IEA vehicle efficiency workshops drive new vehicle policy approaches

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Fuel economy is not only about getting more performance from the engine. Components outside the engine are also large fuel consumers. If fuel-economy test methods always remembered that, vehicle manufacturers would optimise component performance. A number of initiatives addressing component test standards and related policies have been triggered by IEA's recent workshops.

Off-test but not off fuel gauge

It is common knowledge that road vehicles dominate global oil consumption and are one of the largest and fastest growing energy end-uses. But it is less well known that current vehicle fuel-economy test cycles fail to capture a large proportion of on-road vehicle energy use.

A significant and growing share of vehicle energy use is attributable to ancillary components that are not currently activated during standard fuel-economy test cycles. Examples are air-conditioners, lights, in-car entertainment systems or navigation and communication systems. Furthermore, other components such as tyres and lubricants that have an important impact on vehicle economy may be changed between the time when the vehicle is tested and its final delivery; and they are usually changed several times during the vehicle's useful life.

Yet the impact on energy performance of these components is neither measured nor reported to consumers at the point of purchase. The failure of current test procedures and information disclosure schemes to capture the impact of component choices leaves little incentive for manufacturers to adopt solutions that optimise component energy performance. If consumers had information on which to base more informed choices and reject inefficient options, the picture would change significantly. Fortunately, however, wherever we see such energy efficiency market failures we also see opportunities to develop new energy-saving policies and it is with this thought in mind that the IEA has been staging a series of workshops looking at the options to improve on-road performance of vehicles through measures to improve the efficiency of vehicle components.

The gap between standard fuel-economy test results and the real fuel use of cars "on the road" is also partly linked to people's driving styles, which are very different from one driver to another. Moreover, where acceleration, anticipation, braking and gear changes are concerned, the driving habits of an average car driver are much less efficient than those of the professionals conducting the official tests. Ironically, some energy-consuming components like "driver feedback systems" that provide instant consumption

indicators, or on-board computers, gear shift indicators or cruise controls, can also assist drivers in achieving a more efficient use of their car.

The average gap between standard tests and real use "on the road" is estimated to be in the range of 20% to 25% of the car' fuel use. But how much energy is at stake worldwide and what could be saved from more efficient component selection? We first looked at this in the case of tyres and held an IEA workshop in November 2005 (see *Energy Efficient Tyres: Improving the On-Road Performance of Motor Vehicles* http://www.iea.org/Textbase/work/workshopdetail.asp?WS_ID=227).

A tiring effort

On average, almost 20% of a car's fuel consumption is used to overcome rolling resistance in the tyres. Manufacturers have already achieved significant reductions in rolling resistance. But, with today's high fuel prices, it makes sense to carefully examine the feasibility of further improvements. Our workshop explored how rolling resistance is measured and how these measurements translate into reductions in fuel consumption. Technical options for further reductions in rolling resistance were considered, and careful thought was given to safety, durability and other key factors. Workshop participants went on to discuss the feasibility of establishing an internationally harmonised procedure for rating the energy efficiency of tyres. They looked at various policy avenues leading to improved fuel economy in cars through tyres with a lower rolling resistance.

There was a general consensus amongst participants on the need to develop harmonised procedures for measurement and improve consumer awareness and information, notably through energy labelling schemes for tyres sold on the replacement market. A lot of new market data and analysis was presented by key actors during the workshop. This all made it possible to reach a clear conclusion regarding the potential trade-offs between rolling resistance and security or durability issues. It seems that there is no systematic link or correlation between low rolling resistance and lower wet grip or product tread. On the contrary, some products on the market have a very low rolling resistance, the highest levels of road safety performance and the longest lifespans.

Since this workshop, several initiatives have been taken to develop test standards and related policy measures. As part of its contribution to the G8 Gleneagles Plan of Action on Climate Change, Clean Energy and Sustainable Development, the IEA has proposed some concrete recommendations regarding energy efficiency. Governments have been advised that international best practice on fuel-efficient tyres consists of two elements:

- establishing maximum allowable levels of rolling resistance for major categories of tyres; and
- developing measures to promote proper tyre inflation levels.

The former requires an agreed test standard. In support of this objective, the International Standards Organisation has established a technical committee (ISO TC31) to develop a standard to measure the rolling resistance of tyres and to ensure sound calibration of the testing laboratories.

Meanwhile, the European Commission recently published its Energy Efficiency Action Plan, which aims to improve energy efficiency in wide-ranging areas of Europe's

economy by 20% between now and 2020. The action plan includes several measures addressing tyre rolling resistance, including requirements for the testing and energy labelling of tyres and consideration of compulsory fitting of tyre pressure monitoring systems on new vehicles[1].

