2017-2025 Light-duty Vehicle GHG & Fuel Economy Joint Notice of Intent and Interim Technical Assessment Report

Briefing for the CAA MSTR Subcommittee

NHTSA & EPA
October 5, 2010

Agenda

- Context for the Interim Technical Assessment Report and the Joint Notice of Intent
- NHTSA/EPA Joint Notice of Intent
- Overview of the Technical Assessment Report

Context for the Joint Technical Report – the May 21 Presidential Memo

"Work with the State of California to develop by September 1, 2010, a technical assessment to inform the rulemaking process, reflecting input from an array of stakeholders on relevant factors, including

- viable technologies,
- costs,
- benefits,
- lead time to develop and deploy new and emerging technologies,
- incentives and other flexibilities to encourage development and deployment of new and emerging technologies,
- impacts on jobs and the automotive manufacturing base in the United States, and
- infrastructure for advanced vehicle technologies."

The President's Memorandum Directive on a Joint NHTSA/EPA Notice of Intent

- *"Take all measures consistent with law to issue by **September 30, 2010**, a **Notice of Intent to Issue a Proposed Rule** that announces plans for setting stringent fuel economy and greenhouse gas emissions standards for light-duty vehicles of model year 2017 and beyond, including plans for initiating joint rulemaking and gathering any additional information needed to support regulatory action."*

- *"The Notice should describe the **key elements of the program** that the EPA and the NHTSA intend jointly to propose, **under their respective statutory authorities**, including*
  - ***potential standards that could be practicably implemented nationally for the 2017-2025 model years** and*
  - *a **schedule for setting those standards as expeditiously as possible**, consistent with providing **sufficient lead time** to vehicle manufacturers."*

EPA/NHTSA Joint Notice of Intent

- NOI describes the Interim Technical Assessment Report as a first step in the development of the 2017-2025 program
  - Technical Report is being released concurrently with the NOI
- Requests comment on the Report and the NOI
- Lays out a rulemaking schedule
  - Proposed rule by September 30, 2011; Final rule by July 31, 2012
- Describes the important ongoing work the agencies need to do in order to support a formal rulemaking
- Describes the next steps:
  - NHTSA and EPA, with CARB, will continue outreach with stakeholders – especially the major car companies, including hearing their feedback on the interim Technical Assessment Report and the range of scenarios evaluated
  - By November 30, the agencies will issue a supplemental NOI with an updated analysis of potential levels of stringency for the 2017-2025 program

Interim Technical Assessment Report Development

- NHTSA, CARB, and EPA met with more than 70 stakeholders during June-August
- Stakeholders: Auto firms, technology suppliers, labor unions, state government agencies, environmental groups, EV charging firms
- The 3 agencies' technical staff considered the information from the stakeholders as well as existing and new technical data and reports
- Performed detailed evaluation of technologies and modeling to produce the assessment in the Report

Overall Summary of Report

- The three agencies received important input from a range of stakeholders to inform the extension of the National Program to 2017-2025
- Auto firms are developing advanced technologies that can reduce fuel consumption/GHGs significantly beyond the 2012-2016 standards
- An initial assessment of potential future scenarios (from 3 to 6%/year, or 47-62 mpg in 2025) demonstrates that use of advanced technologies can achieve substantial reductions in fuel consumption/GHGs
- We analyzed four illustrative technical pathways for the industry as a whole, reflecting various ways the industry could achieve more stringent targets
  - Each pathway includes various mixes of advanced gasoline vehicles, mass reduction, hybrids, plug-in hybrids, and electric vehicles.

Overall Summary of Report, cont'd

- Based on this initial study, preliminary estimates of costs and benefits from the range of scenarios evaluated included:
  - Cost increases for an average vehicle ranged from $770 to $3,500 per vehicle in 2025
  - Fuel savings result in a net lifetime savings between $4,900 and $7,400 for the 2025 vehicles
  - CO2 reductions range from 340 to 590 MMT over the life of the model year 2025 vehicles
  - Oil savings range from 0.7 to 1.3 billion barrels over the life of the model year 2025 vehicles

Overall Summary of Report, cont.

