FOREWORD

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Back in 1975, I was a young academic who, thanks to a fortunate mix-up, ended up accompanying a group of eminent figures as a member of the first delegation of French scientists to be officially welcomed to China. Mao Zedong still ruled over a country that was just beginning to open up. It was a fascinating trip during which, to illustrate the merits of traditional Chinese medicine, we were given a demonstration of surgery under acupuncture anesthesia. It was very impressive – a single needle was inserted in the foot of a male patient who continued to speak calmly as doctors sawed open his thorax. The window in the rudimentary operating room was opened between operations to let "pure" air in and let out microbes and miasma.

Reading this remarkable issue of the Veolia Institute's FACTS Reports, my memories of the event resurfaced because it illustrates the volatility of what we perceive to be "pure" air. This issue invites us to look afresh at the fundamentals of the quality of the air that we breathe, whether indoors or outdoors.

On the surface, what could be simpler than air? What could be easier to share? More essential and vital? Yet the truth is that air is varied and complex. Air is seen as so fundamentally elementary as to be of interest only to poets, not to chemists. This is far from the case. We should speak of "airs" not of air. In this, air is the same as water. Air is made singular and diverse by its impurities: molecular pollutants, microparticles, microbes, etc. Their sources are as numerous as their effects: polluted air dirties building façades, annoying city-dwellers who have to renew them often; it is harmful to health, causing the loss of countless days of life; and again, it is a form of air pollution that induces global warming.

We seek the causes: here, cars, diesel fuel, tire wear; elsewhere, methane produced by cows and rice paddies. We need solutions for everywhere we live and work, including cities, factories, aircraft, offices, fields, and garbage dumps. We also seek the culprits: all too quickly we point fingers at manufacturers that know the harm they cause in search of making a profit, at incompetent or complacent politicians who close their eyes out of self-interest or lust for power, and so on. But this is something that concerns every single one of us. We have to become more conscious of the problems and challenges associated with air quality. This is the subject of the first part of this issue.

Part two looks at several areas of research and explores possible solutions. Science is advancing. The digital era is here and massive data gathering using ever more powerful sensors gives us the ability to analyze problems that are increasingly complex, preventing us from applying solutions that are at once simple and universal. Biology has a role, too, because plants and microorganisms have considerable and as yet under-explored capacities for regeneration. Architecture too: suitably designed constructions are themselves instruments for prevention and improvement.

The last part of this issue looks at the future, discussing possible changes to standards and regulations, with a focus on public health, and how to spread and harmonize best practices at the global level.

Our future will be what we make of it. Air is one of the most fundamental global commons. It is so ubiquitous that all too often we take it for granted. This issue invites us to pay much closer attention to it – and not just in a superficial way. This core component of our environment raises countless problems that demand we address them head-on, individually as well as collectively, in an ongoing process to improve our knowledge, understanding, and actions.