COMPASS Staff's Emissions Testing Benefit Analysis

INTRODUCTION

COMPASS staff was asked by the Treasure Valley Air Quality Council (TVAQC) to conduct an emissions analysis of various proposed vehicle emissions testing programs. The request was made with the intent to gathering information on the potential benefits of valley-wide (e.g. Ada and Canyon Counties) emissions testing programs. As part of the analysis, Air Quality Board staff was asked to provide cost estimates for the various types of emissions testing programs analyzed.

Four vehicle emissions testing scenarios were developed for analysis purposes during a subcommittee meeting held on May 30, 2006. They are:

- No Emissions Testing Program – The only emissions benefits associated with no emissions testing program are due to cleaner, newer vehicles replacing dirtier, older vehicles. However, there are no programmatic costs associated with this option. This is considered a "bookend" scenario.

- Air Quality Board Recommended (May 24, 2006) - A program describe at the May 24, 2006 Treasure Valley Air Quality Board Meeting. It is similar to the program currently operated by the Air Quality Board. Its features include:
  - A biennial 2500 RPM test for all light duty gasoline vehicles and two classes of heavy duty gasoline vehicles model year 1972 to 1995.
  - A biennial OBDII test for all light duty gasoline vehicles model year 1996 and newer. A four year grace period was included for new vehicles. Note: the evaporative benefits of the OBDII program were included in the analysis.

- OBDII Only Program (with remote sensing) – Similar to the OBDII portion of the above program. It only applies to light duty gasoline vehicles 1996 and newer. Late model vehicles (1995 and older) would be exempted from the program. No grace period was given to new vehicles and an annual testing requirement are included to incorporate a "remote sensing" component to the program. Note: the evaporative benefits of the OBDII program were included in the analysis.

- IM240 (Dynamometer) Program - This type of emissions testing program is often considered the most effective and resource intensive. It is the opposite of no emissions testing. Many ozone non-attainment areas are required to establish this type of program. It is administered through dedicated testing facilities (centralized testing facilities) where vehicles are put on an apparatus (called a dynamometer) that allows the vehicle to be operated as if it were being driven. This program includes:
  - An annual test on all light duty and two classes of heavy duty gasoline vehicles for model years 1972 and newer.
  - No OBDII program(s).
  - No grace period for new vehicles.
  - Tailpipe emissions limits (e.g. cutpoints) of:
    - 1.2 grams VOC/mile (model range 5.0 – 0.8 grams/mile)

- 20 grams CO/mile (model range 100 – 15 grams/mile)
- 3 grams of NOx/mile (model range 4.5 – 2.0 grams/mile)

ANALYSIS

This analysis was done using EPA's MOBILE6.2 emissions model and COMPASS' travel demand model. Model assumptions consistent with the draft *Communities in Motion* air quality conformity demonstration were used. Reductions were calculated with regard to on-road emissions sources. The overall impacts on emissions in the airshed are not included in this analysis, but can be estimated.

Each scenario was analyzed for potential on-road emissions reductions in 2006 (today) and 2030. Additionally, the on-road emissions were estimated for a 2030 "Trend" growth scenario with no emissions testing program. Figures 1 - 6 display the estimated reductions. Figures 1 and 4 show modest on-road NOx and VOC emission reductions in 2006 associated with the modeled testing programs. Net reductions (Figures 2 and 5) of the testing programs increase in 2030. This is due, in part, to greater proportions of the fleet required to meet EPA's Tier II vehicle emissions standards. Testing programs help to ensure that, as the Tier II vehicle ages, it still meets the required standards. Vehicle fleet turnover significantly contributes to the gross reductions observed in the 2006-2030 analyses (Figures 3 and 6).

Based on Air Quality Board staff estimate, Table 1 shows the 2006 cost/benefit estimated for each program. The OBDII program has the lowest associated cost/benefit of the programs analyzed (e.g.: the 2006 "no program" option does not have a cost/benefit).

TABLE 1: Cost-Benefit Analysis Based on 2006 Estimates

	2006 Annual Cost (in MM)	2006 Nox Reduction Estimate (ton/year)	Annual Nox cost/benefit ($/ton)	2006 VOC Reduction Estimate (ton/year)	Annual VOC cost/benefit ($/ton)
No IM	$ -	0	$ -	0	$ -
AQB (May)	$ 1.9	388.8	$4,887	431.8	$4,401
OBDII	$ 1.2	440.0	$2,728	341.1	$3,518
IM240	$ 3.6	438.7	$8,206	573.3	$6,280

Figure 7 shows how growth can drive the rate at which regional vehicle miles of travel (VMT) increases. Although reductions in VOC and NOx are achieved regardless of continued growth in VMT, these reductions may be temporary. As Figure 8 shows, the CO emissions reductions realized from fleet turnover are nullified by regional VMT growth.

