

# **School Bus Emission Reduction** **in New York City**

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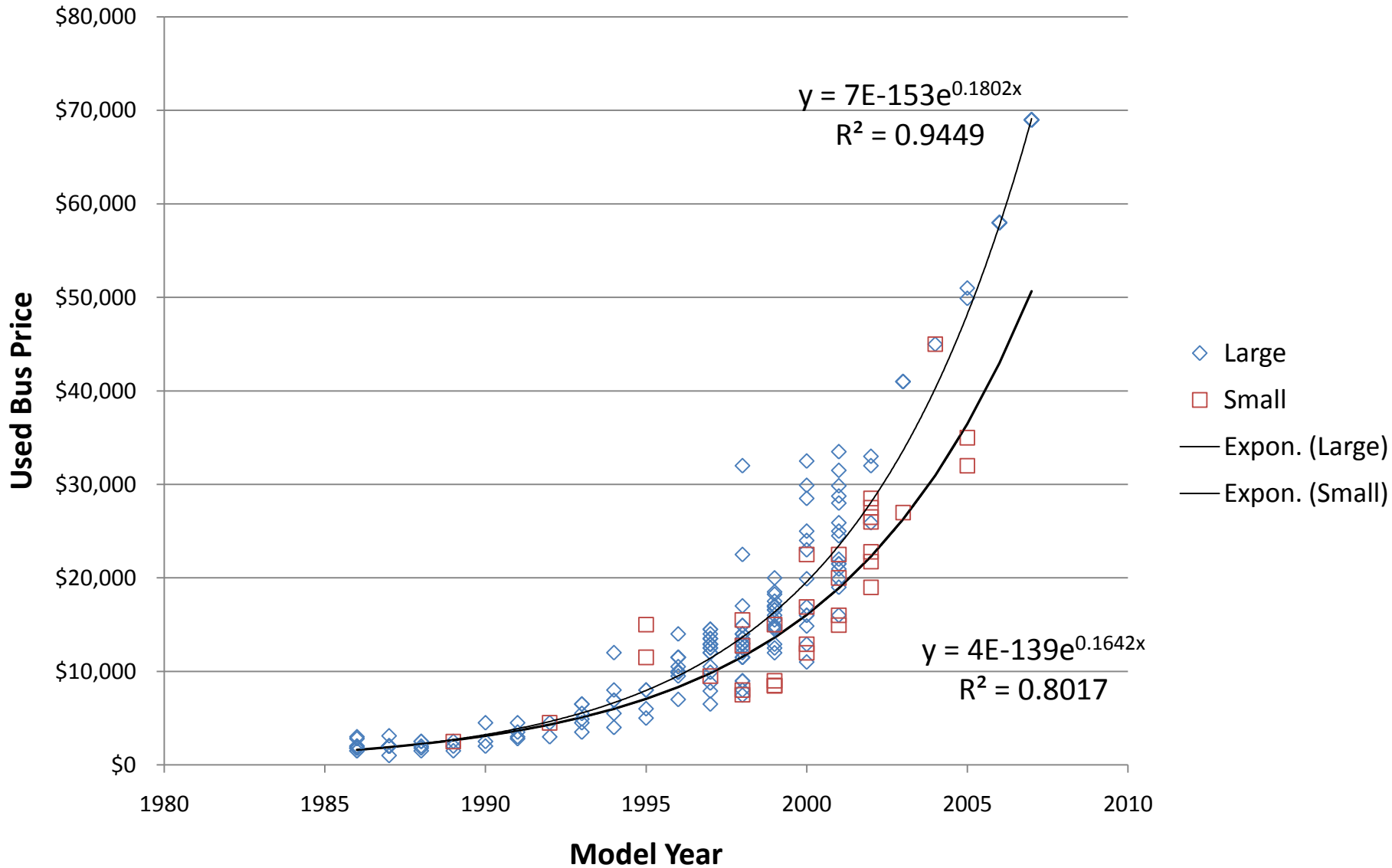
# Considered Retrofit Options

- Diesel Oxidation Catalyst (DOC)
  - \$2000 base cost, 3 hour install
- Passive Diesel Particulate Filter (PDPF)
  - \$9000 base cost, 8 hour install
- Active Diesel Particulate Filter (ADPF)
  - \$16000 base cost, 16 hour install
- 2008 Model Year Replacement