In the United States, a study by the National Academy of Science on tyres was completed in 2006 and concluded that it would be both feasible and worthwhile to develop a labelling scheme for tyres. California has passed a framework regulation on minimum permissible tyre rolling resistance levels and is in the process of developing the technical specifications prior to its full implementation.

Finally, Russia has initiated a procedure on tyres within the framework of the United Nations Economic Commission for Europe (UNECE) Working Party 29.

A chilling thought

When in use, mobile air conditioning (MAC) systems are responsible for as much as 15% of the fuel use of modern cars. And it can be even more – up to some 30%, depending on the vehicle – in some specific driving conditions (e.g. during heavy congestion). Identifying technologies that can reduce the amount of fuel used to cool motor vehicles was the purpose of the IEA's workshop *Cooling Cars with Less Fuel* (http://www.iea.org/Textbase/work/workshopdetail.asp?WS_ID=247), held at IEA headquarter in Paris in October 2006.

The workshop further evaluated the sources of current cooling loads and the efficiencies of the delivery systems. Agreement was sought among participating experts on procedures to measure the effectiveness of more efficient cooling technologies. We are pleased to report that, among the conclusions, consensus was reached on the need to develop common procedures to test the efficiency of MAC systems and components, also on the need to include cooling-system energy consumption in standard fuel economy tests.

Another important finding was that, ultimately, policies to raise consumer awareness must be shaped to help end-users choose more efficient products and to advise drivers on the best way to use mobile cooling systems more efficiently. The IEA intends to use the results from this and future related workshops to make some solid recommendations to its member countries on new policies to encourage energy efficiency in transportation. In the meantime, the European Commission's 2006 Energy Efficiency Action Plan has included an ambition to work towards minimum efficiency requirements for automobile air-conditioning systems in the timeframe of 2007-2008.

An illuminating book

The IEA publication *Light's Labour's Lost: Policies for Energy Efficient Lighting*, (http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1695) was released in 2006. This sharp focus on energy efficiency in keeping the lights on established the first global estimates of how much energy is used by lighting in vehicles. Although the amount of light produced by vehicles is not very significant compared with that produced by indoor and stationary outdoor lighting, the efficiency of the lighting

[1] Following up to previous EU commitments as the directive 2001/43EC (mentioned possibility of a regulation on RR) and the second European Climate Change Programme (ECCP2).

process is far lower in vehicles, due to significant losses in the engine and alternator. As a result, use of energy on-board vehicles for lighting accounts for a surprisingly high share of global oil demand: 1.4%. This is equivalent to 1.1 million barrels of oil a day and leads to the emission of over 140 $MtCO_2$ per year. Furthermore, energy use for vehicle lighting is rising, due to three sorts of upward pressure. First, the global vehicle fleet is set to grow by roughly 75% up to 2030, from 1044 million vehicles in 2005. Second, the number and power of lights per vehicle is increasing. Third, many countries are introducing legislation requiring headlamps to be on during the daytime in response to safety data which has shown that a significant proportion of head-on collisions can be avoided by making vehicles more visible in the daytime. Depending on the choices made regarding the way this legislation is implemented, and on the efficiency of the lighting technology used, global vehicle lighting-related fuel demand could rise spectacularly to 2.5 times today's levels, or, under more favourable conditions, it could fall to 40% of today's levels. This shows just how much can be done by encouraging the adoption of energy-efficient choices.

The road ahead

Can the energy efficiency of other automobile components be measured and improved? This was the topic of another workshop organised jointly in June 2006 by the United Nations Environment Progamme (UNEP) and IEA on *Energy Efficiency Through Better Car Components*, http://www.iea.org/Textbase/work/workshopdetail.asp?WS_ID=257. A special focus was placed on developing countries, where the issues are more acute because of lower levels of efficiency in new car component, also because of the much faster pace of growth in vehicle ownership. Delegates from India and China presented the particular cases of their countries.

It emerged clearly from this event that much remains to be done to bring all these end-uses into the light and to provide the appropriate information and incentives for more efficient choices to be adopted. That our workshops were so well attended, however, is a sure sign of keen interest in learning more and taking action to stem unproductive energy consumption in vehicles. We are very much encouraged to see that the international policy community has clearly become very aware of the opportunities available in this area and that there will be increasing activity to bridge the gaps left by current policy instruments and ensure that energy use by car components gets the focus it so badly needs.

More IEA workshops on car components will be organised in the future, for example further exploring vehicle lighting or focusing on driver feedback systems. The IEA will also pursue its investigations on all major components and do further follow-up on findings from past workshops. We are looking towards organising workshops in different parts of the world, including in developing countries, in co-operation with other organisations or countries. Our aim is to involve the maximum number of stakeholders in addressing what we must regard as one of today's truly global issues.