CONCLUSIONS

Generally, the analysis shows emissions testing acts as an "insurance policy" of sorts. As newer, cleaner vehicles enter the fleet, testing programs ensure they will be

clean. In the absence of a program, fleet turnover will improve on-road vehicle emissions, but not as effectively.

In almost every analysis, the modeled OBDII testing program outperformed the more complex IM240 (dynamometer) program. It was also found to be comparable to the program recommended by the Air Quality Board at the May 24, 2006 meeting of the Treasure Valley Air Quality Council. Thus, an OBDII program may provide the best future reduction in on-road emissions at the lowest regional cost (see Table 1). However, fleet turnover will also reduce on-road vehicle emissions from current day (2006) estimates.

Emissions impacts resulting from reductions in VMT growth should also be considered with vehicle fleet turnover and emissions testing programs. This analysis shows forecasted reductions in VMT associated with the "Community Choices" 2030 growth scenario do translate into reductions in VOC and NOx emissions. As regional VMT continues to grow beyond 2030, it is possible that the VOC and NOx reductions once realized by fleet turnover and/or emissions testing may be negated. This seems to be happening with CO. Reductions in 2030 CO associated with fleet turnover are 100% nullified by increases in VMT.

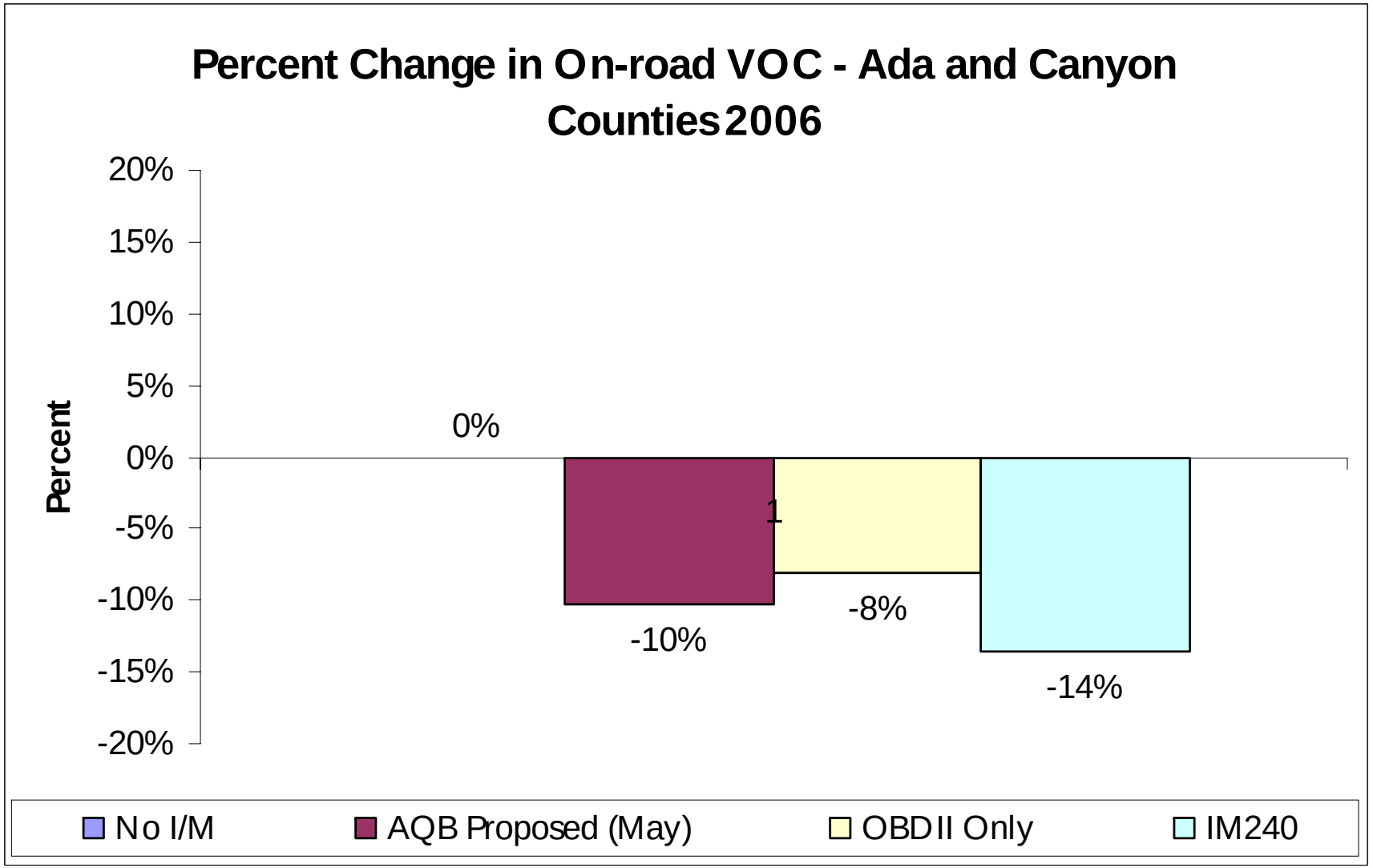

FIGURE 1: Percent change in 2006 VOC reduction as compared to the no testing scenario.

