

## From the guest editors

Transport in general, especially road transport is a significant sector of energy consumption. This sector completely depends on oil supply, *i. e.* supply of oil derivatives and is at the same time the key source for greenhouse gas emission. In the last year transport has faced the problem of rapid increase of oil prices on the world market.

Mobility requirements are rising in the world and lead to an increase in the vehicle number and fuel consumption. At the same time, the fact that oil is a non-renewable energy source and that oil sources are concentrated in several regions in the world has lead to examination of possibilities for secure supply in the future, decrease of import dependence and reducing environment pollution.

Existing conventional fuels (gasoline and diesel fuel) have developed and improved for about a hundred years and have attained enviable quality. Conventional fuels are still being improved in parallel with improvement of new engine technologies in accordance with current requirements. The engine industry has developed at the same time as fuel development, with requirements focused on reduction of fuel consumption, emission reduction, and maximal utilization of renewable energy sources.

In general, alternative fuel for combustion engines can be divided into two groups: biofuels and gaseous fuels. Biofuels are fuels that can be produced from renewable raw materials and in general they have a positive effect on environment protection, *i. e.* reduction of CO<sub>2</sub> emission. Biodfuel development programs have defined first and second generation biofuels. Biofuels of the first generation include bioethanol, biodiesel, biogas and bio-ETBE. They are produced by already developed technologies and are being improved at the same time. Use of biofuel from lignocellulosic materials and also synthetic fuel is planned for obtaining second generation biofuel. Liquefied petroleum gas, liquefied natural gas, gas to liquid, compressed natural gas, and hydrogen can be examined as alternative gaseous fuels for combustion engines. Possible applications of alternative fuels are the subject of a large number of studies in the world. They deal with WTW (well-to-wheels) analysis of the application of alternative fuels from the energy and environmental aspects of production and utilization of alternative fuels from the energy and environmental aspects of production and utilization of alternative fuels. This analysis can include analysis of the vehicle itself – WTT (well-to-tank) or utilization analysis of the vehicle – TTW (tank-to wheels).

Engine and vehicle manufacturers have also defined future activities and defined research routes:

- improvement of conventional petroleum fuels (gasoline and diesel fuel),
- optimization of gasoline and diesel combustion engines, development of new, more efficient and low emission combustion regimes,
- engine optimization for alternative fuels (liquid and gaseous),
- reduction of fuel consumption,
- reduction of exhaust emission,
- development of hybrid concepts, and
- development of hydrogen fuel cell technology or battery electric technology.

All activities linked with fuel and engine development are directed to fulfilling criterion 3A: accessibility, availability, and acceptability.

This issue of the journal Thermal Science is completely devoted to worldwide research of combustion engines from different viewpoints – modeling, experimental research, and possible use of alternative fuels. The internal combustion engines as thermal machines take the important part in total energy consumption and that is the reason for preparation of the special issue. At the same time, during preparation of this issue great interest was expressed for publication of papers on this subject in Thermal Science, so we hope that some of the following issues will also be devoted to this subject.

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The guest editors would like to take the opportunity to express gratitude to all authors and reviewers involved in preparation of this issue and at the same time deep appreciation of Prof. Sim-eon Oka, editor-in-chief for creating the possibility of publishing papers on specific subjects.

Guest editors of this Special issue  
Assoc. Prof. Dragoslava Stojiljković, Ph. D  
Prof. Stojan Petrović, Ph. D  
Faculty of Mechanical Engineering  
University of Belgrade,  
Belgrade, Serbia