

# Diesel Inventory Improvements for Regulatory Development

Planning and Technical  
Support Division

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California Environmental Protection Agency

 **Air Resources Board**

# Outline

- Emissions Inventory Development
- Truck and Bus Rule Inventory
- Off-Road Rule Inventory
- Conclusion

# What is an emissions inventory?

- An estimate of current and future air pollutant emissions
- Combines emissions measurements with data on the population and operating characteristics of different types of vehicles
- Methods and data sources improve over time

## How are future emissions forecasted?

- Current emissions are adjusted for growth and regulation requirements
  - Forecasted economic trends
  - New technology penetration

## What types of data sources are used?

- Engine emission test data
- Academic research
- Agency program information
- Market reports and industry surveys
- ARB surveys and field studies
- Economic forecasts

## What's different with in-use rules?

- New engine standards focus on manufacturers
- In-use rules focus on fleets owned and operated by individual businesses
- Requires understanding the nature of individual fleets and their operations

# Truck and Bus Inventory

- Comprehensive update in 2008
- Latest update is for recession impacts
- Other refinements



# Inventory Updates

- Comprehensive 2008 update
  - Addressed variety of fleet categories
  - Incorporated new methods and data
- 2010 update for recession
  - Adjusted economic assumptions
  - Other refinements

## Inventory Update Public Process

- First workshop discussing updates April 2007
- 6 inventory workshops in 2007 and 2008
- 9 inventory workshops in 2009 and 2010
- Stakeholder participation
- Inventory data and models available to public

## Recession Impact

- Emissions reduced by 25%
- Impact of recession based on fuel sales data
- Agrees well with fuel estimates

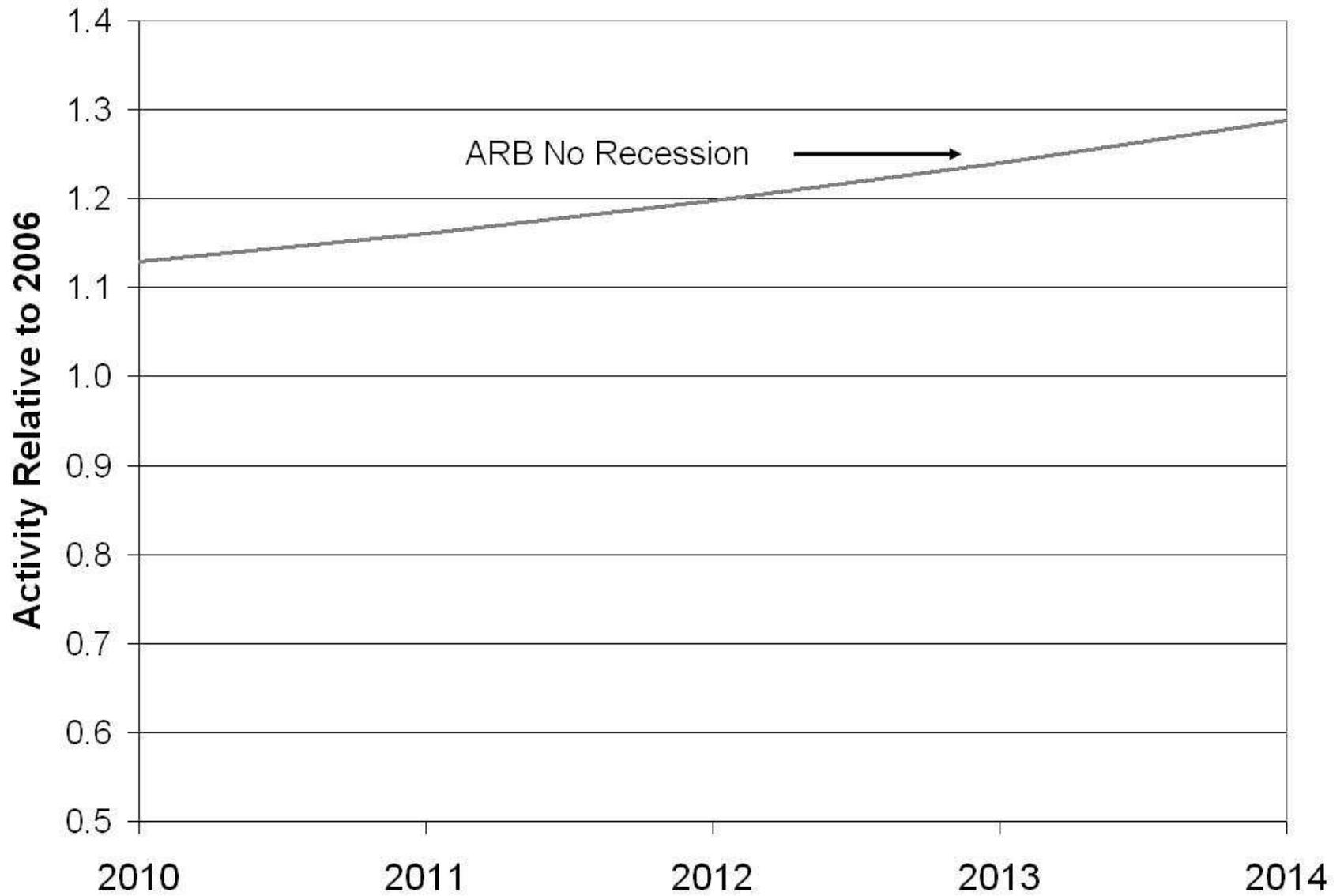
## Use of Economic Forecasts

- Evaluated latest near-term forecasts
- Forecasts from UCLA, UOP, CA Department of Finance, Beacon Economics, Energy Information Administration, Congressional Budget Office, and others
- Focus on 2014

