EPA's Advance Notice on Greenhouse Gases

MSTRS Meeting

EPA - Office of Transportation and Air Quality

September 17, 2008

How it all began - The ICTA Petition & Supreme Court Decision

- October 1999-- International Center for Technology Assessment and 18 other groups file petition with EPA
  - Request that EPA regulate 4 GHGs from new motor vehicles under Clean Air Act Section 202(a) as air pollutants
- August 2003-- EPA denies petitioners' request
- April 2007 – Supreme Ct. rules EPA improperly denied ICTA's petition
  - GHGs are air pollutants under CAA and EPA must decide whether to regulate using permissible criteria

Administrations Initial Response to the Supreme Court, and the Passage of EISA

- May 2007-- President issues Executive Order 13432
  - Directs EPA, DOE, DOT and USDA to take first steps toward regulations that cut GHG emissions from motor vehicles and their fuels
- December 2007-- Passage of Energy Independence and Security Act
  - Requires EPA promulgate new Renewable Fuels Standards (RFSII)
  - Amends DOT's authority to set CAFE standards for vehicles
    - Requires a fleet-wide average FE of at least 35mpg by 2020 for light-duty vehicles
  - Requires DOT to address fuel efficiency from highway HD vehicles

EPA Receives Additional GHG Petitions for Mobile Sources

- October 2007 to January 2008
  - EPA receives 7 additional petitions requesting EPA propose and adopt GHG standards for:
    - Aircraft
    - Ocean-going marine vessels
    - Nonroad engines and equipment

GHG ANPR

- March 27, 2008 - EPA Administrator's letter to Congress announces EPA will issue ANPR
  - Goes beyond Supreme Court's mandate
  - Allows for broader perspective
  - Explores many relevant sections of the CAA and implications of possible regulations of stationary and mobile sources
  - Will solicit public input and relevant information regarding interconnections and
    - Best available science relevant to making an endangerment finding
    - EPA's first responses to mobile source petitions and various stationary source rulemakings
- July 11, 2008 – ANPR Signed by Administrator
  - Published in the Federal Register on July 30
  - Public comment period open until November 28
  - Next Administration will need to respond

GHG ANPR - Scope

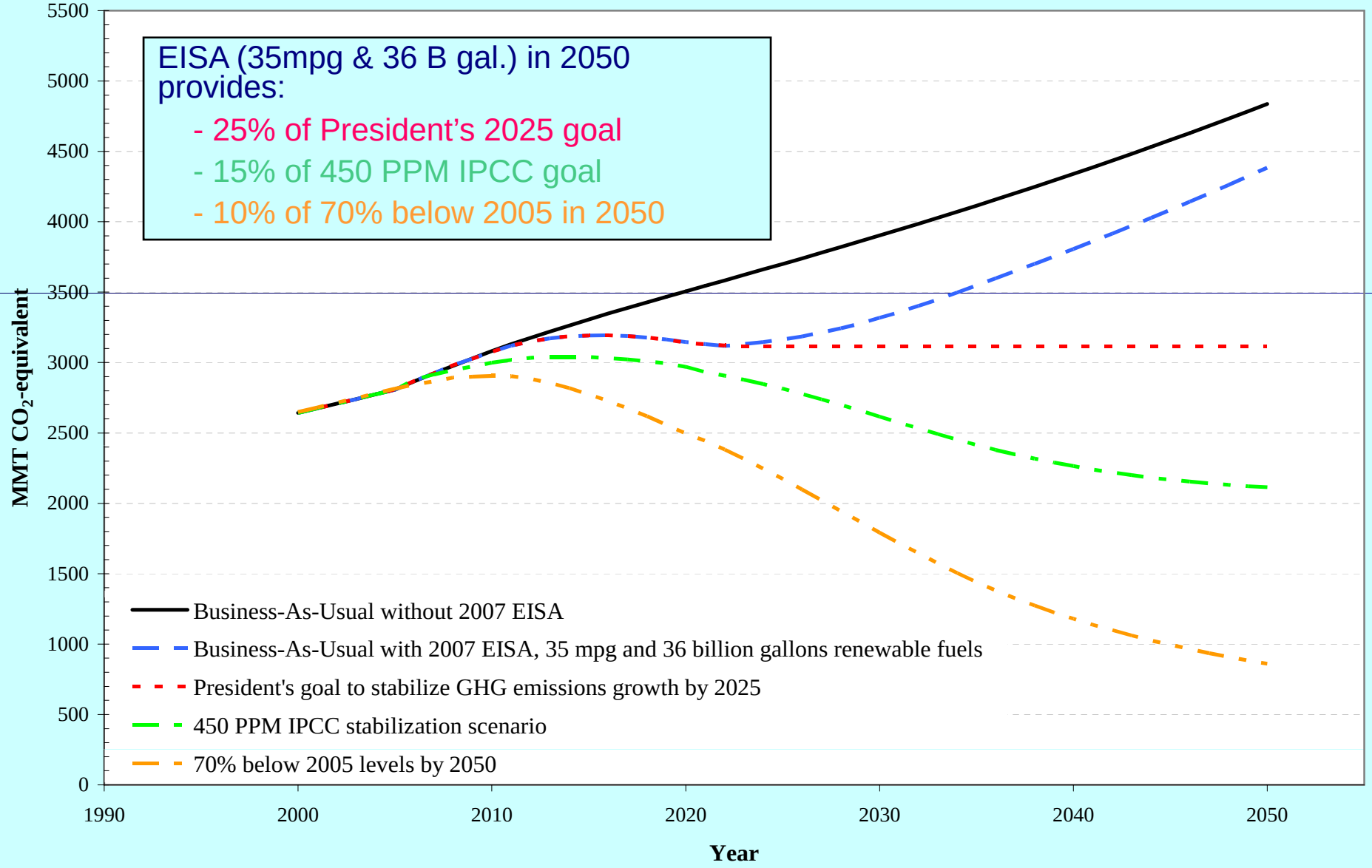
- GHG contributions from all US Sectors
- Public health & welfare impacts from climate change
- Detailed discussion of Clean Air Act authorities
- Implications and approaches for CAA GHG regulation for stationary sources and mobile sources & mobile source fuels
- Does NOT propose any actual standards or recommend specific approaches, and does not make a formal GHG endangerment finding
- Request public comment throughout Notice