# Cost of Replacement

- Cost = Used Bus Market Value – Scrap Value
- Scrap value of \$700 for short, \$1000 for long
- Used bus market values obtained from 100's of bus prices collected from public and private sellers

# Used Bus Prices by Model Year and Size



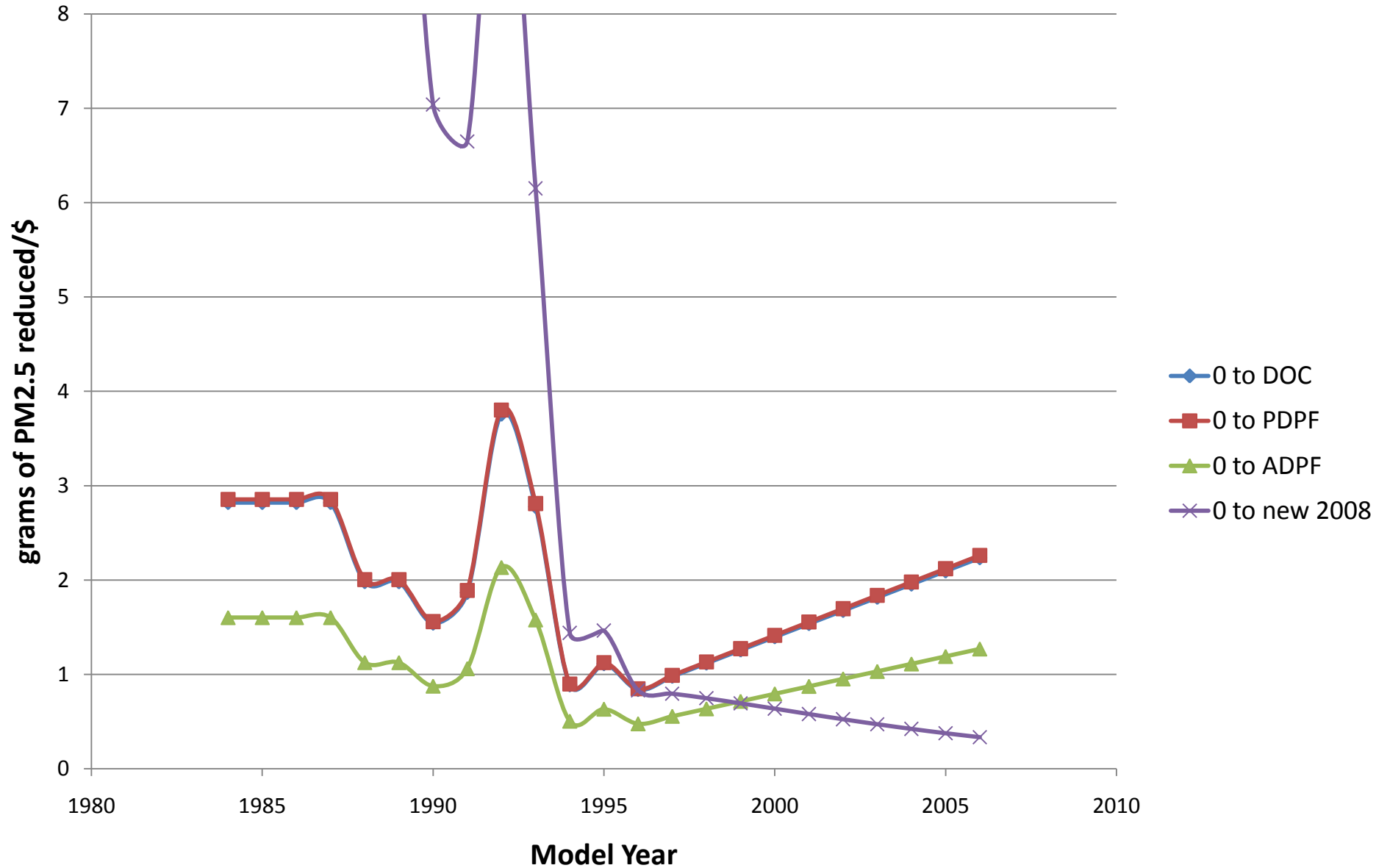
# School Bus Usage

- MOBILE6.2 standard of 9939miles/year for school buses was used
- Additionally, 15min of idle time/school day was included
- Expected life of 19 years, 1 remaining year for those older than 19