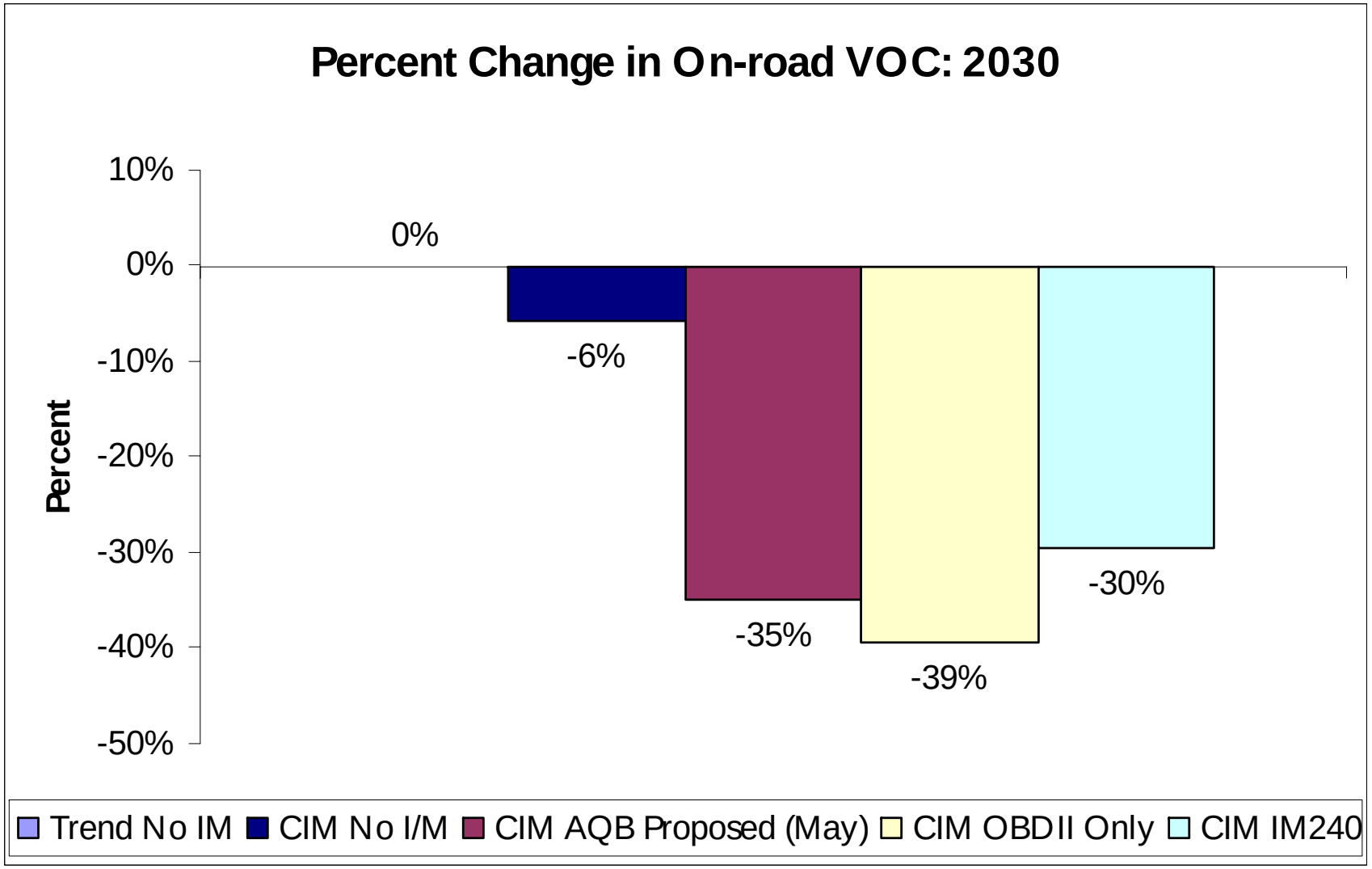

FIGURE 2: Percent change in 2030 VOC reduction as compared to the "Trend" growth/no testing scenario (Net Reductions).