Mobile Source Overview

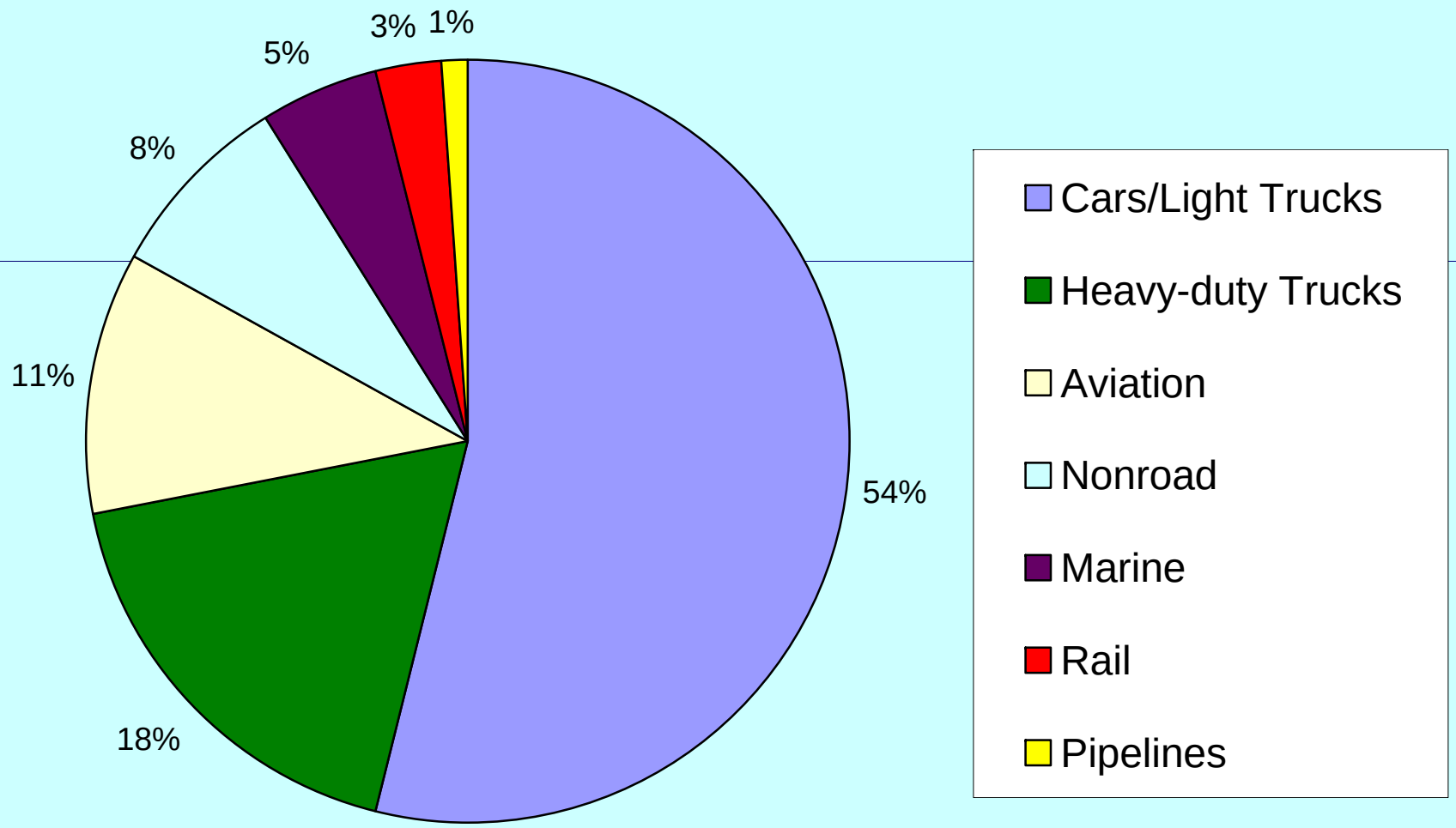
Title II of the Clean Air Act

- Provides statutory authority for EPA to address air pollution from mobile sources and mobile source fuels
- Title II provides significant discretion in how EPA can reduce air pollution from mobile sources
- Has been used successfully over past 30+ years on criteria pollutants (e.g., NOx, VOC, CO, PM)
- ANPR request input on how Title II could be used to address the significant, long-term challenges of GHGs from mobile sources

U.S. Transportation GHG Emissions Projections and Illustrative Targets Based on Proportional Reductions



U.S. Mobile Source GHG Emissions by Sub-sector (2006)



Light-Duty Vehicles

US Light-duty Vehicles

- 54% of mobile source GHGs
- ANPR substantially informed by 2007 work under Executive Order 13432
- ANPR discusses and request input on;
  - Appropriate approaches under CAA Title II
    - Time frames for standard setting (5yr, 10-15yrs, or longer)
    - Standard metrics (e.g., grams/mile)
    - Which GHGs should be addressed, and how (CO2, N2O, HFC, CH4)
    - Test procedures
    - Compliance and enforcement programs
  - How to coordinate with NHTSA CAFE program
- Includes detailed analysis of specific standards

Light-duty Vehicle Standard Analysis

- ANPRM contains several analysis of potential GHG stds.
- 2007 Analysis
  - Conducted under Executive Order 13432 with NHTSA
  - Two potential standard scenarios analyzed
    - 4% per year increase in mpg – from Presidents 20-in-10 goals
    - Model optimized – a method for estimating mpg at point of maximum net societal benefits