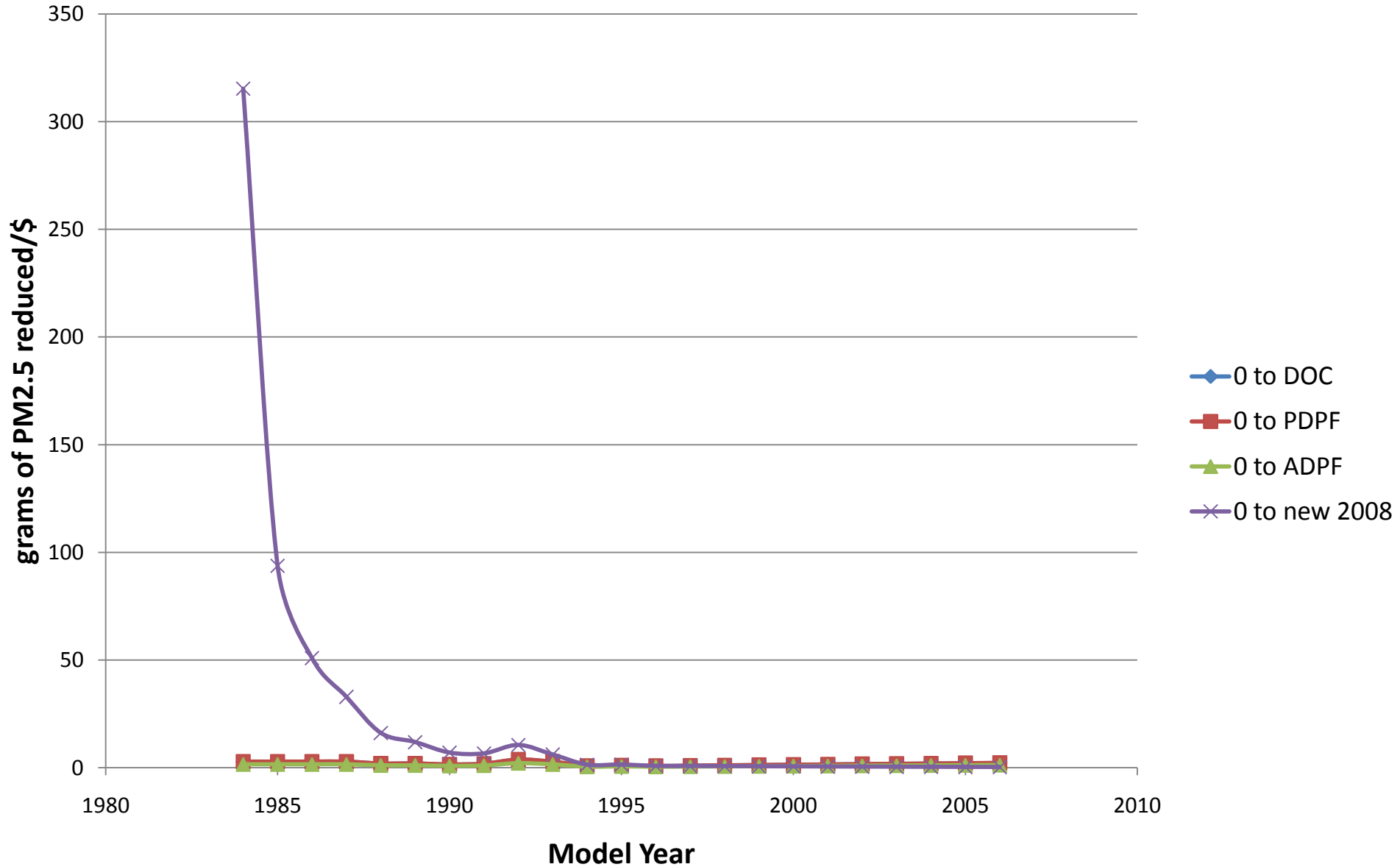
# Emission Rates

- All emission rates are obtained from EPA MOBILE6.2 software
- Distinct PM2.5, CO, NOx, VOC g/mile and g/hr idle rates for each model year
- Gaseous idle emission rates are computed using EPA recommended 2.5mph speed
- % reductions from each retrofit from EPA verified technology list