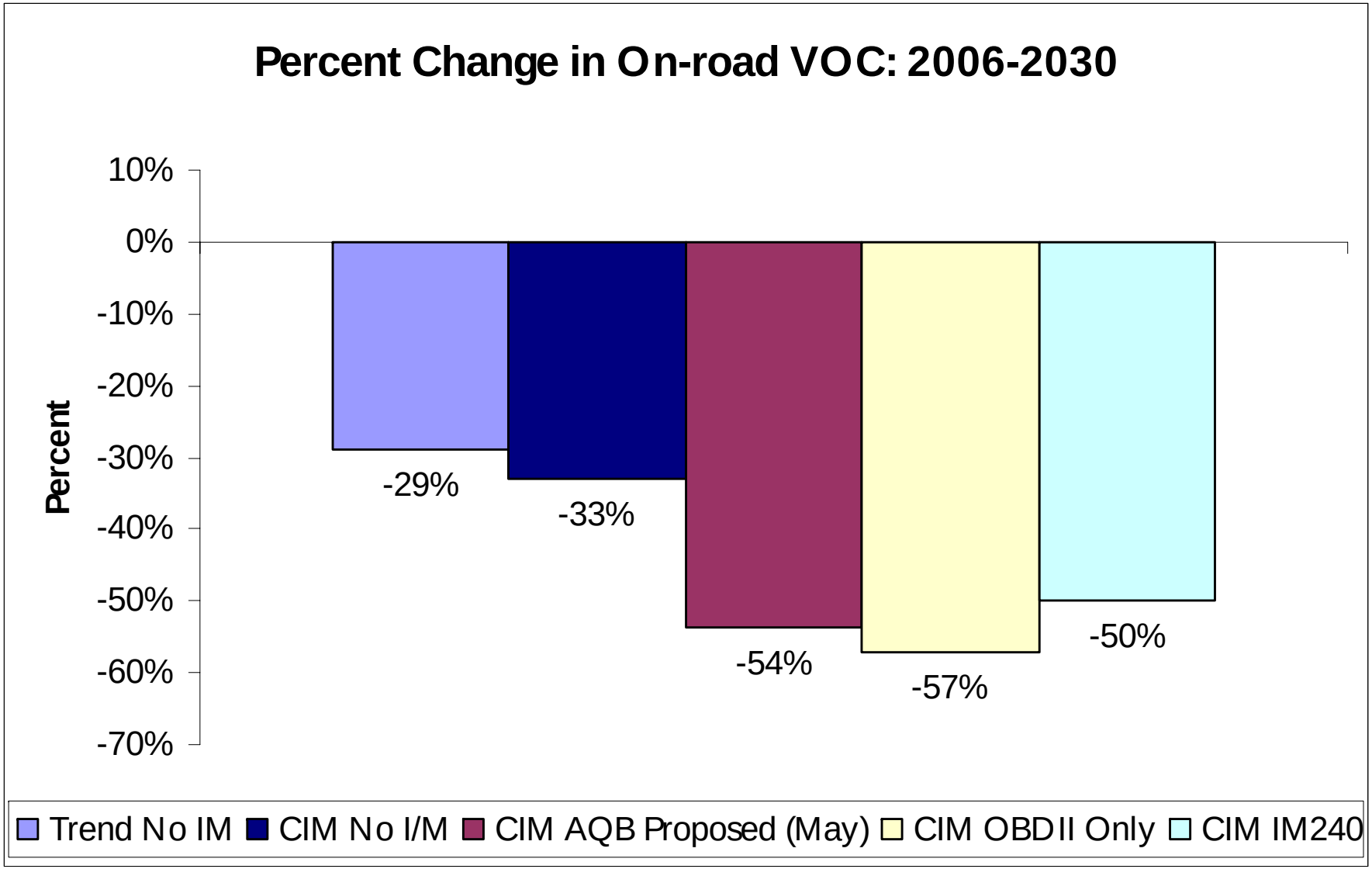

FIGURE3: Percent change in 2030 VOC reduction as compared to the 2006/no testing scenario (Gross Reductions).

