

Major Challenges in Each Region for Reducing Environmental and Health Damage from Motor Vehicles

1. Country/Region: United States

A. Current Status

- Stringent emissions standards adopted for cars, light trucks, heavy trucks and non road vehicles.
- Low sulfur standards adopted for gasoline, on-road diesel fuel, non-road diesel fuel and locomotive and marine fuels.
- EPA and some states have initiated efforts to move forward with programs to retrofit existing heavy duty diesel vehicles, but these programs remain under funded (in spite of significant improvements) and lacking in sufficient forcing mechanisms or incentives.

B. Major Challenges

- Fuel consumption and greenhouse gases increasing rapidly with no significant national program in place to address them.
- Stringent emissions standards for locomotive and marine will be a difficult fight.
- Existing heavy duty diesels will remain heavy polluters for the next 25 years unless serious, effective, broad based retrofit efforts are developed and implemented.
- Emissions from international sources such as aircraft and ocean vessels are becoming an increasingly larger contributor to the US inventory and much stronger actions are needed to reduce emissions from those sources.

2. Country/Region: California

A. Current Status

- Stringent emissions standards adopted for cars, light trucks and heavy trucks.
- Low sulfur standards adopted for gasoline, onroad diesel fuel, and non road diesel fuel.
- Greenhouse gas emissions standards have been proposed for light duty vehicles.
- Funding for the Carl Moyer program has been significantly increased in an effort to clean up existing diesels which is complementing a regulatory effort to force improvements to all existing diesels in the state.

B. Major Challenges

- The vehicle industry is expected to attack the greenhouse program in the courts, in the statehouse and if necessary in the Congress.

- Even with additional funding, cleaning up existing diesels faces difficult technical and funding challenges.

3. Country/Region: Canada

A. Current Status

- Stringent emissions standards adopted or soon to be adopted for cars, light trucks, heavy trucks and non road vehicles, closely mirroring the US national requirements. (Tier 2 and HD standards)
- Low sulfur standards adopted or soon to be adopted for gasoline, onroad diesel fuel, non road diesel fuel and locomotive and marine fuels, closely mirroring the US national requirements.
- MMT has been widely used in recent years but evidence is growing that cars with advanced catalysts and substrates are experiencing rapid deterioration from this additive.
- Discussions underway with the auto industry aimed at reducing light duty vehicle greenhouse gas emissions by 25% by 2010 as part of the national commitment to the Kyoto protocol.

B. Major Challenges

- Industry is strongly resisting the greenhouse gas reduction effort.
- Ethyl is aggressively resisting the effort to ban MMT.

4. Country/Region: Mexico

A. Current Status

- Tier 1 standards for light duty vehicles are being phased in and Tier 2 is under discussion starting in 2006.
- PEMEX has agreed in principle to phase in low sulfur gasoline and diesel fuels meeting the same specifications as in the US but must get approval from Hacienda to make the investment and from the parliament to be able to pass through the costs to the consumers through a slight price increase.
- Preliminary discussions are underway regarding a tightening of truck standards which are currently quite weak but serious discussion awaits resolution of the fuels issue.
- A retrofit demonstration program has just been initiated in Mexico City with support from US EPA and EmbarQ.
- Mexico City has what most consider being the best I/M program in the developing world.

B. Major Challenges

- Getting final approval of the low sulfur fuels investment is the critical first step which would allow a serious and rapid move toward identical emissions standards for all categories of vehicles throughout NAFTA.
- The fuels decision is also critical if any serious retrofit effort is to be undertaken in Mexico.
- A serious program to reduce fuel consumption and greenhouse gases is urgently needed.

5. Country/Region: European Union

A. Current Status

- Tight standards have been adopted for gasoline fueled vehicles but both light and heavy duty diesels need significantly more stringent standards for NO_x and PM; several countries are pushing for the introduction of PM filters in the interim through incentives and public pressure but results are mixed.
- Europe has been the leader in the worldwide movement to near zero sulfur in both gasoline and diesel fuel.
- Europe has also adopted through a voluntary agreement with industry the first CO₂ standard in the world and so far is on track in moving toward that standard.

B. Major Challenges

- Getting tighter emissions standards for all categories of vehicles but especially for diesel vehicles reflecting the state of the art technology.
- Assuring that the CO₂ standard of 140 grams per kilometer by 2008 is achieved and then reduced to 120 grams/km by 2012.
- While a number of very good retrofit programs have been initiated in Sweden, Germany, Switzerland and the UK, there needs to be a European wide push to clean up existing diesels.
- While MMT has historically been absent from most EU fuels, it has been used in gasoline in several of the new accession countries and must therefore now be addressed by the EU.

6. Country/Region: Japan

A. Current Status

- Japan has recently tightened emissions standards for all categories of vehicles substantially although the NO_x standard for diesels remains quite weak compared to comparable gasoline fueled vehicles.
- Diesel and gasoline sulfur levels will be similar to EU's near zero requirements by the end of 2007. (Diesel and gasoline sulfur levels will be reduced less than 10 ppm by the year 2007 and 2008, respectively.) The large-scale supply of such low sulfur fuels will start in Tokyo and other large cities at the beginning of 2005.)
- An aggressive retrofit program is underway in Tokyo and surrounding areas and it appears to be going well.