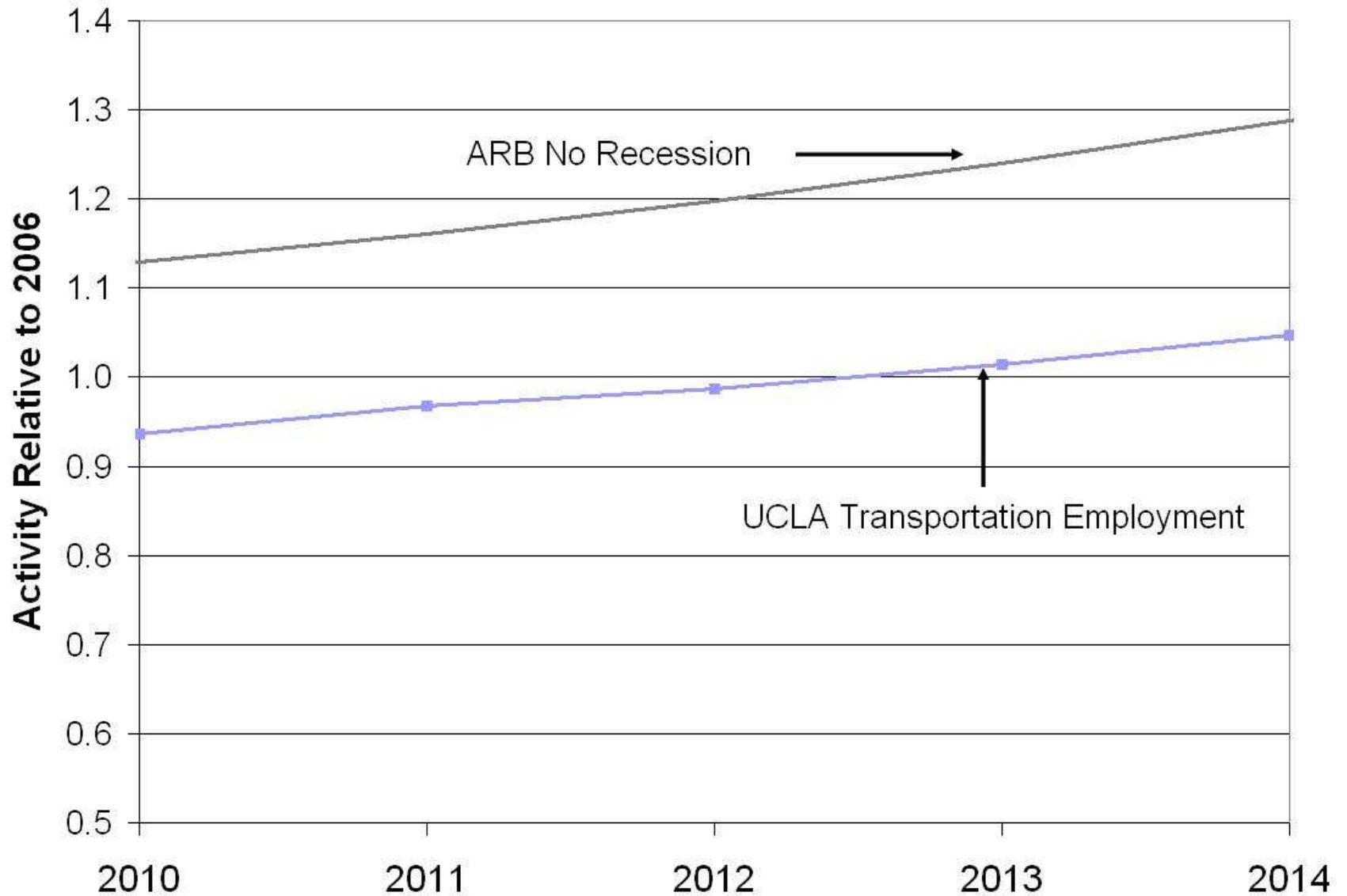
## Economic Recovery Scenarios

- Faster scenario assumes eight year recovery period
- Slower scenario assumes no return to previously anticipated levels
- April report to Board used average scenario
- Average scenario consistent with UCLA and UOP transportation forecasts