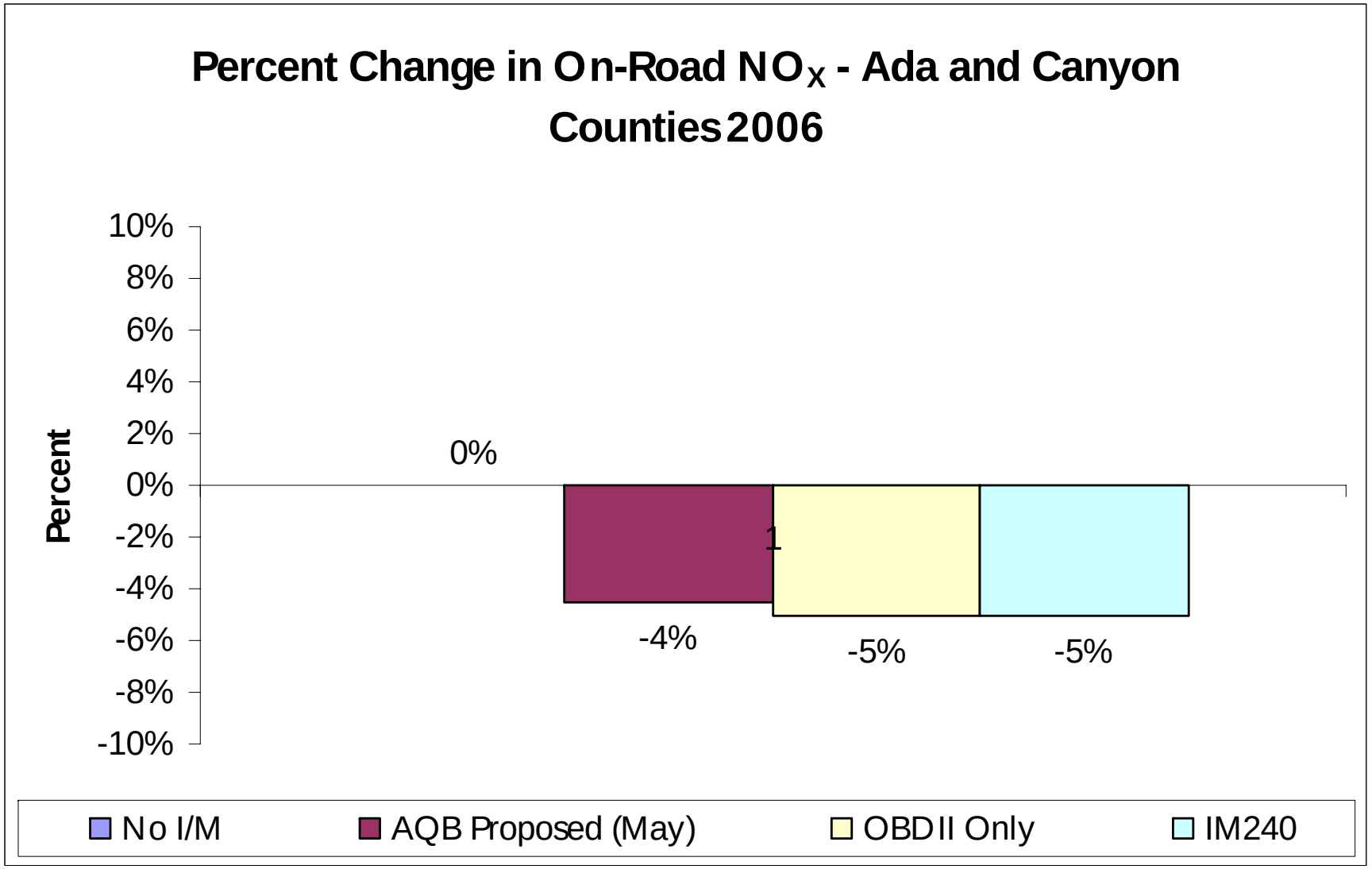

FIGURE 4: Percent change in 2006 NOx reduction as compared to the no testing scenario.