- Best in class fuel economy requirements have been adopted which will result in an approximately 25% improvement in new light duty vehicles by 2010. (All Japanese automakers except one will achieve these requirements by 2005 and one automaker by 2006.)
- The Japanese Ministry of the Environment has begun drafting new regulations on automobile tailpipe emissions that would require substantial improvements by fiscal 2010 from the current levels. The Automobile Emission Gas Expert Committee, which advises the Central Environment Council, has begun drafting a new diesel vehicle emission standard that is expected to reduce NOx and particulate matter by approximately 50 to 70 percent from the fiscal 2005 regulations.
- Through a variety of incentives, the government has created a climate of innovation which has stimulated manufacturers to become the world leaders in advanced clean, efficient technologies such as hybrid vehicles. (Almost all vehicles utilize combinations of conventional technologies apart from hybrids.)
- While not “legally” banned, MMT is not used by any oil company in Japan.

B. Major Challenges

- Emissions standards for all categories of vehicles must be further tightened to reflect the emerging state of the art.
- Further additional improvements in fuel economy post 2010 must be adopted.
- The government has begun to discuss fuel economy regulations for heavy-duty vehicles.

7. Country/Region: China

A. Current Status

- China has just adopted Euro 2 emissions standards for cars and trucks. Work is underway to lay out a roadmap for future standards at both the national and major cities levels.
- Fuel specifications are widely variable with national sulfur specifications for gasoline and diesel at 800 and 2000 ppm respectively but cleaner fuels being sold in some of the major cities such as Beijing and Shanghai.
- China is on the verge of adopting fuel consumption limits for new cars with the only remaining hurdle apparently being WTO approval.

B. Major Challenges

- Mainly because of the difficulty in adopting European fuel specifications for sulfur and other parameters, China continues to lag the European standards schedule by 7 to 8 years.
- MMT in gasoline is also emerging as a major fuels issue, constraining car companies such as Honda and GM from introducing state of the art catalysts with high cell density substrates; MMT seems to be used in about 1/3rd of China’s gasoline and may be increasing. Ethyl is aggressively resisting a ban in Beijing.
- Actual enforcement of standards is also a major issue with SEPA’s resources very limited. Anecdotal evidence indicates that widespread cheating may be occurring.

- Efforts to upgrade the I/M programs in major cities have proceeded very slowly.

8. Country/Region: India

A. Current Status

- Like China, India lags well behind Europe in introducing more stringent emissions standards mainly because of the difficulty in improving fuel sulfur levels. India has adopted Euro 2 standards for 2005 and Euro 3 by 2010. The major cities will be on a faster schedule, moving to Euro 4 by 2010. Currently, 11 cities are required to meet Euro II norms: New Delhi, Mumbai (Bombay), Kolkata (Calcutta), Bangalore, Chennai, Hyderabad, Ahmedabad, Pune, Surat, Kanpur, and Agra. Under the new policy, vehicles in the 11 cities now operating under Euro II standards will be required to meet Euro III norms by April 1, 2005, and Euro IV standards by 2010. Unless fuel quality improves, even these levels will not be attained in use.
- India has no program at present to reduce fuel consumption or greenhouse gases from the road transport sector

B. Major Challenges

- India must invest in its refineries to reduce sulfur to near zero levels if it is going to clean up its vehicle fleet. At a conference organized by CSE (Anumita), the major oil companies indicated that they could provide low sulfur fuel if it was required by the government but the government seems unable to make the decision.
- As a country with a rapidly growing vehicle population, India must begin to address fuel consumption and greenhouse gases.
- Efforts are underway to substantially upgrade the I/M program and these efforts must be accelerated.

9. Country/Region: Brazil

A. Current Status

- Brazil will phase in US Tier 1 standards during the period from 2005-2007 jumping to US Federal Low Emissions Vehicle standards (FedLEV) in 2009. Diesel Cars will continue to be banned throughout the country. With regard to heavy duty trucks and buses, Euro 3 will be phased in during 2004-2006 and Euro 4 in 2009.
- Fuel quality sulfur levels will drop from the present 3,000 ppm (2000 ppm metropolitan) to 500 ppm by 2006. Discussions continue but there is no certainty that 50 ppm sulphur will be required even in the major cities by 2009, although Petrobras' refineries will require upgrading very soon. Even then fuels throughout the rest of the country will have much higher levels with no firm date under discussion for reducing national fuels to 50 ppm.
- Since the program startup in 1975, 250 million cubic meters of ethanol has been produced resulting in significant CO₂ savings. More recently, sales of gasoline-ethanol

flexible fueled vehicles have increased from 38,000 units sold in 2003 to an estimated 600,000 units by the end of this year.