# PM2.5 Reduction Cost Effectiveness for Large Buses

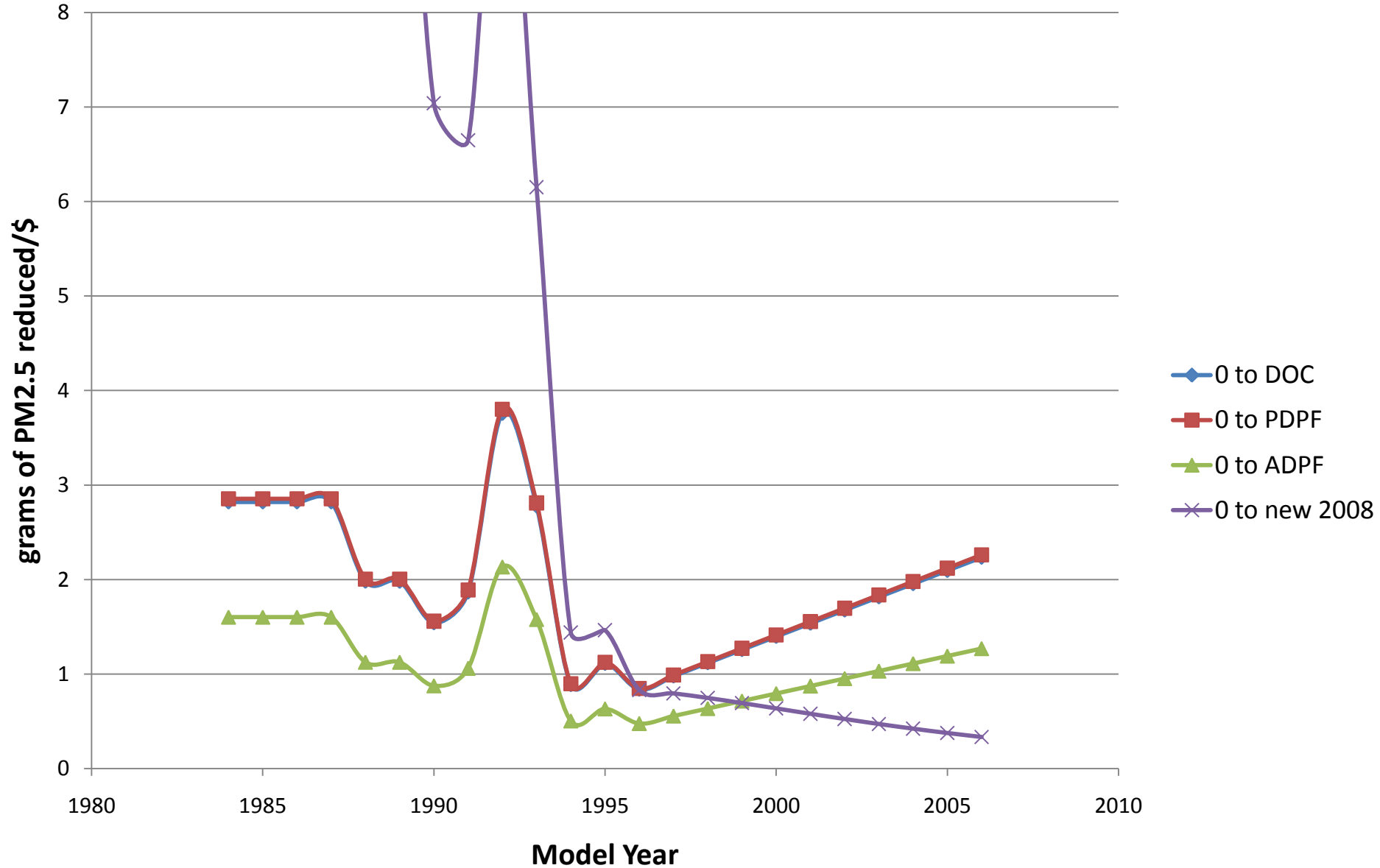