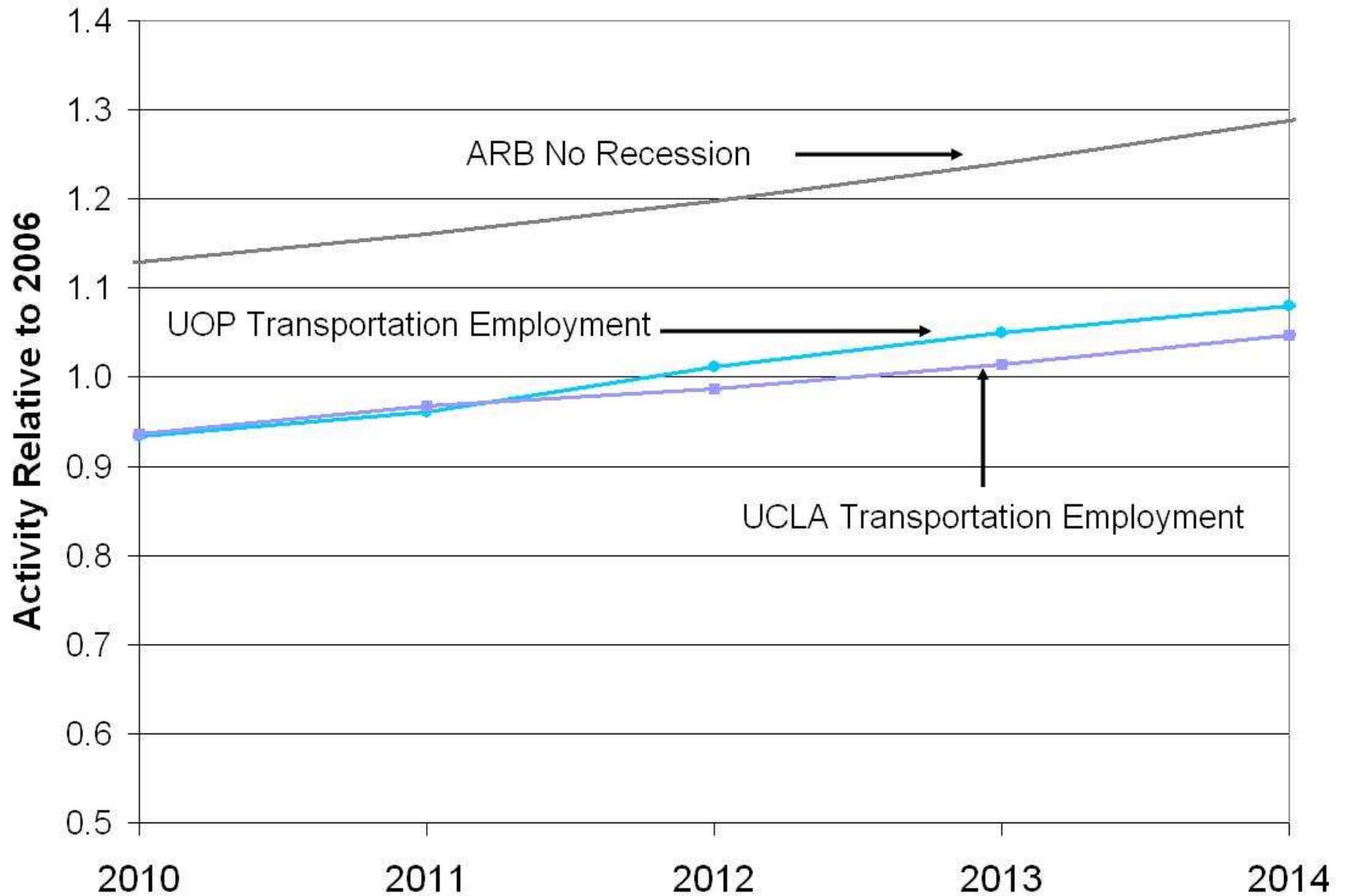
# Scenarios Forecasting Truck Activity



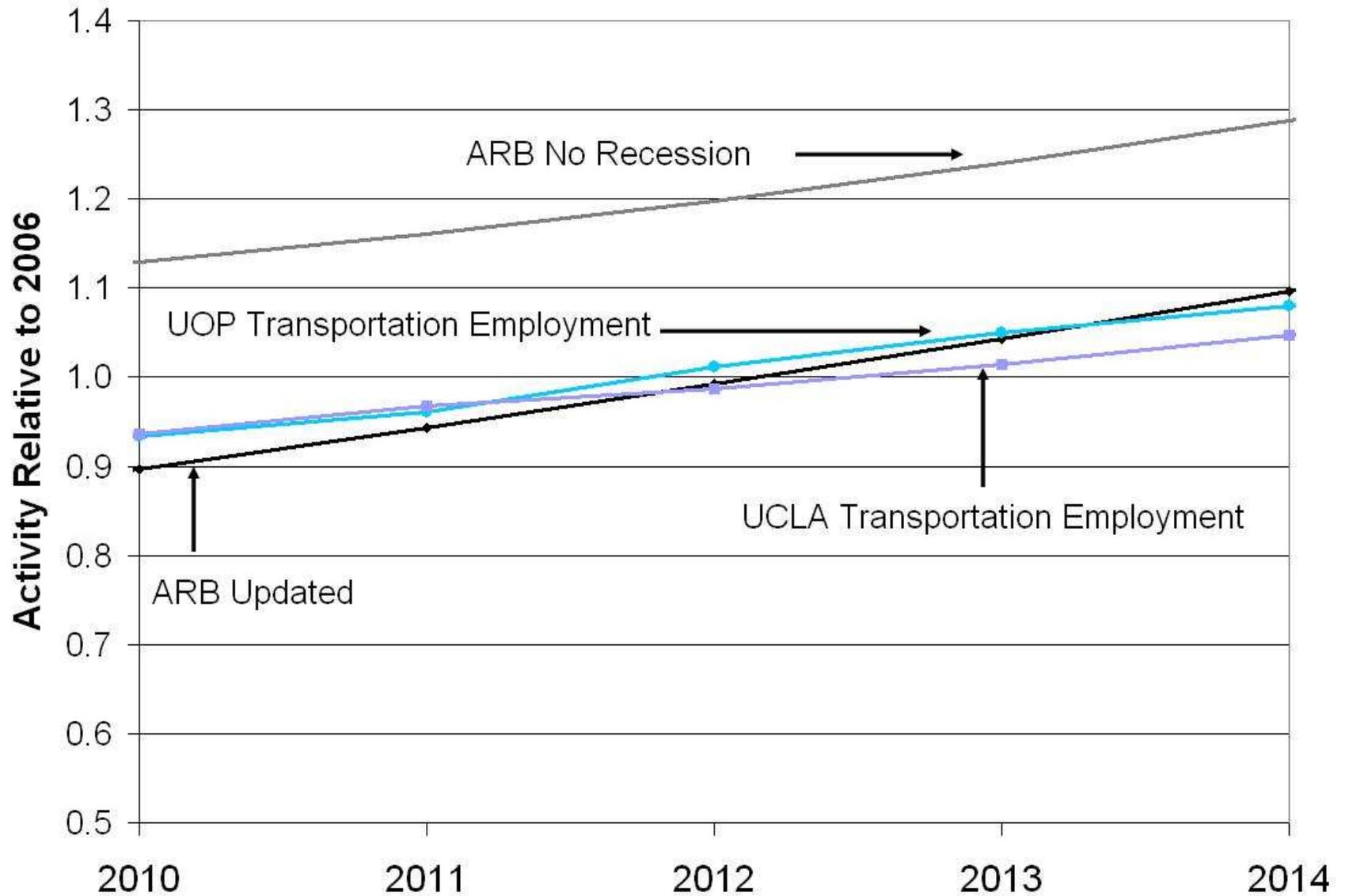
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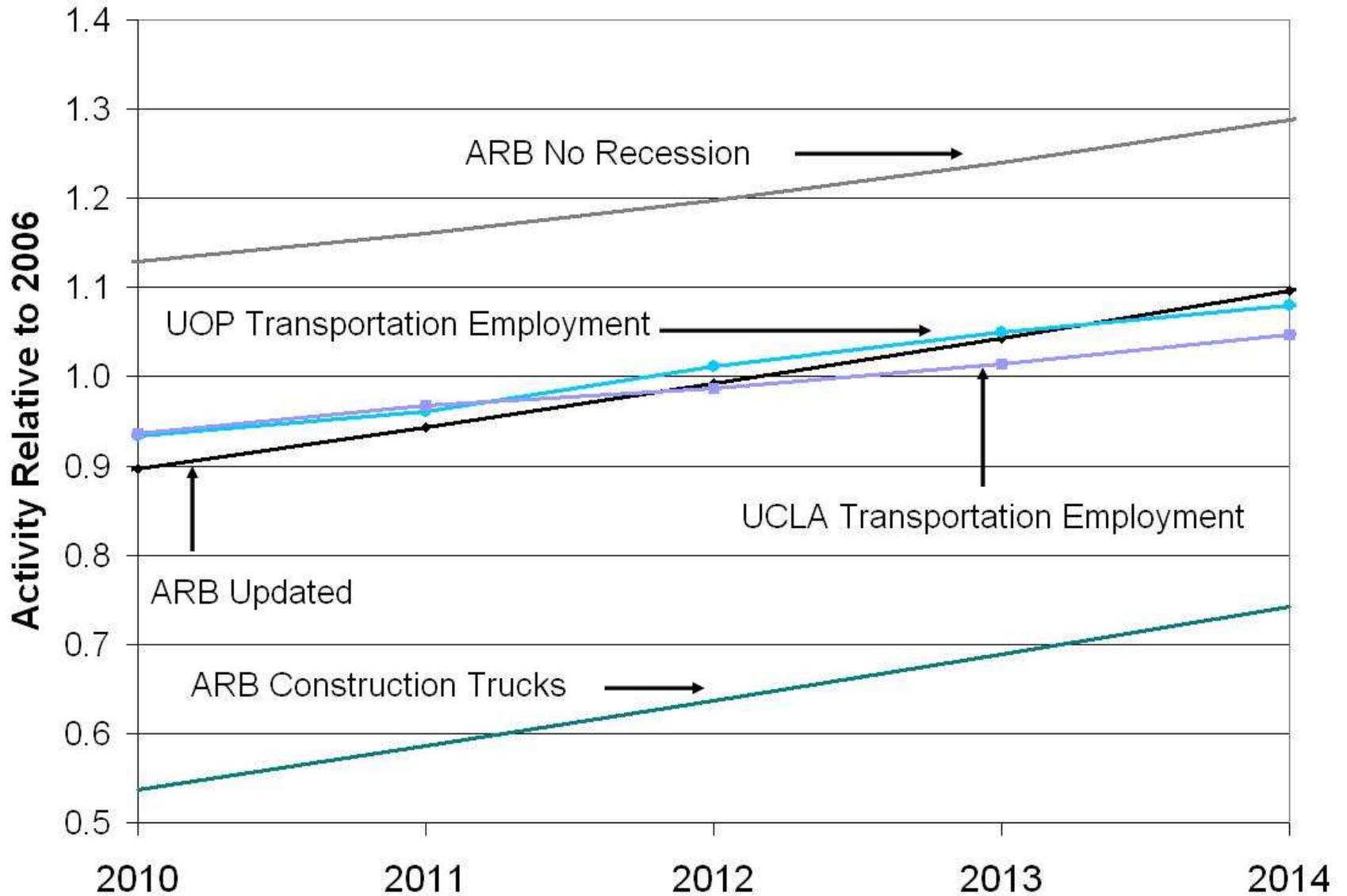
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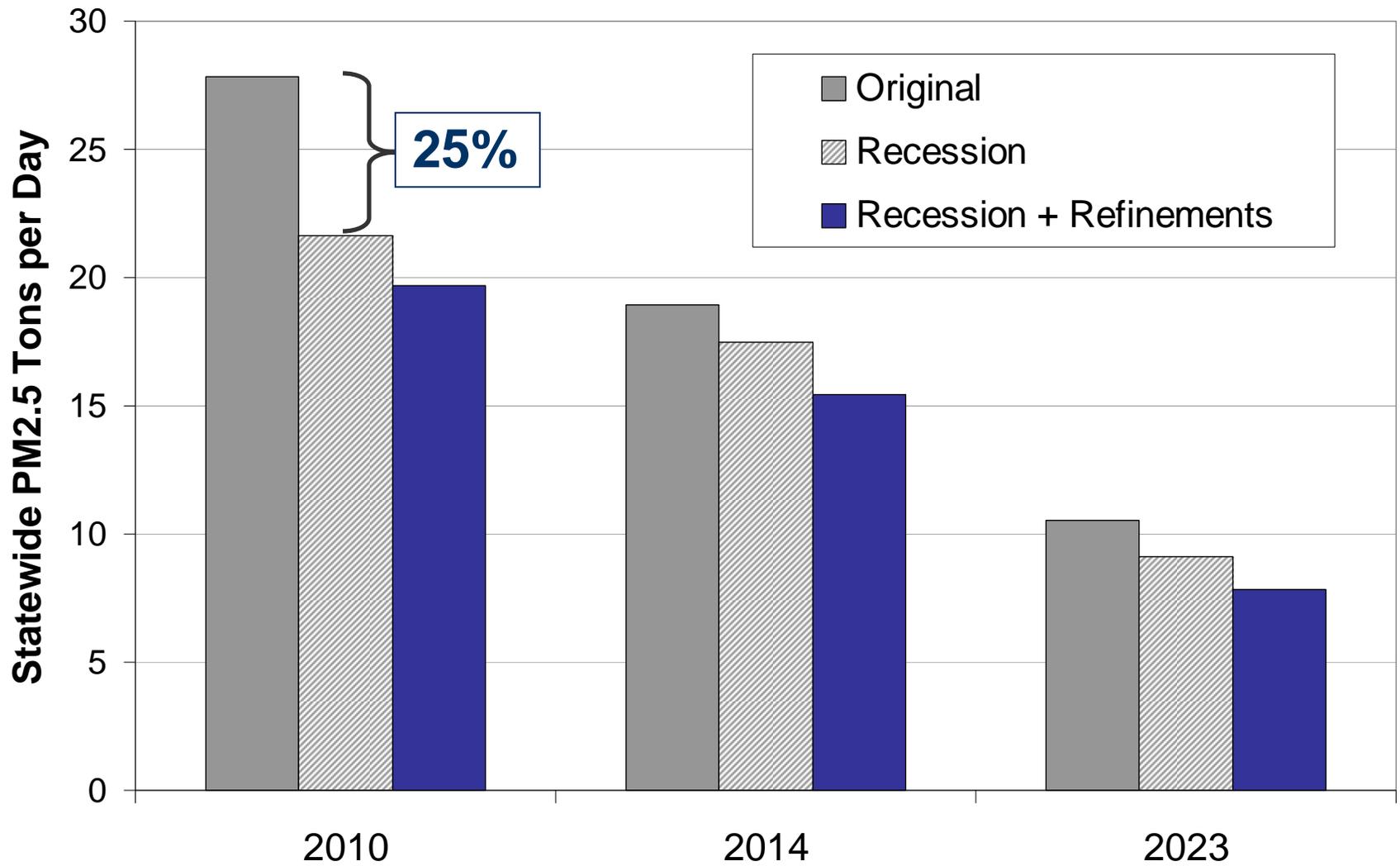
# Scenarios Forecasting Truck Activity