- There are only limited voluntary efforts underway to reduce fuel consumption or greenhouse gas emissions from the transportation sector beyond the ethanol program. ANP, the National Petroleum Agency, is conducting, for example, the EconomizAr, a diesel labeling program applied to 188,000 vehicles and which is estimated to save 786 kt CO₂/year. Another is the Siga-Bem which is estimated to save around 1.8 kt CO₂/month through orienting truck drivers at pumping stations. Other limited efforts are also underway.

B. Major Challenges

- Brazil continues to lag behind the EU and the US in introducing state of the art vehicle emissions requirements. Poor fuel quality, especially with regard to sulfur levels is one of the major impediments.
- In use vehicle emissions seem to be much higher than reflected by the standards themselves in part because debates over whom should implement an I/M program have prevented any program from being introduced. Debates among the Federal, State and Municipal authorities have caused the program to be systematically postponed.
- While new car standards are being tightened, OBD requirements have not yet been imposed.

10. Country/Region: Thailand

A. Current Status

- Thailand has decided to proceed to Euro 4 standards by the end of the decade. Agreement has been reached with the fuels industry to reduce sulfur levels in both diesel and gasoline to a maximum of 50 ppm by 2010 and discussions are ongoing regarding a possible reduction to 10 ppm maximum.

B. Major Challenges

- The country needs to carry through on its program and assure that state of the art emissions standards apply to all new vehicles by 2010.
- Discussions with industry regarding fuel quality must continue with the goal of achieving 10 ppm maximum sulfur levels. In addition, the country must pay careful attention to prevent the introduction of MMT into gasoline.

11. Common Threads and Conclusions

A. OECD Countries

No country or region has yet put in place a comprehensive program that adequately addresses urban air pollution, energy consumption and greenhouse gas emissions. The prospects look promising in Japan, the EU and California but each of these regions has significant hurdles and challenges to overcome.

- Japan may actually be the furthest along because there seems to be a consensus that additional emissions reductions are needed and feasible and that lowering fuel consumption must be a high national priority. In addition, the Japanese vehicle industry sees producing clean, efficient vehicles as a major element of their overall business plan.
- One can see reasons for optimism in Europe as well as major countries such as Germany, Sweden, France and Denmark seem committed to state of the art vehicle pollution controls in tandem with lower CO₂ emissions. But the departure of Bernd Lange from the EU parliament and the addition of 10 new member states may slow down the process.
- California already has the world leadership with regard to vehicle emissions standards and continues to stimulate the introduction of advanced technology vehicles, but it faces many political and legal challenges in the next few years as it tries to address greenhouse gases.
- Canada also is attempting to join lower greenhouse gases to its low emissions vehicle program but is clearly running into strong resistance from the vehicle industry.
- In the US nationally, there is some momentum toward addressing CO₂ as an air pollutant to complement the longer term effort to further tighten CAFÉ requirements but the election outcome is still very unclear and it appears that a change in administrations is a necessary precondition for progress on either of these fronts.

Even with stringent emissions requirements being phased in for new vehicles, existing in use vehicles, especially heavy duty trucks and buses will be on the roads and polluting heavily for the next 20 to 30 years in many countries. Retrofit efforts are underway but they have so far been modest at best and remain under funded and technically challenging.

B. Developing Countries

In the rapidly industrializing developing world, one can also see several common threads.

- **Introducing near zero sulfur fuels remains a major challenge in every country.** Thailand seems the closest to actually being on a par or close to being on a par with European fuel quality this decade. But there is progress and genuine debate in China, India, Mexico and Brazil indicating that continued pushes in these countries could be very fruitful.
- **MMT in gasoline is a growing concern as evidence continues to accumulate that it causes damage to advanced catalyst technology.** Because it is not marketed in very much of the “West” only limited formal bans (only CARB at this point?) are in effect, allowing Ethyl to mischaracterize its “acceptability”.
- **Poor vehicle maintenance is the norm.** With the notable exception of Mexico City, most developing countries are not giving adequate attention to improving in use vehicle maintenance to keep vehicles clean and efficient. Efforts are underway in the major cities of China, India, Thailand and Brazil but these efforts must be carefully monitored because it is much easier to make compromises which can undercut the effectiveness of the program than it is to just do it correctly.

C. Global Concerns

Aircraft and international marine traffic are becoming increasingly important pollutant sources, in part because they are growing rapidly and in part because their controls are so weak. Currently regulation of these industries is under the control of ICAO and IMO which are largely controlled by the regulated industries. To the extent that countries could try to push tighter regulations in these organizations, the wrong organizations represent the countries (e.g., in the US it is the FAA rather than the EPA who participates at the ICAO meetings).

There is some progress. Countries such as Japan and the UK, for example have been studying the issue. The MARPOL agreement has created certain protected waterways in which vessels must meet more stringent requirements. Individual ports have begun to impose tax policies to encourage the use of lower sulfur fuels. But all these efforts have made barely a dent in the problem to date.