ABSTRACT:

In a frame where the preoccupation by the environment and sustainability is growing, the introduction of more sustainable power sources in the urban transport becomes inescapable. In Barcelona, a first test with buses driven with Natural Gas was made between 1995 and 1996. As a result of which Transports Metropolitans de Barcelona, SA has recently incorporated to the their fleet 70 vehicles driven with this power source.

The objective of the present work is the one to present the results obtained in the process of evaluation of the introduction of these first 70 Natural Gas buses in the TMB fleet. This evaluation has consisted mainly of the elaboration of a power and environmental balance, the accomplishment of one double campaign of surveys to drivers and users, and the accomplishment of the corresponding economic balance of the experience. All this in relation to the buses diesel of TMB of similar characteristics.

In order to complete this evaluation, and to locate the experience in the present context of the sustainability in Catalonia and Europe, it have been previously analysed: the relationship among transports, energy and environment in detail, studying the power consumption and the environmental impacts of the transport; the European framework of the sustainable development of the transports; the alternative energies and their perspective of future; the operation of the technology of the Natural Gas buses, detailing to its different forms of use and the necessary infrastructure; the state of its implantation to the world and Spain: a series of experiences made in other European cities.

The present tendency of growth of the power consumption and the emissions of CO\textsubscript{2} due to the transport in Europe, an annual 2%, is one of the main environmental problems of the European Union, that conscious of this problem, impels in its political actions the bet by sustainable mobility and the introduction of alternative energies. This bet is shown in the White Paper of Transport “The European policy of transport facing the 2010: Time to decide” and Green Paper of Energy “Towards an European strategy of security of the power provision”, in agreement with the objectives of the Protocol of Kyoto (8% of reduction of the CO\textsubscript{2} emissions in period 2008-2012, with relation to the value of 1990). The EU’s objective is to arrive at a quota of 20% of alternative energies in 2020.

After the analysis of the different alternative energies one reaches the conclusion that Compress Natural Gas (CNG) is call to be to in short-medium term the main alternative energy, since although of a fossil fuel, has relatively low emissions and exist reserves sufficient to supply to the future demand. The fuel battery, cradle in the technology of Hydrogen, is an option to long term, since still it is a technology to develop. In effect, the technology relative to the use of the Natural Gas as a source of propulsion of vehicles is developed enough, as it demonstrates the level of implantation in countries like Argentina, the United States and France, among others.

Finally, from the evaluation of the implantation of the 70 buses in the TMB fleet, the following main conclusions are come off:

- The power disadvantage on which it counts the CNG in relation to the diesel oil (30% of over consumption in kWh), is compensated by the reduction in the emissions of polluting agents (surroundings to a 90%).
- As much the group of conductors as the one of users very positively values the introduction of this type of vehicles, valuing the environmental improvement that supposes and its level of comfort (smaller vibrations and noises).
- The introduction of the CNG takes associate to an important economic cost at the moment of its implantation, that can act like brake in the implantation of this...
system. This over cost is compensated partly by the later reduction of the operation costs. This compensation is still greater if the saving in social costs derived from the reduction of emissions is considered.

These considerations do that the implantation and the development of the CNG like a propulsion system, that provides to the society great environmental benefits and an improvement of the quality of life, need a real political will and a favourable legal framework to the use of these new energies (by means of subventions or reductions of taxes), thus making the reduction possible of this over cost of initial investment.