## Other Refinements

- Applied 2008 statewide methods to develop regional estimates
- Reduced out-of-state vehicle miles traveled in California
- Reduced emission rate estimates for older vehicles
- Overall these changes reduce emissions by about 10 percent

# Results of PM<sub>2.5</sub> Inventory Update



## Recent Public Comments

- Comments
  - Use a slow recovery scenario
  - Limit *lifetime* mileage to 600,000 miles
  - Reduce *annual* mileage assumptions
- Based on review of the data staff concludes current inventory estimates are appropriate

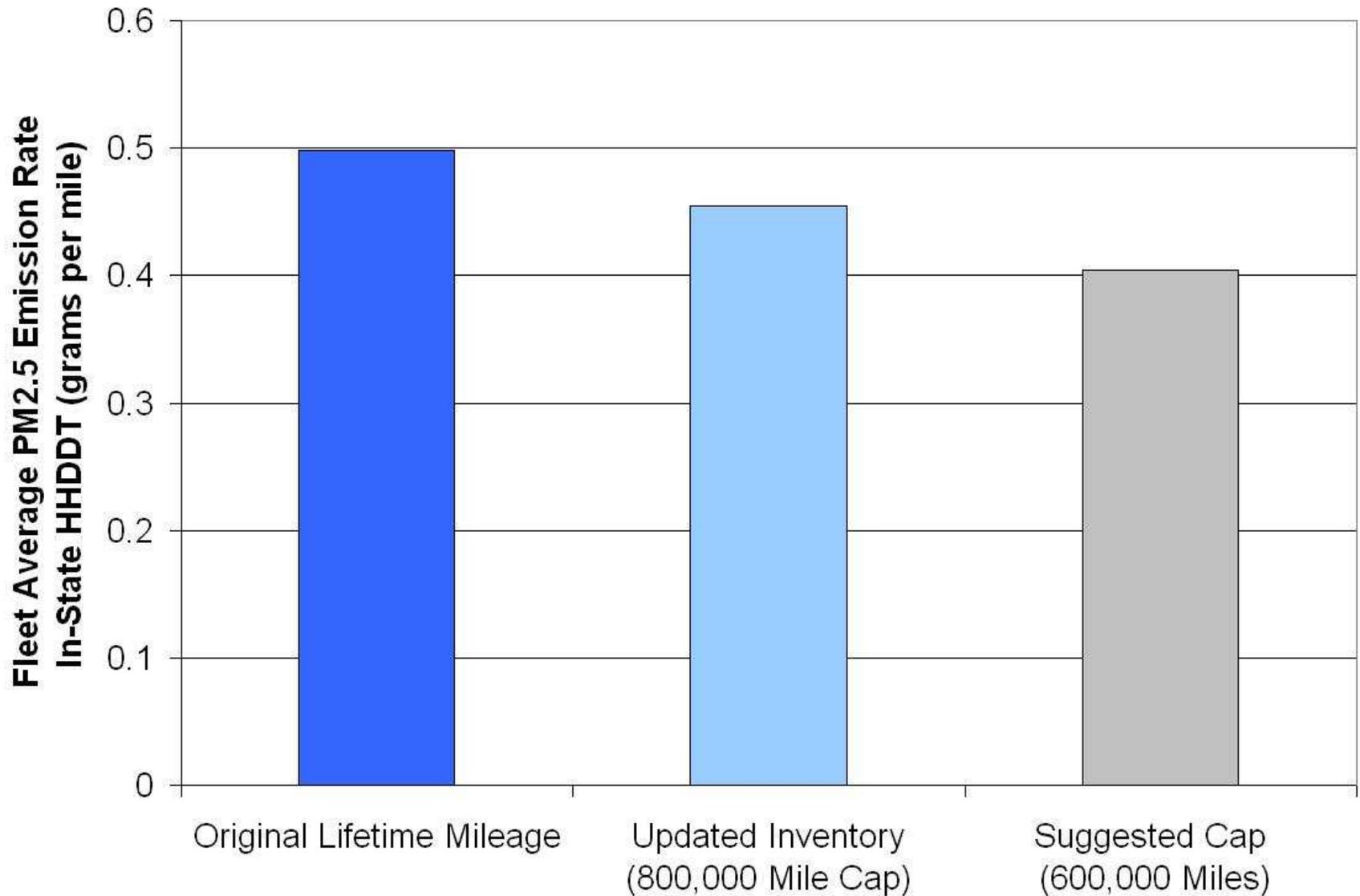
## How was *lifetime* mileage updated?

- Refers to the cumulative miles traveled by a truck category over a lifetime
- Fleet average value used in calculation
- Emission rates increase with use
- 2008 inventory used values greater than one million
- Updated inventory average lifetime mileage is 800,000

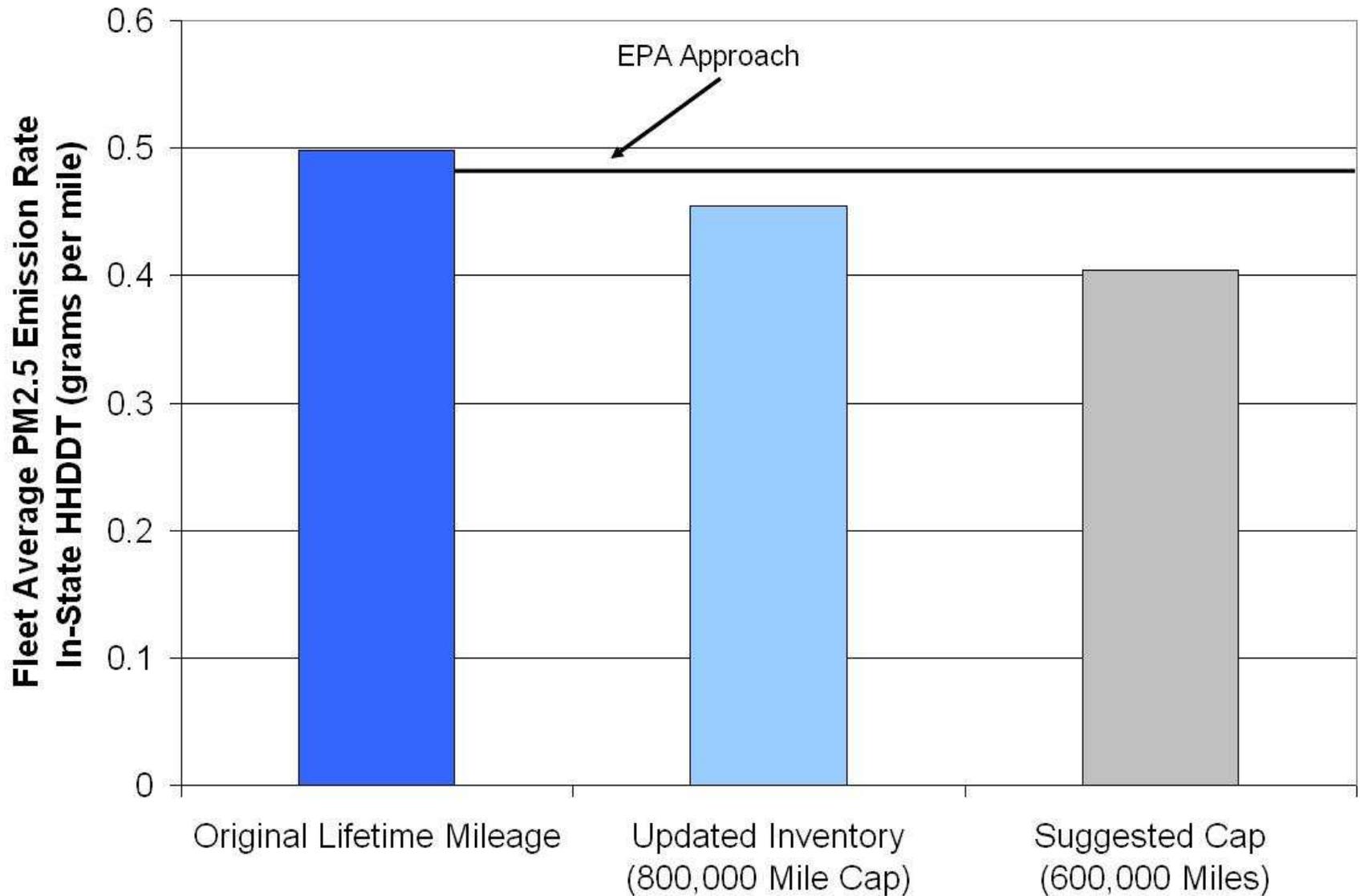
## ARB Response to *Lifetime Mileage* Comment