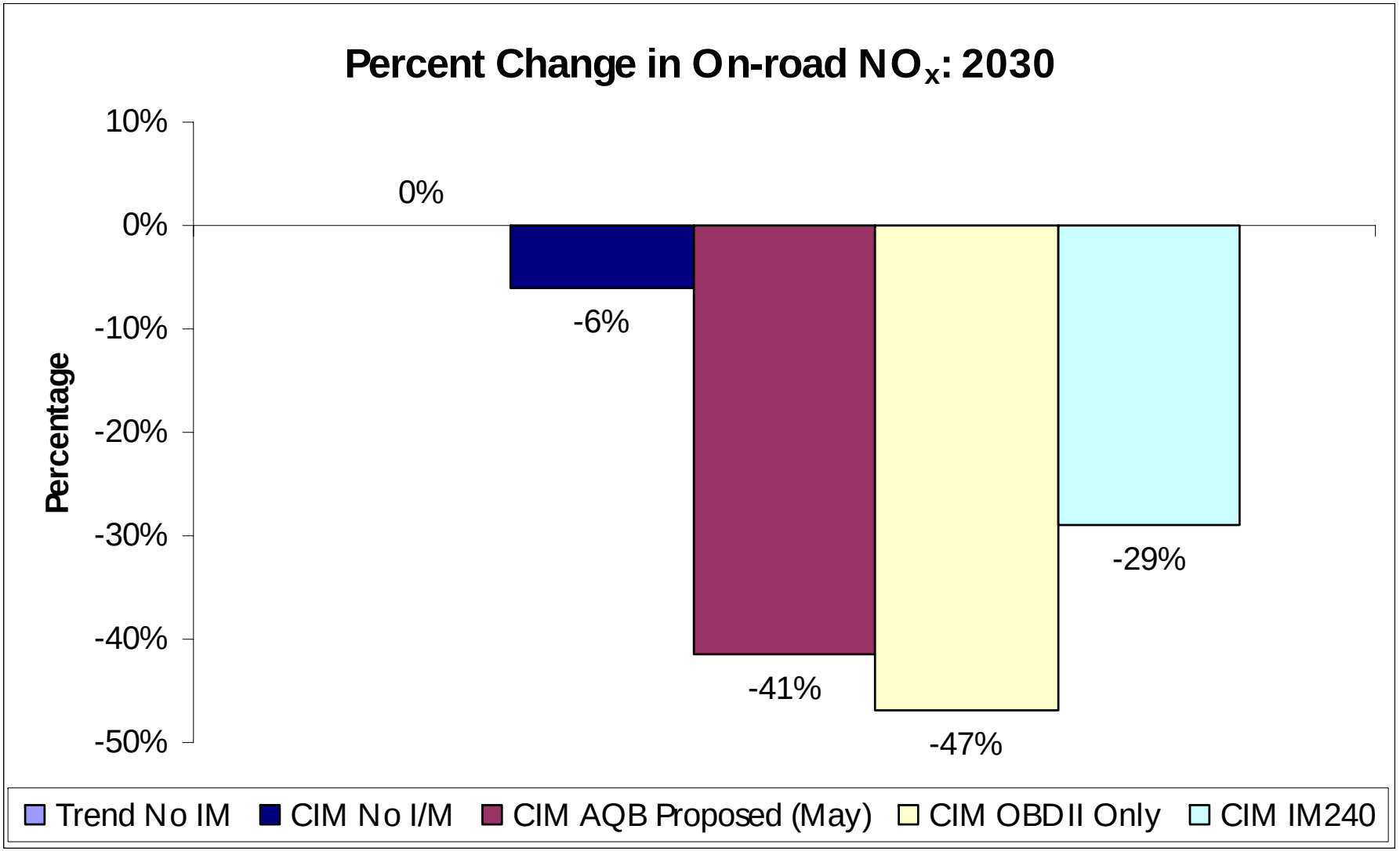

FIGURE 5: Percent change in 2030 NOx reduction as compared to the "Trend" growth/no testing scenario (Net Reductions).