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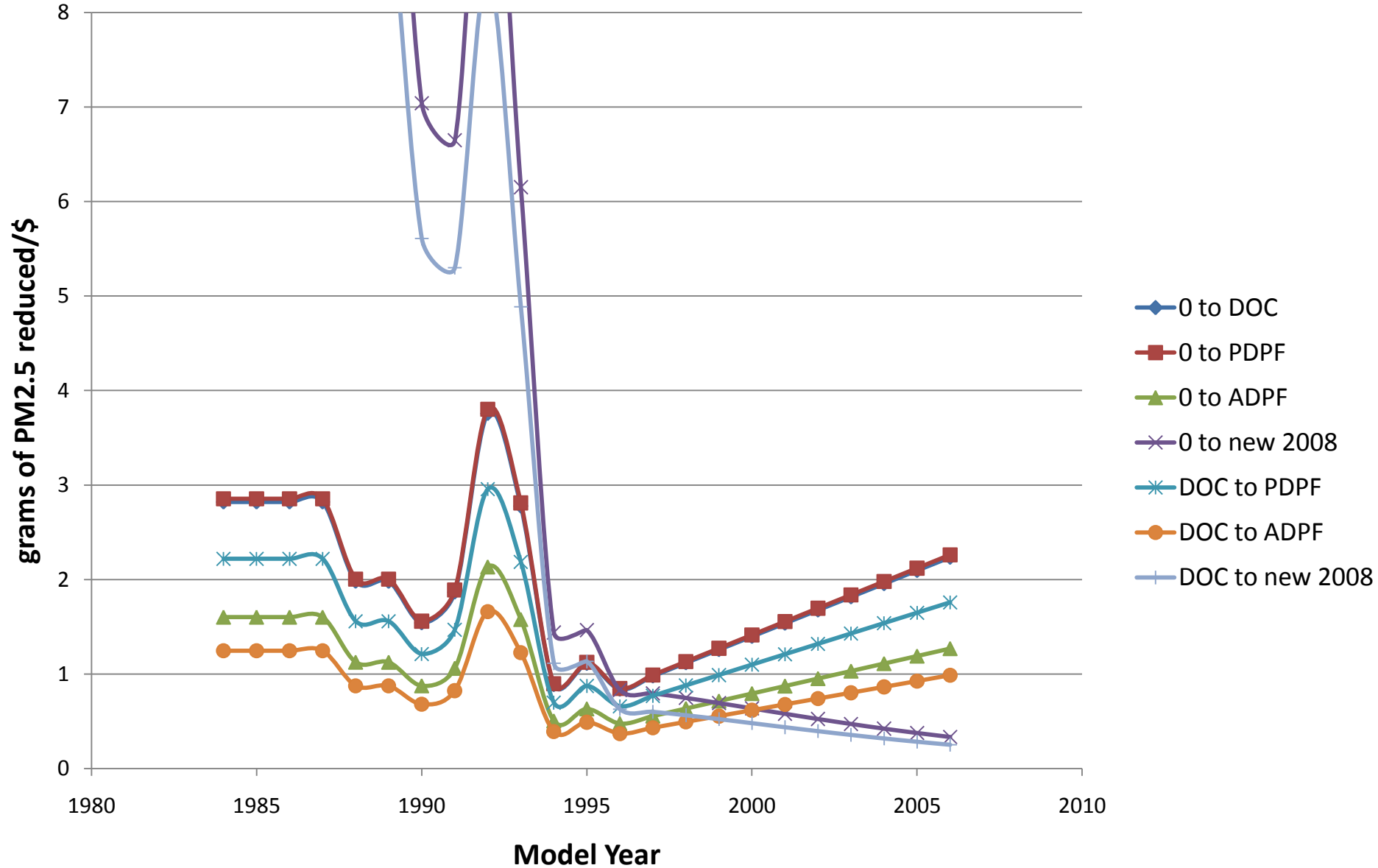