- Two approaches to estimating lifetime mileage
  - EPA approach suggests lifetime mileage of 1,000,000 miles
  - Survey approach suggests 650,000 miles
- 800,000 miles is an appropriate mid-point lifetime mileage estimate

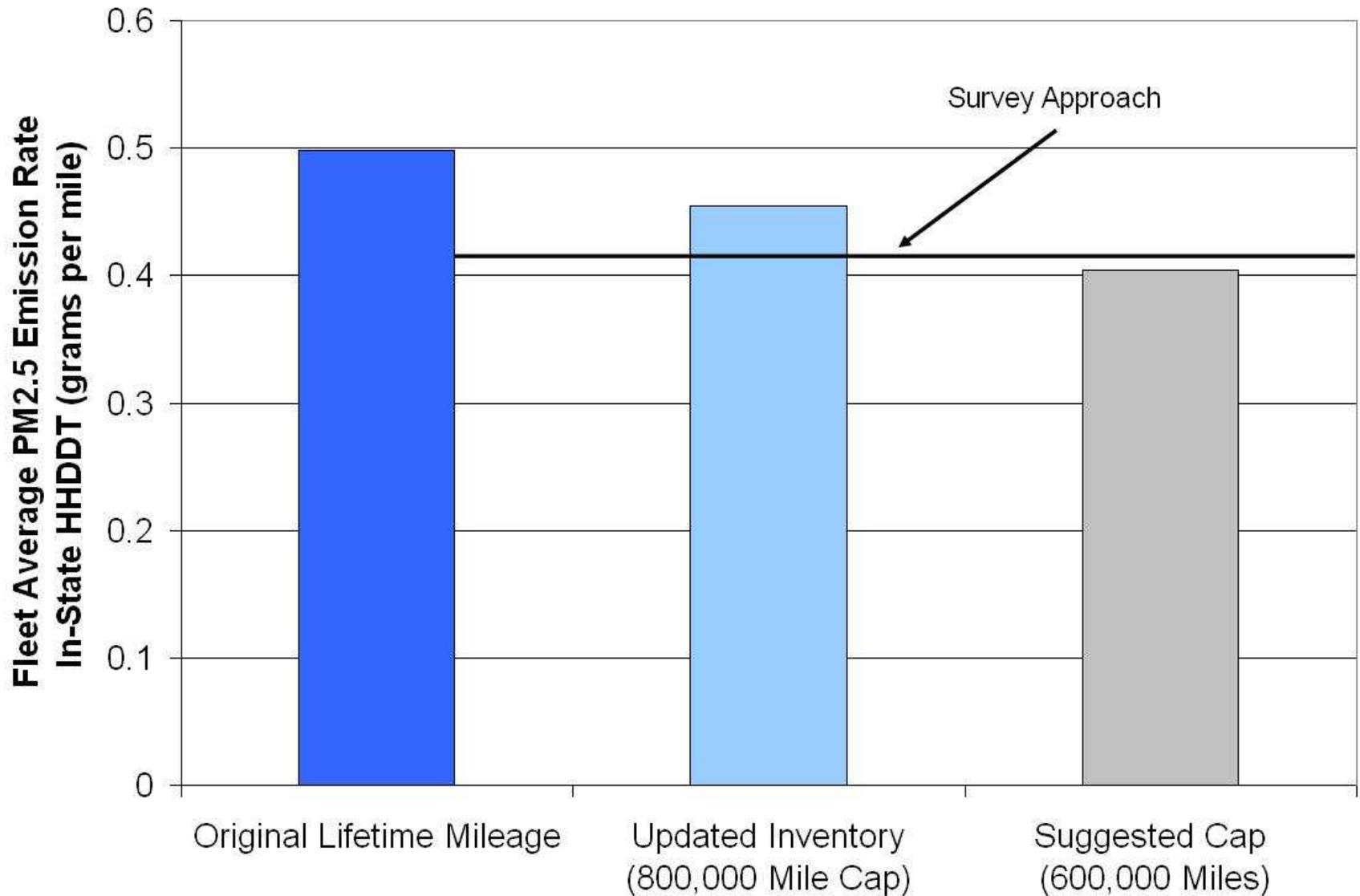
# Evaluating *Lifetime* Mileage Estimates



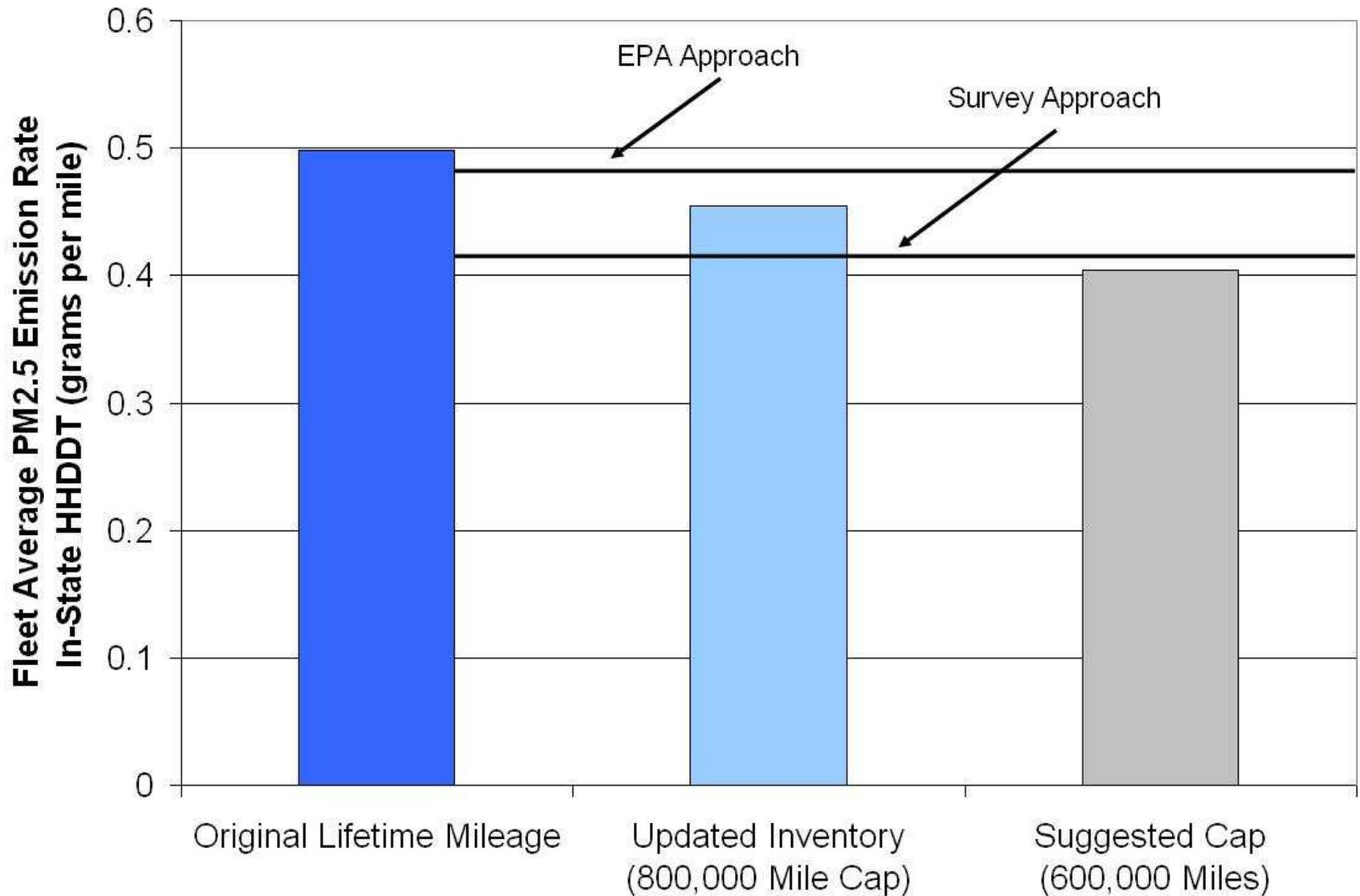
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## How is *annual* mileage used?