  - 2007 analysis was limited in a number of areas compared to what EPA can consider under the Clean Air Act
    - E.g., did not consider car-truck credit trading or consideration of multi-year planning by auto companies
- 2008 Analysis
  - Updated the 4%/year scenario
  - More consistent with CAA provisions and flexibilities
    - E.g., allow for car-truck trading within a company, consideration of multi-year planning, require all companies to comply with std. rather than pay a penalty

2007 and 2008 Standard Scenarios

Year	2007 Analysis (g/mile)		2008 Analysis (g/mile)
	4% per year	Model-optimized	4% per year
2011	338	334	335
2012	323	317	321
2013	309	295	307
2014	296	287	293
2015	285	281	283
2016	274	275	272
2017	263	270	261
2018	243 [35.1 mpg]	266 [33.4 mpg]	251
2019	n/a	n/a	241
2020	n/a	n/a	232 [38.3 mpg]

Updated 2008 LDV GHG Analysis
(4%/year increase)

New Vehicle Fleet Standard in 2020	232 g/mi CO2 [38.3 mpg]
GHGs Reduced in 2040	635 MMT CO2 equivalent
NPV of Net Social Benefits through 2040 (w/o CO2 valuation)	$830 billion
NPV of CO2 valuation through 2040	$10 to $680 billion
Per-vehicle costs	$1,920
Per-vehicle lifetime monetary impact	$1,630
Note: Net Present Value (NPV) discounted at 3%	

Key Factors Limiting Stringency for 2008 Analysis:

- 4%/yr rate of increase based on Presidents 2007 SOTU goal ("20 in 10" goal)
- Based on 2005-2007 vehicle product plans/projections (e.g., 54% light-trucks in 2020, and fleet is large truck/large SUV "heavy")
- Several adv. technologies not considered (e.g., wide-spread weight reduction)
- Utilized AEO2007 fuel price projections (~$2.10/gallon gasoline)

Beyond Light-Duty Vehicles:

