

*Keynote*

## **NEW CHALLENGES IN COMBUSTION FOR POWER GENERATION**

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The evolution of the intensive use of energy has afforded the most developed countries the opportunity to reach their current economic and social levels. Such exponential growth has disturbed the equilibrium of the ecosystem sufficiently to draw attention to the environmental problems arising from human activity - combustion in particular. Today there is a new awareness of the dangers arising from uncontrolled combustion processes and of the need to strike the difficult balance between social welfare and environmental protection. Such a compromise is relatively more difficult to attain in developing countries where the demand for social and economic progress is more pronounced. A continuous loop of analysis and technology improvement has led to the identification of many causes of environmental risk to human health. In parallel, more stringent regulations have been activated.

Traditional issues around toxic substances as NO<sub>x</sub>, HCl, SO<sub>x</sub>, Dioxin, Furans, TOC are supplemented by emerging problems due to PAH, ultra-fine particulate and heavy metals. At the same time, global warming has highlighted the issue of the environmental sustainability of combustion processes. Whilst at first sight these two concepts seem to be related to each other in that both concern the impact of gaseous emissions, they are completely different. Often the difference between them is not clear to the community and this enables general opinion to be manipulated by unscrupulous ideological and political propaganda. What is required is an integrated global approach to the problem and very long strategic time horizons.

The responsibility for emissions is often not localized at the precise geographical source of a pollutant, even when the effects are extremely long term. Studies of the medium and long-term availability of fossil energy resources have further complicated the framework by ramping up the contribution of lower quality organic matrices, in terms of energy. The solution doesn't come directly from combustion process improvements, but very often, from the development of different processes requiring a non-conventional approach.

From Kyoto to now, numerous targets have been reached but a final solution cannot be said to be at hand. Probably, the most important result achieved has been the strengthening of a sense of global responsibility, helped by the more diffused knowledge that this problem may be an important lever for economic development and global markets.

Combustion has various roles to play in the solution, some obvious such as renewable fuels, or increasing combustion efficiency, others less obvious. The balancing of these roles defines the challenge of a new prospective on Combustion in Power Generation.