

Lisbon Statement on Hydrogen and Clean Energies

- It is undeniable that the present accumulated amount of knowledge in Science and Technology can influence all aspects of human life and at the same time interferes with our *habitat*, giving rise to drastic consequences for human health and quality of life.
- The real danger for attaining irreversible climate changes, critical levels of pollution and certain disease thresholds are now clearly assumed by the main relevant institutions.
- The choice between healthy and harmful *habitats* is not a scientific issue but a cultural one. When critical natural human needs are threaten by technology development, then new cultural choices and roadmaps are demanded.
- Economical resources of the societies must be directed toward keeping human health at the best possible level. In this regard, the search for clean and friendly energy alternatives that mitigate warming and climate changes, must be successfully developed.
- The ever-increasing demand for energy coupled with dwindling fossil fuel resources, and the security of supply, make the establishment of a clean and sustainable energy system a compelling need.
- Hydrogen is a clean source of energy and does not contribute to the *greenhouse* effect, having the potential to replace the present fossil fuel resources.
- Hydrogen, as a new energy vector and strongly connected with other renewable energy resources, introduces the need to deepen the knowledge in the Energy domain.
- Furthermore, research in Hydrogen technology has reached a *status* of development already implemented at an experimental level in several countries.
- Traditional organization of most universities is still not suitable for a fruitful cross linking among the several areas of knowledge related with the field of Energy. A more efficient interaction between universities and energy based industries must be sought.
- Energy is in fact a priority area for teaching and research. Actually, Energy Engineering needs to be taught, starting at a graduation level and including several subjects which must not be imposed by pre-established corporative interests within university departments.
- Technological challenges regarding large-scale Hydrogen production from renewable sources, and efficiently storing Hydrogen on board fuel-cell electric vehicles, urgently demand for in-depth fundamental understanding.
- The appealing market for the electric vehicles driven by fuel-cells comes just in time when people, aware of climate changes, demand a reduction of emissions in compliance with post-Kyoto commitments.
- Even though from renewable origin, energy production contributes to carbon dioxide increase. So, there is a need to compute all the energetic costs taking into account efficiency and optimization.
- It is of vital importance identifying the basic factors needed to start an effective process to protect human life and culture from the environment threats originated by fossil fuel based energy resources. It is necessary to endorse a truly international action towards the implementation of Hydrogen as an effective energy vector.

Considering that “it is now too late to be pessimistic”, our proposals are:

- Governments should try to boost directly or indirectly the implementation of a Hydrogen based Economy.
- Governments should make efforts to balance their trend in decreasing carbon dioxide emissions with the implementation of effective technological and scientific programmes to promote the creation of a real Hydrogen based energy network.
- Governments should foster university graduation and post-graduation courses in the field of Energy and promote experimental research in the field. Taking into account the multidisciplinary characteristics of the subject, and the traditional organization of universities in distinct departments, it is strongly recommended the creation of autonomous Departments of Energy, which should

lead the above mentioned graduation and post-graduation *curricula* in interaction with the other traditional departments. This process is well inspired in what universities did in the recent past with the creation of some successful new departments, as for instance the Environment ones.

- The Governments policies regarding the implementation of the Hydrogen Economy should assure that in case it comes from hydrocarbon transformations giving rise to carbon dioxide emissions, these must be sequestered for further uses, or injected into the subsoil.
- Governments should prepare legislation in order to assure that fuel production raw materials and energy production devices must be taxed accordingly to the amount of produced carbon dioxide and other *greenhouse* gases; for example, computing the tax from the electric energy equivalent price, taking into

account the usual production in a thermoelectric power plant.

- These policies will significantly contribute to assure a trend to carbon-free energy technologies based on a vision of a truly competitive economy, enabling global development.
- Energy based industries and related technological research centres should be encouraged to work in collaboration with the new university Energy Departments already proposed.

Those who agree with the *Lisbon Statement for Hydrogen and Clean Energies* engage, in doing everything possible to contribute for dissemination of the ideas outlined in the present document.

This statement was written in Lisbon (Portugal), on the 13th May 2009, by **Carmen M. Rangel, César. A. Sequeira** and **Rui F. Lobo**, in the sequence of the International Conference on Hydrogen, HYPOTHESIS VIII, and will be available *on-line* in order to be signed by scientists, institutions and all those who, in good faith, decide to join it.