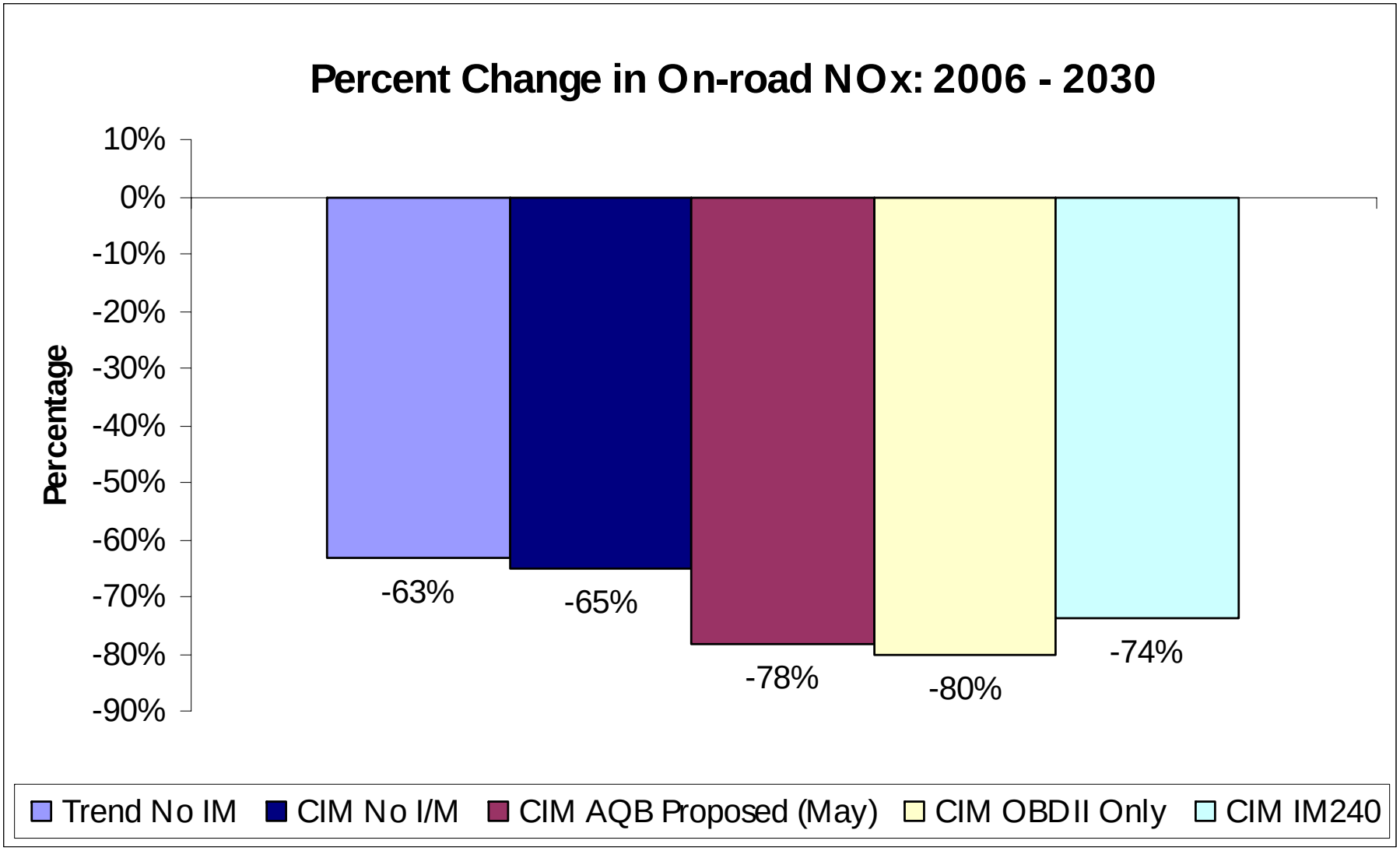

FIGURE6: Percent change in 2030 NOx as compared to the 2006/no testing scenario (Gross Reductions).