- Heavy-Duty highway
- Nonroad gasoline and diesel engines
  - Farm, construction, industrial
  - Locomotives
  - other smaller categories
- Marine vessels
- Aircraft
- Mobile source fuels

Approaches Discussed in ANPR for Building an Effective GHG Program

Operations-based measures—

- used in voluntary EPA programs (such as Smartway)
- may provide good opportunity to gain credits
- greater human element-- reductions must be verifiable
- provides many more options—
  speed reduction, idling reduction, system efficiency improvements, …

Vehicle-based measures—

- (or "equipment"-based, or "vessel"-based)
- has been EPA approach for LD highway – "g/mile"
- greatly expands the technology options --
  - transmissions, hybrids, …

Engine-based measures--

- traditional EPA standards-setting for HD highway and nonroad sectors – "g/hp-hr"
- rewards only <u>engine</u> design improvements --
  - electronic fuel controls, 2-stage turbos …

Each New Approach Brings Added Challenge … and Added Potential

The challenge:

Increasing complexity

The potential:

Increasing flexibility and effectiveness

Heavy-Duty Highway

- Trucks have been regulated under Clean Air Act 202 since 1974—
  - Diesels are now 98% cleaner
  - Same Clean Air Act provisions may be applied to GHG control
- ANPR requests comment on providing for vehicle-based controls through setting of "g/ton-mile" standards
- Comment also requested on a number of GHG reduction strategies –
  - Engine-based – combustion improvements, waste heat recovery, …
  - Vehicle-based – aerodynamics, tires, weight reduction, hybrids, …
  - Operations-based -- idling, speeds, tire inflation, …
- ANPR: Potential for up to 40% GHG reduction for typical truck by 2015

Nonroad Engines and Equipment

A major Clean Air Act success story for criteria pollutants

- covers wide diversity in applications and engine sizes
- flexibility provisions and gradual phase-in have been key
- Tier 4 phase-in started this year → advanced Clean Diesel technology

ANPR requests comment on applying same provisions (213) to nonroad GHGs

- Large potential to apply current and future highway engine technology
  - especially where fuel economy has not been a high priority in the past--
    - farm, construction, industrial, …
- And even where it has (railroads), much more can be done --
  - Some examples in ANPR: GPS-based automated throttling, track lubrication, hybrid, targeted electrification, cross-RR dispatching/tracking of railcars and locomotives

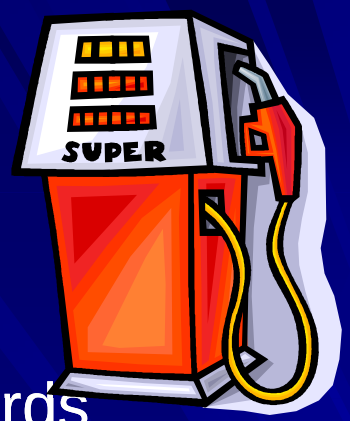
Marine Vessels

- EPA has been working with IMO to explore ways to reduce GHGs from ocean-going vessels
  - Important due to global nature and rapid growth of shipping business
- Past EPA standard-setting under same Clean Air Act provisions as for nonroad engines (213)
- ANPR asks for comment on applying these to GHG control
- ANPR requests comment on a number of methods to reduce GHGs:
  - Engine-based – higher efficiency engines, waste heat recovery, …
  - Vessel-based – hull shapes and coatings, propeller designs, …
  - Operations-based -- reduced speeds, shoreside power, …

Aircraft

- FAA and ICAO play important roles in EPA standard-setting programs
  - Safety is always an important issue
  - International nature of air traffic raises need for coordinated programs
    - ANPR requests comment on proposed EC program:
      - A CO2 cap covering all flights in and out of EU
- ANPR also requests comment on ways to reduce aircraft GHGs:
  - More efficient engines
  - Airframe changes to reduce drag and weight
  - Operations changes
    - such as route and speed optimization, single-engine taxiing, …
- Comment requested on airline fleet-based approach (declining average GHG)