- As a first step, NHTSA and EPA evaluated annual GHG reductions in the range of 3% to 6% per year; as we move forward with refined analysis, we will continue to evaluate appropriate levels of reduction

- NHTSA, EPA, and DOE have on-going technical work to refine estimates of cost and effectiveness for many technologies and important new safety assessments underway

- More detailed assessments will be needed to support a full rulemaking , including impacts on the industry, individual companies, evaluation of potential safety impacts, and estimates of societal costs and benefits when all statutory considerations are accounted for

Analysis of 2025 Scenarios

- Report contains an initial assessment of a range of potential stringencies; this is a preliminary analysis, to indicate how the application of different advanced technologies can be used to improve the emissions and fuel economy of the overall fleet
- Impacts on individual manufacturers are not analyzed
- Does not consider all of the factors, including EPCA/EISA statutory requirements, we would analyze for a proposed rulemaking and final rulemaking action
- Consideration of those factors may affect the level of stringency promulgated, and will lead to overall higher cost estimates than contained in this initial assessment

2025 Stringency Scenarios

- This table shows the scenario stringencies evaluated

Scenario	Target in MY 2025 (gram/mile CO2)	MPG-equivalent
3% per year	190	47
4% per year	173	51
5% per year	158	56
6% per year	143	62

Advanced Technologies Considered

- We evaluated more than 30 technologies with potential to reduce GHGs and improve fuel economy in the 2017-2025 timeframe

- Major technologies included:
  - Advanced gasoline vehicles
  - Hybrid-electric vehicles (HEVs)
  - Plug-in hybrid electric vehicles (PHEVs)
  - Electric vehicles (EVs)
  - Mass reduction

Multiple Technical Pathways

- We analyzed four illustrative technical pathways which rely upon different levels of emphasis on advanced technologies

Pathway A – Emphasis on HEV technology, with a lesser degree of mass reduction (up to 15% in 2025) and next generation advanced gasoline technology penetration.

Pathway C – Emphasis on next generation advanced gasoline technology, and the highest level of mass reduction considered (up to 30% in 2025)

Pathway B – A strategy between Pathways A and C with respect to HEV and next gen. advanced gasoline technology, as well as mass reduction (up to 20% in 2025)

Pathway D – Emphasis on an EV/PHEV focused approach, with a lesser degree of emphasis on advanced gasoline, HEV, and mass reduction

Evaluation of Scenarios

Pathways A, B, and C

- The 3% per year scenario (47 mpg) requires at most a small increase in HEVs, and moderate mass reduction on the order of 15 to 18%

- The 4% and 5% per year scenarios (51 and 56 mpg) requires either high levels of mass reduction (20% to 25% from 2008 vehicles) and advanced gasoline technology; or significant HEV penetration combined with moderate mass reduction in the 15-20% range

- The 6% per year scenario (62 mpg) requires between 4% and 9% penetration of PHEVs and EVs, very large HEV penetrations between 44% and 68%, and mass reductions up to 26%

Pathway D

- The PHEV/EV focused pathway shows that even with a conservative approach to mass reduction, HEV, and advanced gasoline technology, PHEV and EVs are not required until the 4% per year scenario
- PHEV+EVs represent approx. 5%, 10%, and finally 16% of new vehicle sales under the 4, 5, and 6% per year scenarios

2025 Average Per Vehicle Costs, Vehicle Owner Payback, and Net Owner Lifetime Savings

Per-vehicle cost increase shows the increase from the 2016 standards. Payback period and lifetime owner savings use a 3% discount rate and AEO 2010 reference case energy prices. Gasoline price is ~ $3.75/gallon