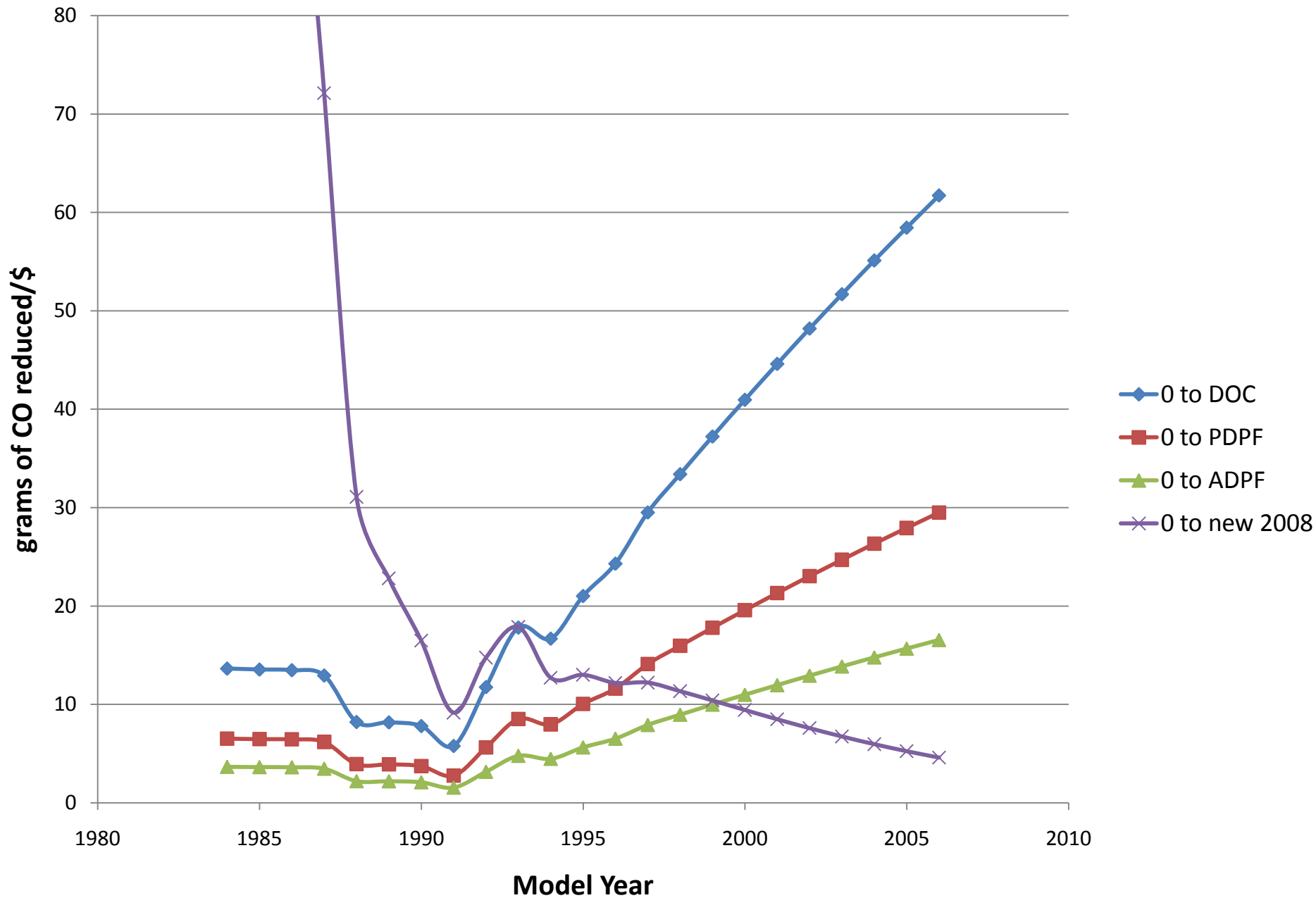
# PM2.5 Reduction Cost Effectiveness for Large Buses