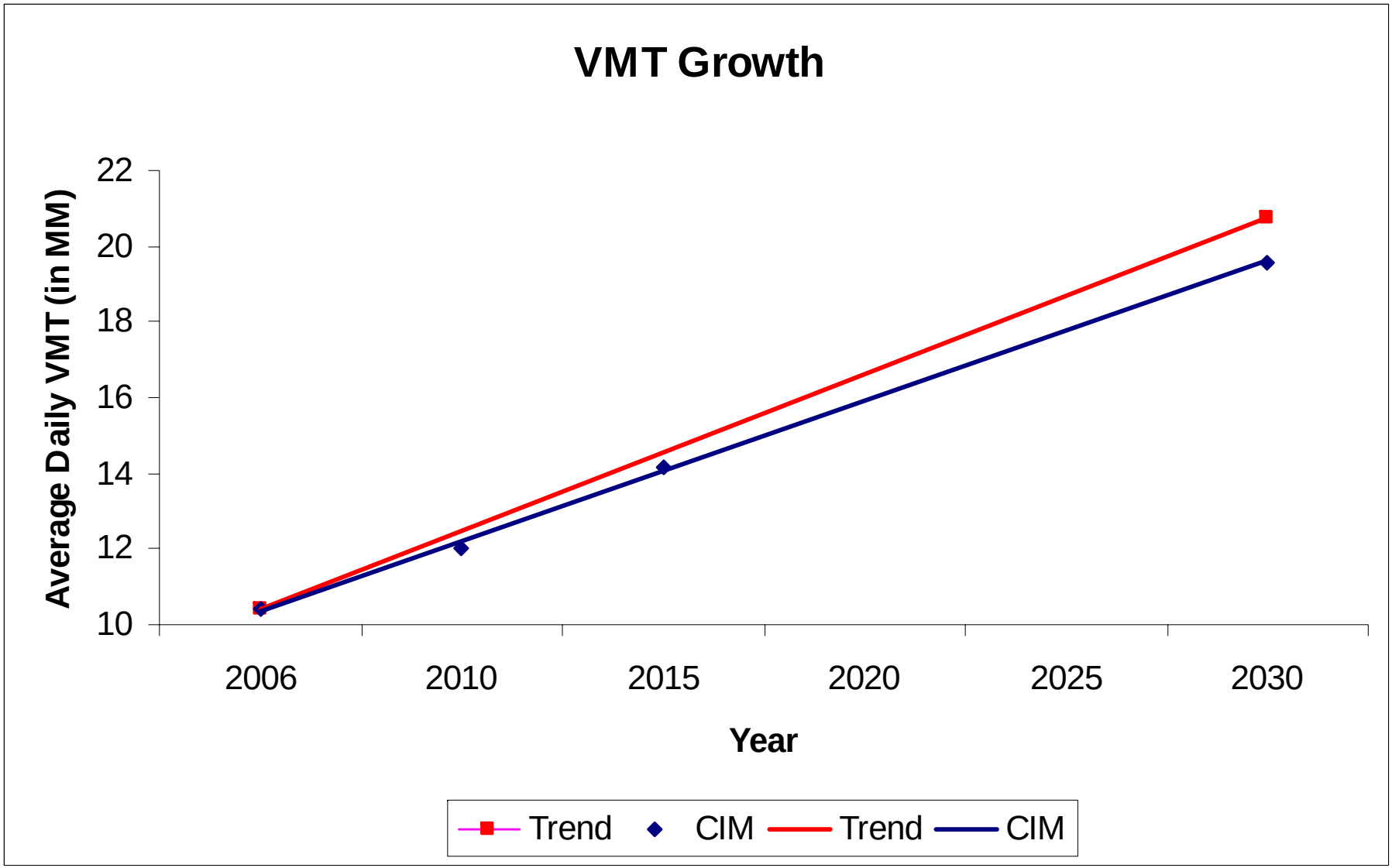

FIGURE7: Treasure Valley (Ada and Canyon) daily vehicle miles of travel (VMT) as a function of growth scenarios.

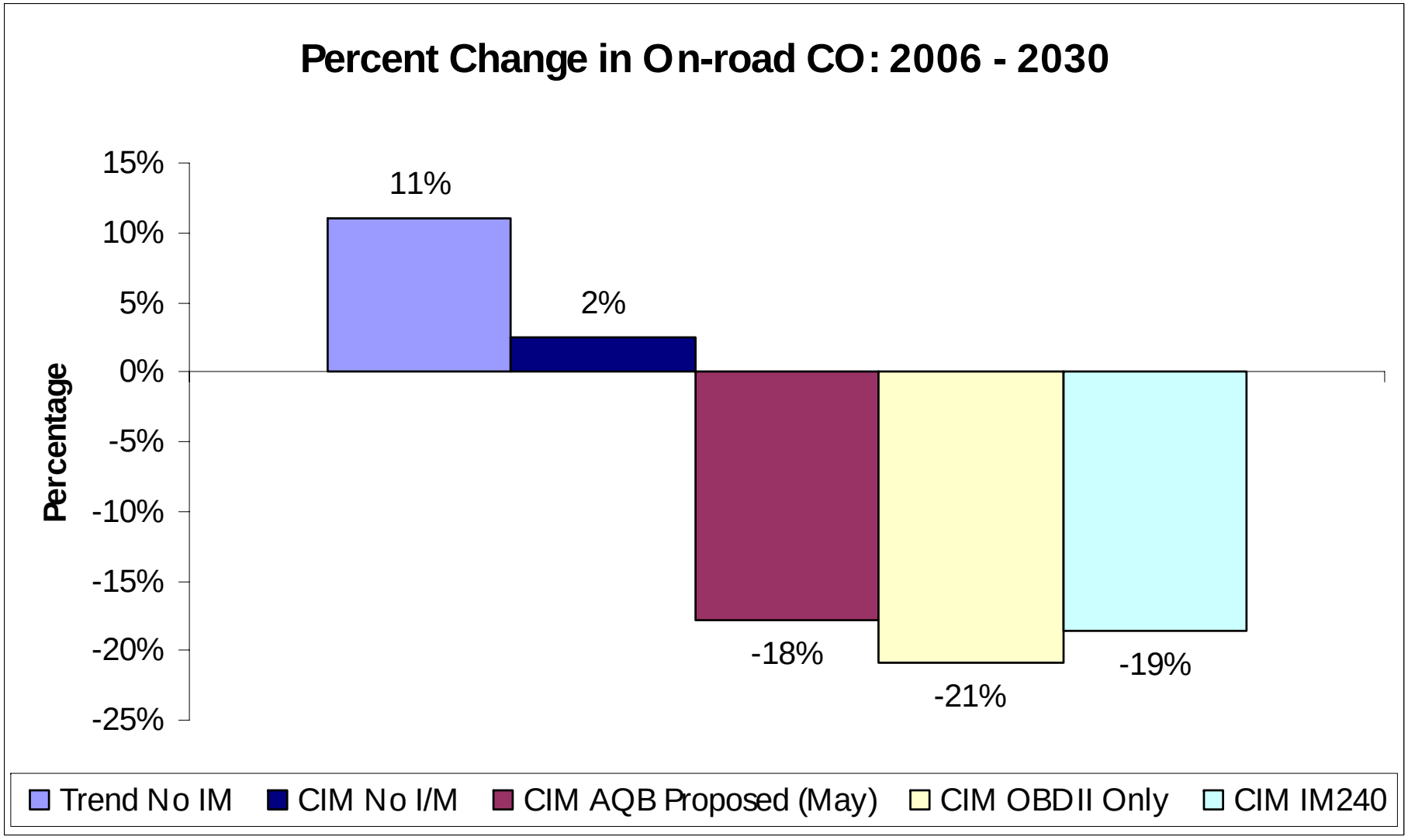

FIGURE8: Percent 2030 CO as compared to the 2006/no testing scenario (Gross Reductions).