Scenario	Technology Pathway	Per-Vehicle Cost Increase ($)	Payback Period (years)	Net Lifetime Owner Savings ($)
3%/year	A	$930	1.6	$5,000
	B	$850	1.5	$5,100
	C	$770	1.4	$5,200
	D	$1,050	1.9	$4,900
4%/year	A	$1,700	2.5	$5,900
	B	$1,500	2.2	$6,000
	C	$1,400	1.9	$6,200
	D	$1,900	2.9	$5,300
5%/year	A	$2,500	3.1	$6,500
	B	$2,300	2.8	$6,700
	C	$2,100	2.5	$7,000
	D	$2,600	3.6	$5,500
6%/year	A	$3,500	4.1	$6,200
	B	$3,200	3.7	$6,600
	C	$2,800	3.1	$7,400
	D	$3,400	4.2	$5,700

2025 Preliminary Per Vehicle Cost Estimates, Vehicle Owner Payback, and Net Owner Lifetime Savings

Per-vehicle cost increase shows the increase from the 2016 standards. Payback period and lifetime owner savings use a 3% discount rate and AEO 2010 reference case energy prices. Gasoline price is ~ $3.75/gallon

Scenario	Technology Pathway	Preliminary Per-Vehicle Cost Estimates ($)	Payback Period (years)	Net Lifetime Owner Savings ($)
3%/year	A	$930	1.6	$5,000
	B	$850	1.5	$5,100
	C	$770	1.4	$5,200
	D	$1,050	1.9	$4,900
4%/year	A	$1,700	2.5	$5,900
	B	$1,500	2.2	$6,000
	C	$1,400	1.9	$6,200
	D	$1,900	2.9	$5,300
5%/year	A	$2,500	3.1	$6,500
	B	$2,300	2.8	$6,700
	C	$2,100	2.5	$7,000
	D	$2,600	3.6	$5,500
6%/year	A	$3,500	4.1	$6,200
	B	$3,200	3.7	$6,600
	C	$2,800	3.1	$7,400
	D	$3,400	4.2	$5,700

2025 technology penetration rates

* Note – Mass reduction is the overall reduction of the 2025 fleet relative to model year 2008 vehicles

Scenario	Technology Path	Mass Reduction*	Advanced Gasoline Vehicles	HEVs	PHEVs	EVs
3%/year	Path A	15%	31%	11%	0%	0%
	Path B	18%	52%	3%	0%	0%
	Path C	18%	46%	3%	0%	0%
	Path D	15%	0%	25%	0%	0%
4%/year	Path A	15%	37%	34%	0%	0%
	Path B	20%	63%	18%	0%	0%
	Path C	25%	97%	3%	0%	0%
	Path D	15%	0%	41%	0%	4%
5%/year	Path A	15%	23%	65%	0%	1%
	Path B	20%	49%	43%	0%	1%
	Path C	25%	74%	25%	0%	0%
	Path D	15%	0%	49%	0%	10%
6%/year	Path A	14%	22%	68%	2%	7%
	Path B	19%	44%	43%	2%	7%
	Path C	26%	53%	44%	0%	4%
	Path D	13%	0%	55%	2%	14%

2025 CO2e and Fuel Reduction Estimates for the lifetime of the model year 2025 vehicles

- Fuel savings are the same for each of the three technology paths
- CO2 reductions vary as a function of the penetration of PHEVs & EVs (due to an increase in upstream emissions)
- For reference, the MY2016 National Program is projected to reduce 0.6 billion barrels of fuel and 325 MMT CO2eq over the life of the MY2016 vehicles

Scenario	**Lifetime CO2e Reduction** (million metric tons)	**Lifetime Fuel Reduction** (Billion Barrels)
3%/year	340	0.7
4%/year	410-440	0.9
5%/year	440-530	1.1
6%/year	470-590	1.3

Next Steps

- Will work closely with individual car companies and other stakeholders to conduct additional technical assessment.
- Complete a second NOI by the end of November, 2010
- Propose standards for MYs 2017 and beyond by September, 2011.
- Finalize standards by July 31, 2012.
- NOI and Technical Assessment Report available at:
  www.epa.gov/otaq/climate/regulations.htm
  www.nhtsa.gov/fuel-economy