# PM2.5 Reduction Cost Effectiveness for Large Buses



# CO Reduction Cost Effectiveness for Large Buses



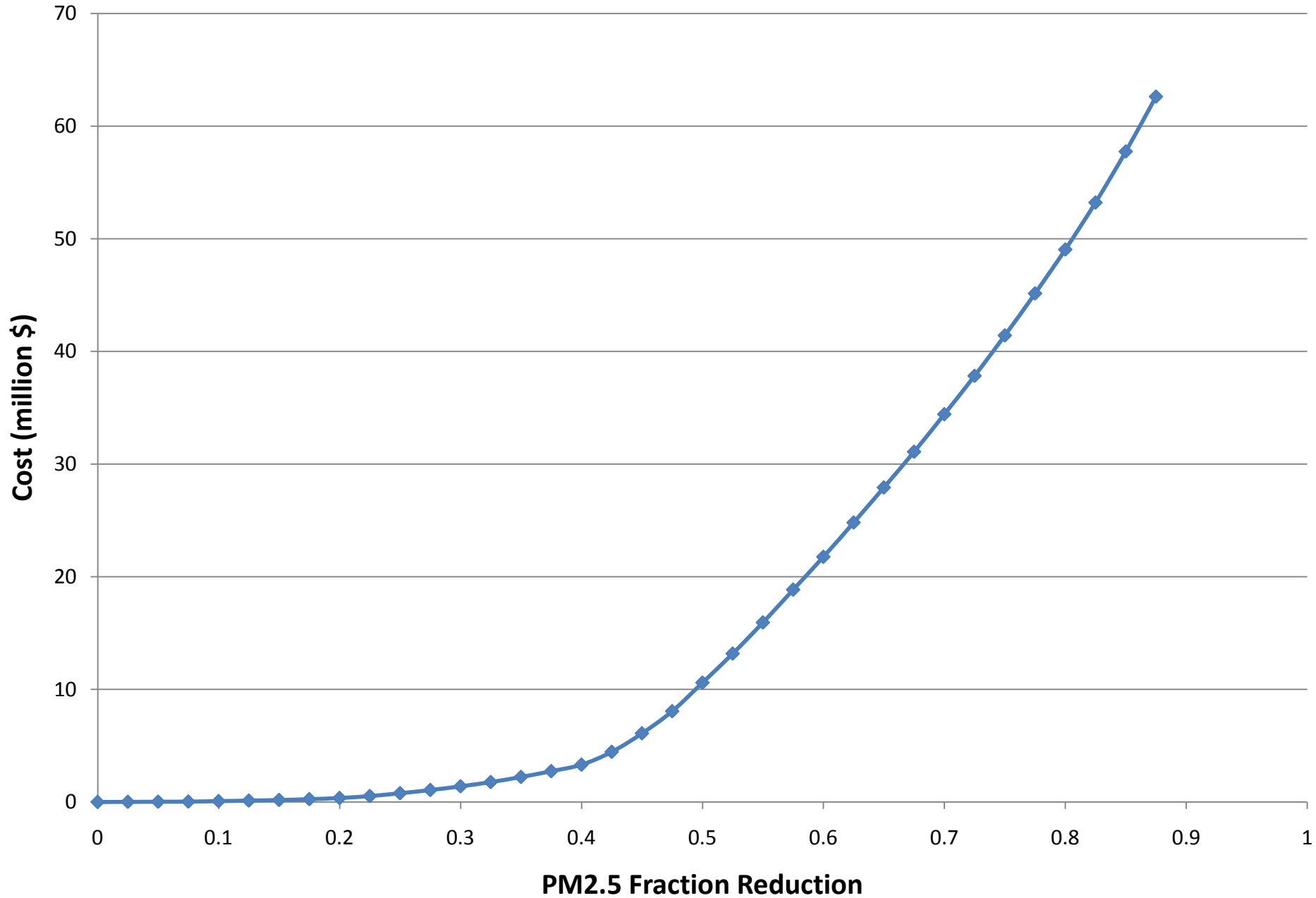
# Trends in Cost Effectiveness

- Replacing the oldest buses is by far the most cost effective way to reduce all emissions
- For PM2.5, VOC , CO, and NOx, it is more cost effective to replace a pre-1991 bus than retrofit
- For PM2.5, VOC and CO, it is more cost effective to retrofit a post-1996 bus than replace
- Most cost efficient 1991-1996 strategy depends on bus size and priority of pollutants

# Fleet Assumptions

- Limited information on past retrofits from meetings with planners, other sources
- PDPFs only possible on Staten Island
- MOBILE6.2 national average age distribution
- Resulting fleet is similar to NYC fleet in many ways, but is likely quite different in others

# Cost vs. PM2.5 Fraction Reduction



# Thank You

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- David Brzezinski (EPA)