Fuels

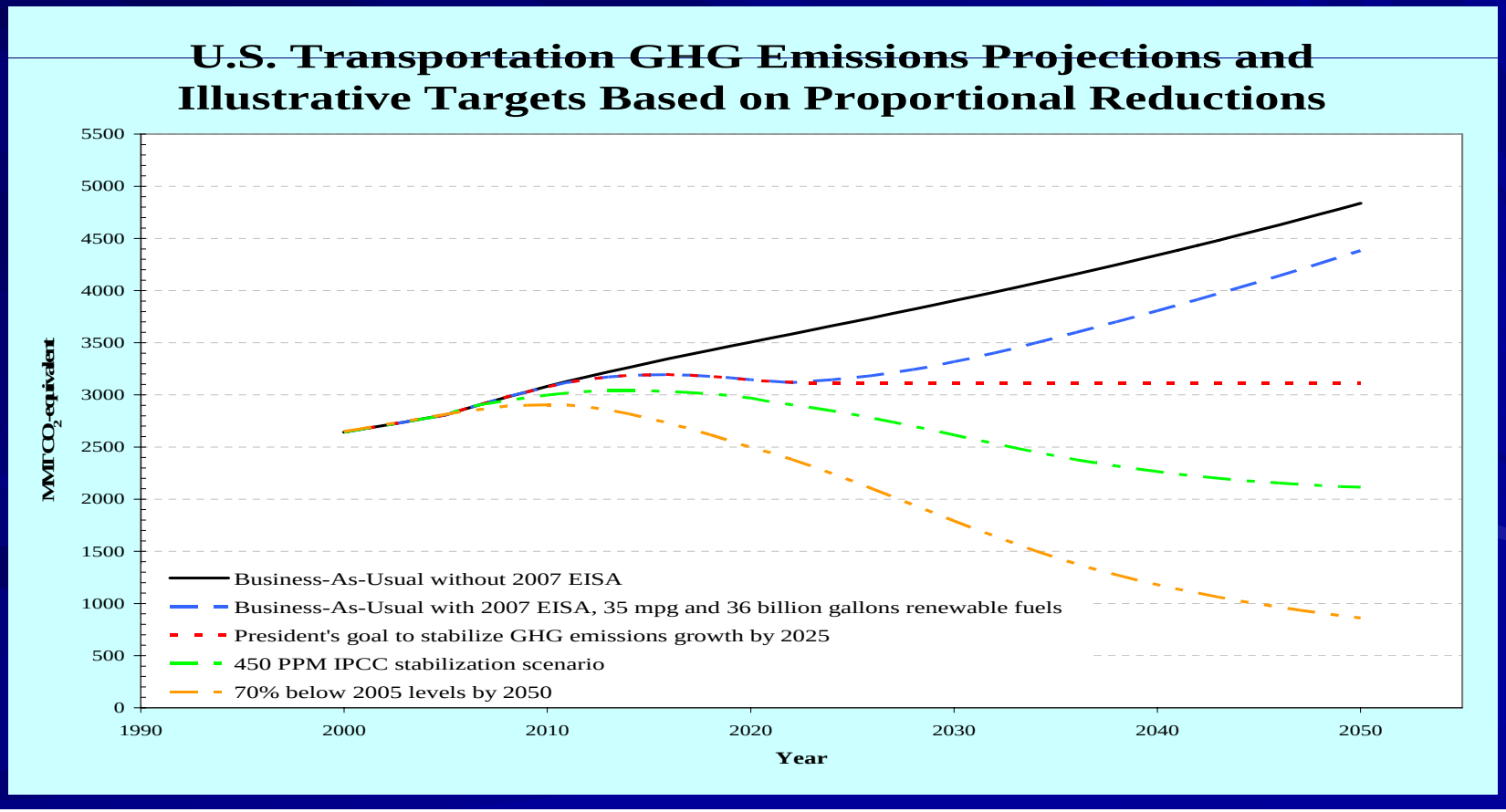


- EPA is developing new Renewable Fuels Standards ("RFS2") under EISA
  - While the program will consider implications for GHG emissions, RFS is primarily focused on energy security
- The ANPR requests comment on whether the Clean Air Act provides EPA authority to directly regulate GHGs from all fuels
- ANPR requests comment on whether the CAA would allow EPA to establish a low carbon fuel standard
  - An effective GHG fuels program must thoroughly explore total life-cycle emissions of CO2, methane, and other GHGs

ANPR Mobile Source Support Documents

- Light-duty Vehicles
  - Light-duty Vehicle Technical Support Document
  - EPA Staff Report on Light-duty Technologies
  - Light-Duty vehicle GHG certification and compliance program options memo
  - Non-CO2 Light-duty GHGs control options memo
  - Light-duty vehicle GHG updated 4% per year control scenario, costs and benefits memo
- Technology memorandum for other mobile sources
  - Highway heavy-duty truck GHG technologies
  - Application-specific nonroad GHG technology pathways
  - Commercial marine GHG control technologies

Mobile Source Conclusions

- Climate Change is a significant long-term challenge
  - Transportation sector will play a major role in any meaningful GHG reduction program
  - The Clean Air Act provides many tools for reducing mobile source GHGs

- EPA must respond to Supreme Court Decision, and recent 7 off-highway GHG petitions