- Inventory includes estimates of annual mileage based on vehicle age
- Emissions are the product of annual mileage and emission rates
- Reducing mileage attributed to older, dirtier vehicles would further reduce emissions
- 2008 inventory included annual mileage adjustments

## ARB Response to Annual Mileage Comment

- Staff compiled more than 11,000 records from US Census surveys, ARB surveys, and the Bond, Moyer programs.
- Data are available to the public
- Results support ARB estimates

# Revised Off-Road Rule Inventory

- Updated for 2007 Rulemaking
- Significant updates to inventory methods using new data
- Effect of recession incorporated



# Inventory Updates

- Rule inventory completed in 2007
  - Started with EPA and ARB methods
  - Updated key inventory estimates with industry studies, market reports
  - Supplemented with ARB surveys of industry
- 2010 inventory improvements
  - New data reported through regulatory process
  - Comparison to fuel-based estimates
  - Impact of recession

## Inventory Update Public Process

- Public workgroup meetings starting in 2004
- 3 inventory workshops in 2006
- Executive Officer Hearing March 2010
- Meetings with stakeholders in 2010
- 8 inventory workshops in 2010
- All inventory data and models available to public

## Sources of New Information

- Off-Road rule reporting database
- Database of financed equipment sales in California
- Manufacturer provided engine downloads
- ARB 2008-2009 engine testing
- Revised human population forecasts
- Updated employment data and forecasts

## Key 2010 Updates

- New methods and data
  - Equipment population
  - Hours of use
  - Load factors
- Recession impact

# Equipment Population Update

- National survey data used in original estimates
- Now California reporting data is used
- Current equipment population is reduced from 195,000 to 145,000

## Hours of Use Update

- Prior estimates based on industry market reports and studies
- New California reporting data used
- On average activity is reduced 50% from previous estimates
- New data reflects both 2007 and 2009 activity levels

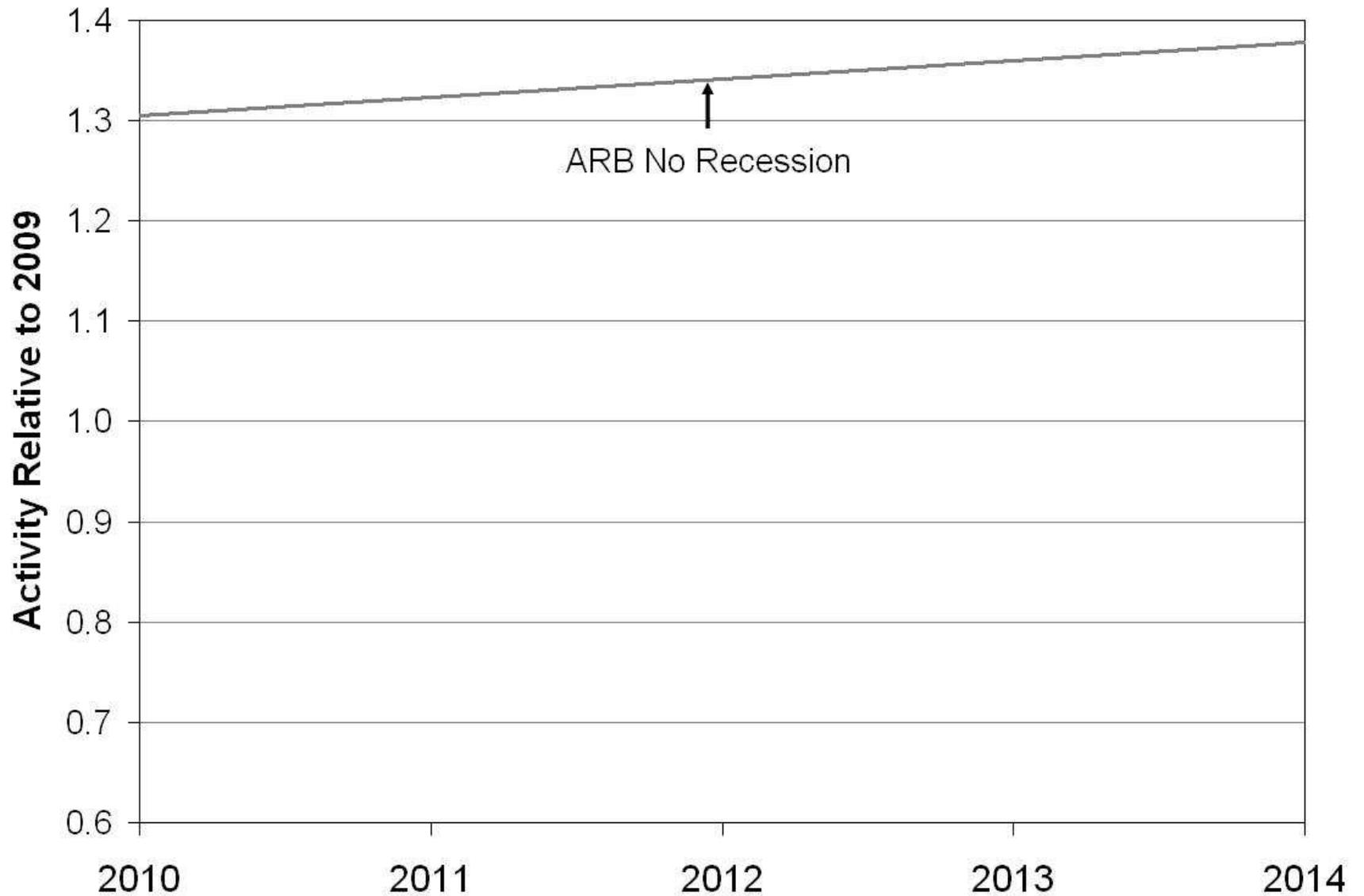
## Load Factor Update

- National study used in original inventory
- Revised inventory uses data collected from industry, ARB testing and academic studies
- New load estimates are 30% lower
- Revision consistent with recent studies in other categories

