

it would be either effective or appropriate for EPA to establish GHG standards for motor vehicles at this time. As described in detail below, the President has laid out a comprehensive approach to climate change that calls for near-term voluntary actions and incentives along with programs aimed at reducing scientific uncertainties and encouraging technological development so that the government may effectively and efficiently address the climate change issue over the long term.

Petitioners cited numerous studies and other sources of information in contending that anthropogenic emissions of CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, and HFCs are accelerating global climate change and that emission of these compounds from motor vehicles contribute to the problem. Numerous commenters agreed with petitioners and a few cited additional information or studies as further support. See "Summary of Climate Petition Comments on Science" in the docket for this action. Other commenters disagreed with petitioners' contentions, citing different data and studies or in some cases interpreting the same data and studies differently or emphasizing different aspects of the information provided. *Id.* We reviewed the information submitted by petitioners and commenters and concluded that all of the information was widely available and in the public domain at the time we solicited comments on the petition. The information submitted does not add significantly to the body of information available to the National Research Council (NRC) when it prepared its 2001 report, *Climate Change Science: An Analysis of Some Key Questions*. We rely in this decision on NRC's objective and independent assessment of the relevant science. The comments submitted to the record do not include information that causes us to question the validity of the NRC's conclusions.

As the NRC noted in its report, concentrations of GHGs are increasing in the atmosphere as a result of human activities (pp. 9–12). It also noted that "[a] diverse array of evidence points to a warming of global surface air temperatures" (p. 16). The report goes on to state, however, that "[b]ecause of the large and still uncertain level of natural variability inherent in the climate record and the uncertainties in the time histories of the various forcing agents (and particularly aerosols), a casual linkage between the buildup of greenhouse gases in the atmosphere and the observed climate changes during the 20th century cannot be unequivocally established. The fact that the magnitude of the observed warming is large in comparison to natural variability as

simulated in climate models is suggestive of such a linkage, but it does not constitute proof of one because the model simulations could be deficient in natural variability on the decadal to century time scale" (p. 17).

The NRC also observed that "there is considerable uncertainty in current understanding of how the climate system varies naturally and reacts to emissions of [GHGs] and aerosols" (p. 1). As a result of that uncertainty, the NRC cautioned that "current estimate of the magnitude of future warming should be regarded as tentative and subject to future adjustments (either upward or downward)." *Id.* It further advised that "[r]educing the wide range of uncertainty inherent in current model predictions of global climate change will require major advances in understanding and modeling of both (1) the factors that determine atmospheric concentrations of [GHGs] and aerosols and (2) the so-called 'feedbacks' that determine the sensitivity of the climate system to a prescribed increase in [GHGs]." *Id.*

The science of climate change is extraordinarily complex and still evolving. Although there have been substantial advances in climate change science, there continue to be important uncertainties in our understanding of the factors that may affect future climate change and how it should be addressed. As the NRC explained, predicting future climate change necessarily involves a complex web of economic and physical factors including: Our ability to predict future global anthropogenic emissions of GHGs and aerosols; the fate of these emissions once they enter the atmosphere (e.g., what percentage are absorbed by vegetation or are taken up by the oceans); the impact of those emissions that remain in the atmosphere on the radiative properties of the atmosphere; changes in critically important climate feedbacks (e.g., changes in cloud cover and ocean circulation); changes in temperature characteristics (e.g., average temperatures, shifts in daytime and evening temperatures); changes in other climatic parameters (e.g., shifts in precipitation, storms); and ultimately the impact of such changes on human health and welfare (e.g., increases or decreases in agricultural productivity, human health impacts). The NRC noted, in particular, that "[t]he understanding of the relationships between weather/climate and human health is in its infancy and therefore the health consequences of climate change are poorly understood" (p. 20). Substantial scientific uncertainties limit our ability to assess each of these factors and to

separate out those changes resulting from natural variability from those that are directly the result of increases in anthropogenic GHGs.

Reducing the wide range of uncertainty inherent in current model predictions will require major advances in understanding and modeling of the factors that determine atmospheric concentrations of greenhouse gases and aerosols, and the processes that determine the sensitivity of the climate system. Specifically, this will involve reducing uncertainty regarding:

- The future global use of fossil fuels and future global emissions of methane,
- The fraction of fossil fuel carbon that will remain in the atmosphere and contribute to radiative forcing versus exchange with the oceans or with the land biosphere,
- The impacts (either positive or negative) of climate change on regional and local systems,
- The nature and causes of the natural variability of climate and its interactions with human-induced changes, and
- The direct and indirect effects of the changing distribution of aerosols.

Knowledge of the climate system and of projections about the future climate is derived from fundamental physics, chemistry and observations. Data are then incorporated in global circulation models. However, model projections are limited by the paucity of data available to evaluate the ability of coupled models to simulate important aspects of climate. The U.S. and other countries are attempting to overcome these limitations by developing a more comprehensive long-term observation system, by making more extensive regional measurements of greenhouse gases, and by increasing the computing power required to handle these expanded data sets.

A central component of the President's policy is to reduce key uncertainties that exist in our understanding of global climate change. Important efforts are underway to address these uncertainties. In particular, the Federal Government has expanded scientific research efforts through its Climate Change Research Initiative (CCRI). President Bush announced this new initiative in June 2001 and called for it "to study areas of uncertainty and identify priority areas where investments can make a difference." The CCRI recently issued its final "Strategic Plan for the Climate Change Research Program" to ensure that scientific efforts are focused where they are most critical and that the key scientific uncertainties identified are