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Brief communications

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Prospects and current problems in the reduction of emission from automobile transport

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The contribution to atmospheric pollution by automobile transport, which amounts to 15–25% relative to the overall pollution, increases to 75–80% (with respect to CO) when pollution in cities is considered.

Real tests have shown that the limiting permissible concentrations have been exceeded by a factor of 7–16 with respect to components for which norms have been laid down in relation to automobile transport, the factor increasing to 20–50 with respect to the overall emissions subject to norms let alone the presence of indirectly normalised and non-normalised components (lead and sulphur compounds, aldehydes, etc.) as well as the "background" (inadequate purification of water, contamination of food products). A similar situation is characteristic of at least 116 cities in the USSR. The possible measures for the planned reduction of emissions from transport, in Moscow for example, could actually prove ineffective because of the growth of the transport fleet and its long renewal cycle (up to 20 years).

The USSR tends to adopt the normalisation level established by the EEC and UNO rules, although the majority of the European countries are going over to the stricter U.S. norms. However, even the EEC and UNO norms presupposes the use of only non-ethylated (unleaded) petrol as the fuel and hence the catalytic purification of spent gases. In our country, the presence of norms for automobiles with catalytic converters (production for export with imported converters) is combined with "milder" norms for automobiles without converters (for internal use). Such "dual" normalisation reflects the situation in which there is a lack of material means for the fulfilment of stricter norms. Thus acording to EEC estimates, the changeover by 1991 to non-ethylated fuels will require 2.7–3.5 billion dollars in capital investment. One must recognise that, as a result, there has been no reduction in automobile transport emission in our cities. Therefore in the general prospective programme for the reduction of emissions from means of transportation, it is essential to concentrate on the rapid improvement of the ecological situation in cities.

The problem of developing promising means of transportation with improved economic parameters includes the search for ecologically acceptable energy carriers. The most promising of these (hydrogen) cannot be regarded as an "ecologically clean" fuel because of the formation, on its combustion in air, of NO and the thermal pollution common to all energy consuming devices. A real effect can be achieved even at the present time by using liquified and compressed gaseous fuels.

The use of gaseous fuels in engines with a homogeneous mixture makes it possible to go over to the combustion of leaner mixtures, taking into account the effect of the diffusional enrichment of the flame front in the lighter component. In diesel engines, the use of gaseous fuel involves the solution of the problem of the reliable ignition of the gaseous fuel stream.

The most effective and realistic procedure is the employment of soot filters in diesel engines and of controlled catalytic converters in petrol engines. However, such converters require an oxygen sensor, an electronic system for the control of fuel injection, and the use of a fuel without a lead antiknock agent. The same measures can be taken in the solution of urgent ecological problems in cities, including Moscow. Here one can assume that purely technical problems are not of decisive importance. In the first place, it is essential to solve the following main problems:

The specification of norms for harmful emissions by legal organs with an expert assessment by an independent competent organisation (the USSR Academy of Sciences) instead of normalisation by what is in fact a government department.

The establishment of the magnitude of fines on the grounds that it is preferable to finance nature-protecting measures rather than pay for the pollution of the atmosphere under conditions where industrial undertakings are economically truly independent.

Transition from financing the research programmes set up by the researchers themselves to the creation of a scientific-industrial association with target financing and the rights of the director (or general constructor) concerning its utilisation.

A combined approach to decreasing the contamination of a city with gases, the reconstruction of the network of highways, and the development of green zones and plantations (including for this purpose financial means received from the increased expenditure on transport).

Thus the current task of reducing sharply the level of contamination of cities by gases is organisational rather than technical in character, which should be taken into account in the development of an ecological programme.