few studies/data available linking large changes in tire traction capability with crashes. Thus, not possible to detect the impact of incremental changes in traction associated with changes to reduce rolling resistance.**
- ★ **Reducing RRC and maintaining generally acceptable traction is feasible**

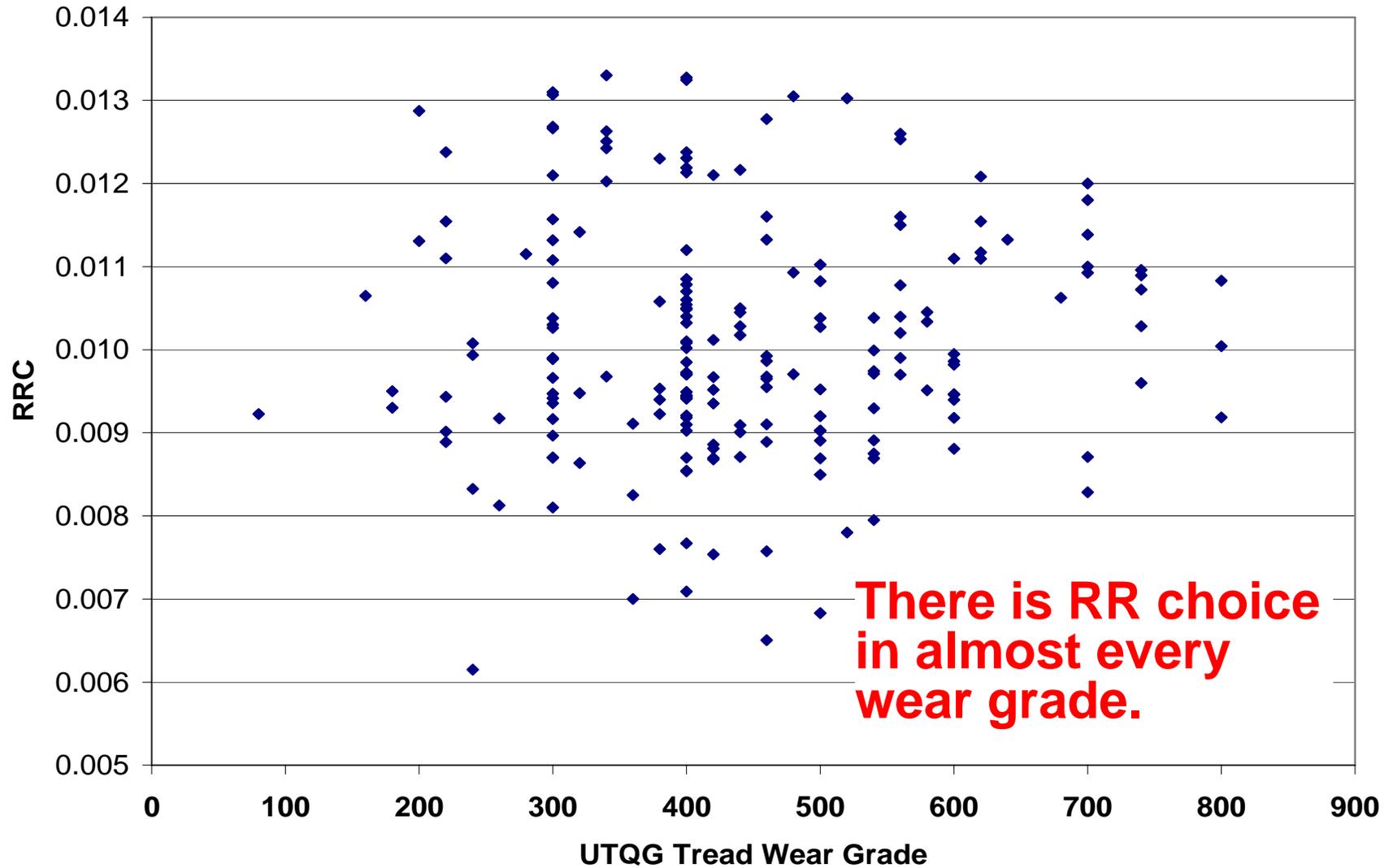
# RRC by UTQG Traction Grade



## 5. REDUCING AVERAGE RR OF REPLACEMENT TIRES PROMISES NET SAVINGS TO CONSUMERS

- 1 to 2% savings in fuel = \$18 to \$36 per year in avg. fuel savings. \$3 to \$6 billion nationally.  
**The \$ numbers are based on \$3 per gallon fuel. ??!**
- New technologies may add \$1 to \$2 per to price of a tire. Increase consumer tire spending by \$1 to \$2 per year.
- Important that tire wear life is not shortened in the current tire industry business model due to the choice of RR reduction technologies.

# All passenger tires



# RECOMMENDATION

- **Congress should authorize and provide resources to NHTSA to:**
  - **Gather and report information on the influence of passenger tires on vehicle fuel economy.**
  - **Information should be made widely available and easy to understand by tire buyers and sellers.**
  - **It should cover a large portion of passenger tires sold with respect to sizes, models, and types.**

# Recommendation Details

- Consult with EPA on ways to convey the information to consumers.
- Seek participation by entire tire industry.
- Periodically review the initiative's:
  - Utility to consumers
  - Industry cooperation
  - Contribution to national energy goals
- Accompanied by efforts to promote tire inflation maintenance.

## HOW WILL CONSUMERS RESPOND?

- **ROLLING RESISTANCE INFORMATION IS NOT AVAILABLE TO TIRE CUSTOMERS TODAY.**
- **The committee didn't know how individual tire purchasers will respond.**
- **No major price differences observed among similar tires with different RR. The committee hoped that this will spur interest in buying lower RR tires.**

**Thanks,  
Any questions?**