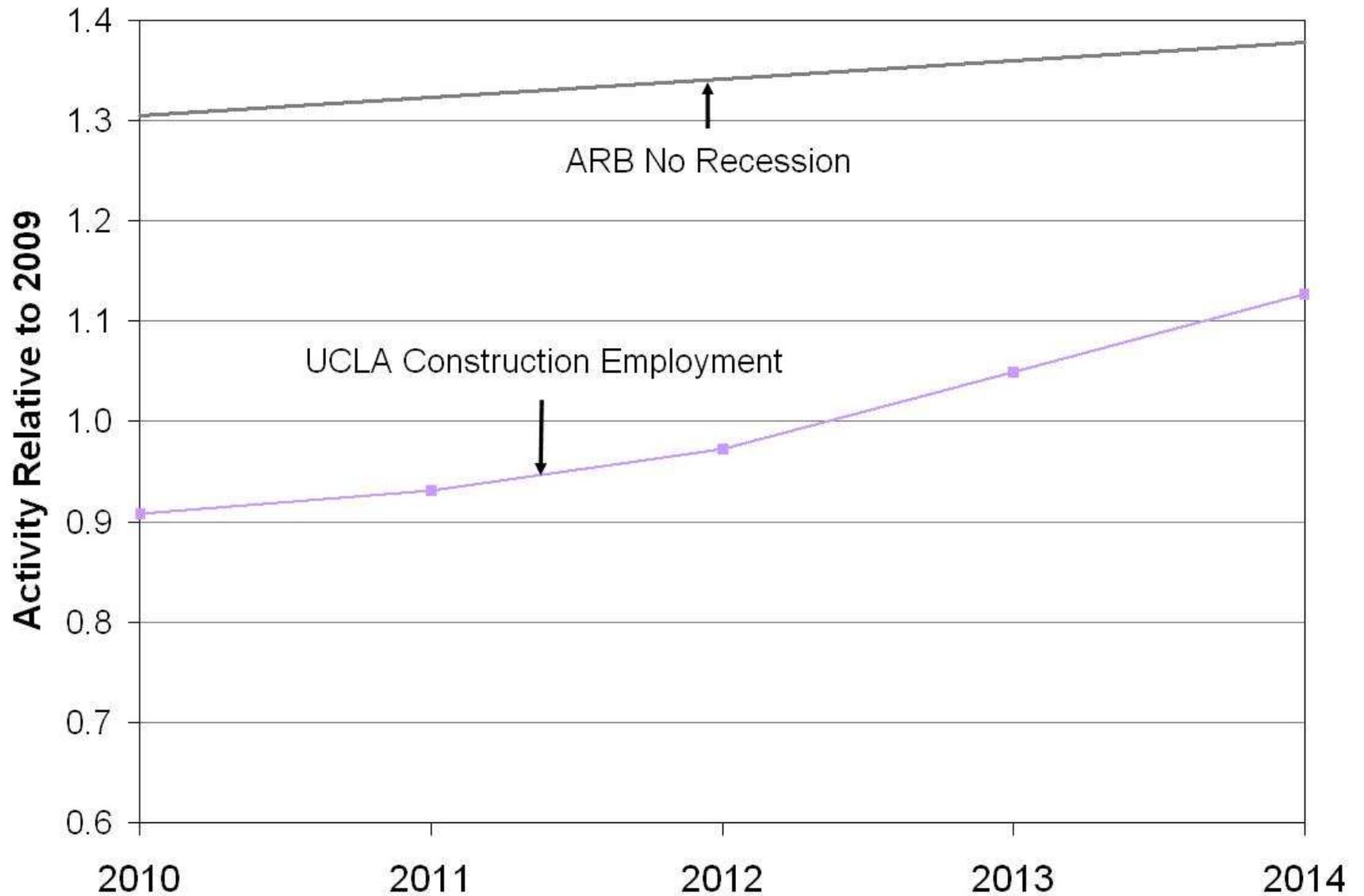
## Recession Impact and Forecast

- Original rule inventory based on 2005 data and continued growth forecasts
- Recession reduced emissions by 50% from peak levels
- Revised emissions forecast

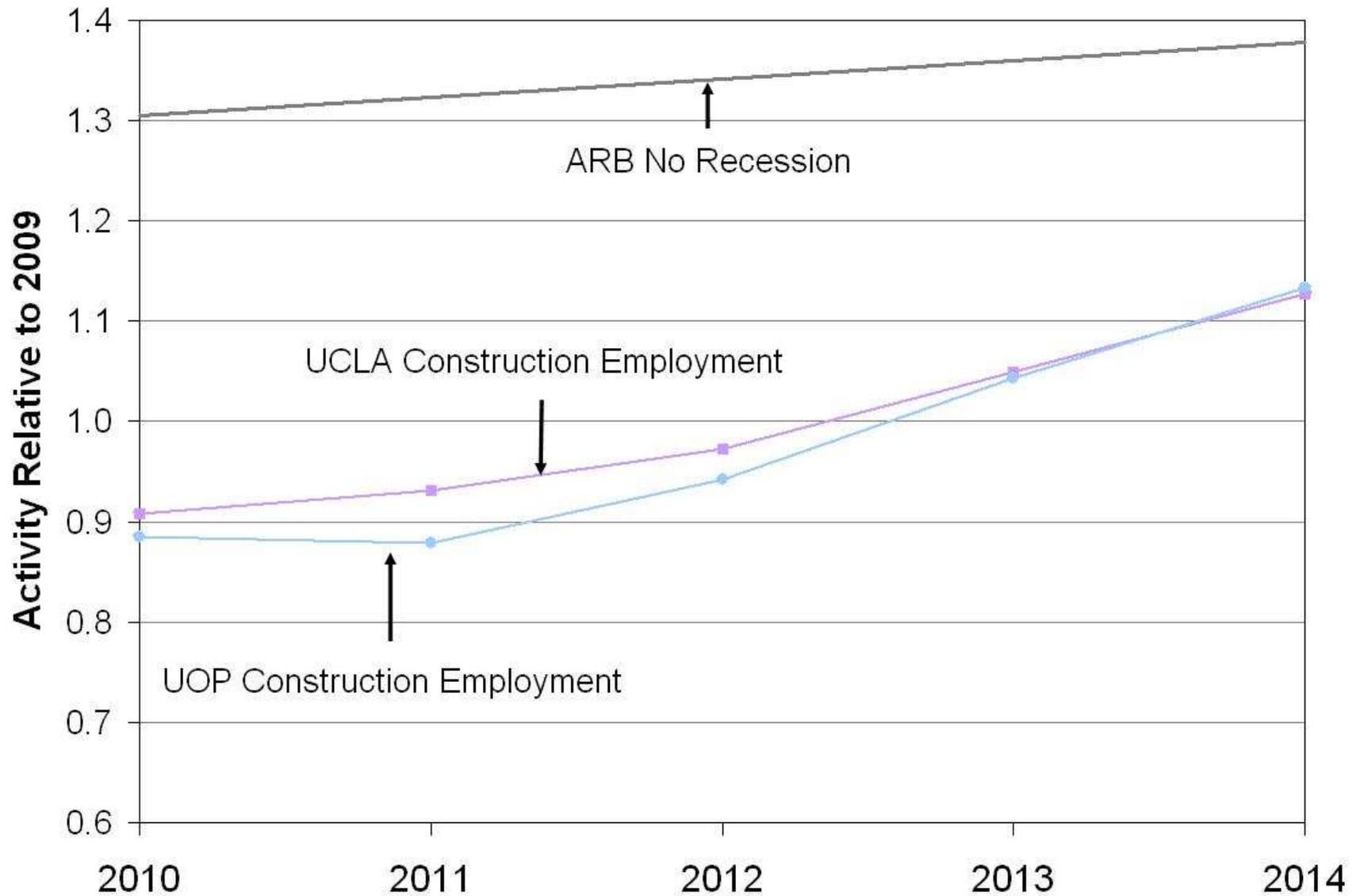
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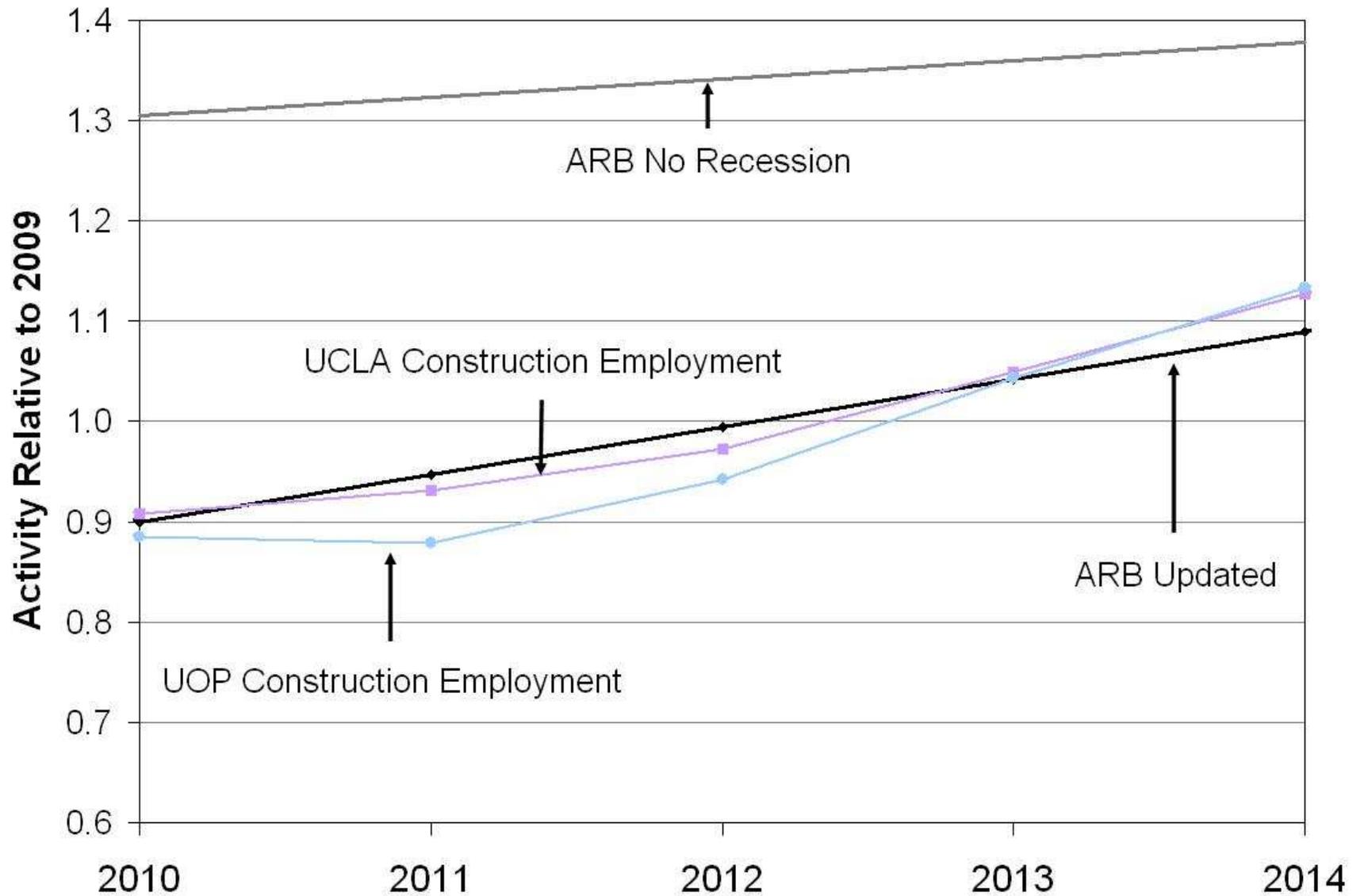
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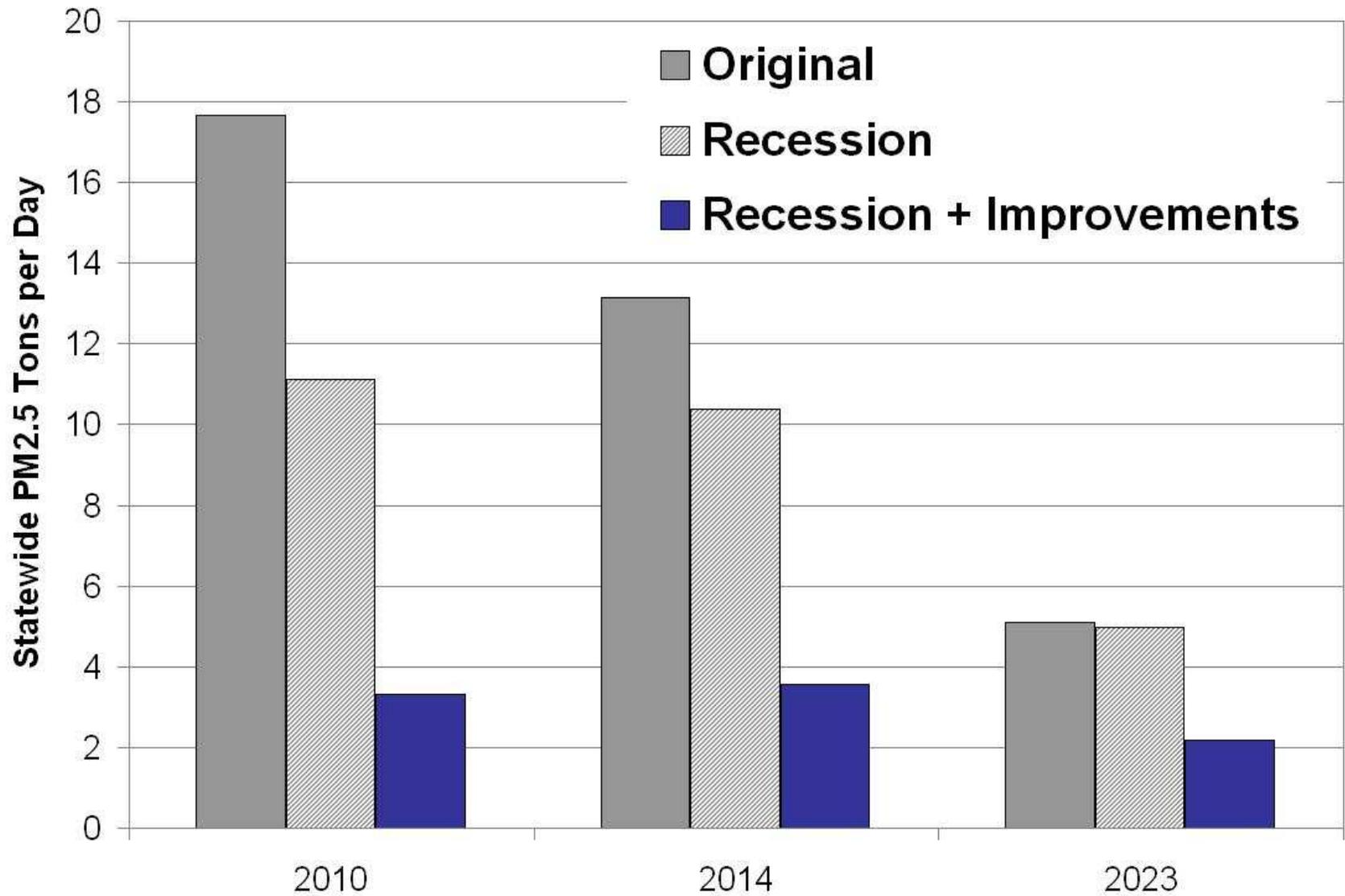
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# Results of PM<sub>2.5</sub> Inventory Update



## Comparison to Fuel Sales

- Fuel sales used to evaluate new estimates
- Only total off-road sales are reported
- Revised inventory based on reported activity
- Updated fuel use is generally consistent with other estimates

# Summary of Inventory Updates

- Trucks and Buses
  - Revised inventory reduced 35% in 2010 due primarily to recession
- Off-Road
  - Revised inventory reduced 80% in 2010; half due to recession and half due to new information
- Both inventories consistent with fuel sales estimates
- Inventory models and documentation available to the public

# Conclusion

- Truck/Bus and off-road emissions are lower than anticipated in the SIP
- Provides a margin for economic relief in 2014
  - Equal to 62 tons/day in South Coast
  - Equal to 40 tons/day in San Joaquin Valley
- Meeting federal air quality standards requires the cleanest technologies for all sources