Cherno-shima, i.e., Italy and Nuclear Energy: for Every Accident, a Referendum

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As is widely known, the accident occurred at units 1, 2 and 3 of the Fukushima-Dai·ichi nuclear power plant. The accident, the largest for the nuclear industry since Chernobyl, reverberated around the World.

The differences between the two accidents are manifold, starting from the causes and up to the consequences. The Chernobyl reactor had been driven to a reactivity accident while carrying out an experiment; on the other hand, the reactors at Fukushima, all scrammed, suffered an incredibly-lasting-in-time complete lack of electrical power which prevented the actuation of emergency cooling functions beyond the grace period guaranteed by the passive systems. Concerning the consequences, the complete lack of a containment building for the Chernobyl reactor, let the destroyed core be poured out of the building, completely exposed to the environment, spreading fission products and actinides all around the globe through the stratosphere. On the other hand, the multiple barriers philosophy implemented at Fukushima allowed the core to be confined and separated from the environment, the main releases of radioactivity to the atmosphere were intentionally actuated by the plant operators according to accident management procedures. In this way the planned radioactive releases allowed the Japanese authorities to issue evacuation orders well in advance, minimizing the radiation exposure risks to the population.

Nevertheless, the two accidents have been associated, ignoring the differences in technology and context.

Actually the only and main similarity between the two cases lays in the great impact they had on public opinion, rather than in health or environmental issues, which for Fukushima are not expected to be on a global scale and are, anyway, far from being even comparable with those that followed the Chernobyl accident.

The first and more immediate consequence, mainly due to political rather than technical reasons, is a widespread reflection on the nuclear industry as a whole. In this sense, Italy is amongst the nations which will suffer the heaviest strokes of the Fukushima accident. As a matter of fact, the decision whether to go nuclear or not has been once more left to the people, with a popular referendum, and the Italian nuclear "renaissance", planned since 2008 with some preparatory laws, regulations and international agreements foreseeing the realization of plants for the production of nuclear energy, has been stopped by a moratorium. As in 1987, after the Chernobyl accident, the people were given the option of deciding on such a strategic matter as the electric power supply of a nation.

The urgency for an energy policy in Italy comes from the incompatibility between the present electricity source mix and the European requirements following the Kyoto Protocol: renewable sources already provide some 21% of the electricity demand, with a high penetration (15 and 1.5 out of 21%) of hydroelectric and geothermal, which are, however, almost saturated. Furthermore, the Italian electric energy portfolio (left frame of Figure 1) includes a 14% share representing the direct import from abroad, mainly produced by nuclear power plants in neighboring countries. The planned inclusion of nuclear energy for one fourth of the mix (right frame of Figure 1) would have reduced the fossil share by some 10 points (out of 65%) still guaranteeing the baseload supply, as well as replaced the imported share, thanks to homeland electricity generation.

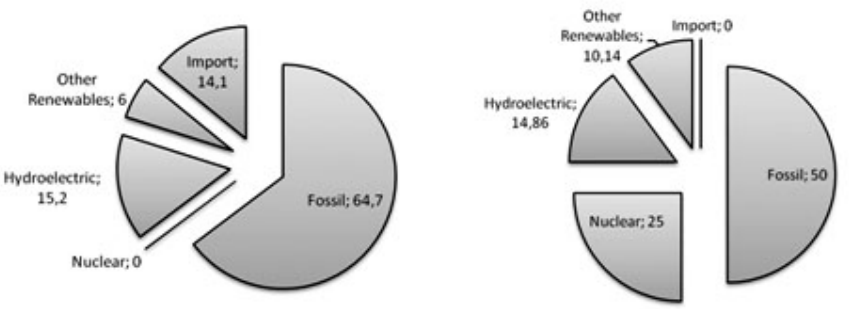

Figure 1
Present (left) and proposed (right) Italian electric energy mix

The Italian people, asked to vote on the nuclear policy of the Government, decided for the abrogation of the laws that would have paved the way to the nuclear renaissance. This decision, as already said, was heavily influenced by the Fukushima accident. After 15 years, this has been the first referendum ever to reach a quorum to get validity; also, public opinion, which immediately before the accident was not against the possibility of the nuclear option for the first time after Chernobyl, changed, and opposed the con-

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See footnote at end of text.

struction of new nuclear power plants for the fear of a "Cherno-shima" at home.[1]

As a consequence of the duration of the moratorium of at least 5 years, nuclear policy in Italy risks being indefinitely *decommissioned*. Among other issues, the ability to preserve, in the long term, the technical and scientific nuclear knowledge will become a central point for the future of nuclear energy in Italy in the years to come. It will require a strong intervention on universities and research agencies in order to allow them to continue the ongoing activities on innovative reactors, components and fuel cycle strategies which at present still maintain Italy among the main actors of nuclear research.

Besides the stoppage of the nuclear program, two important decisions remain as the only heritage of this aborted renaissance: the setting up of a new Nuclear Safety Agency and the commitment for a national repository for nuclear wastes, envisaged by European policies. The decision to organize and centralize the management of the existing wastes coming from the past opration of the plants as well as from industrial and medical applications, was indeed a central and urgent point still unsolved, that now explicitly appears in the Government agenda. Concerning the Agency, it will be another important opportunity for preserving a strong competence in the nuclear field. Among the roles charged to the Agency, will be the siting and licensing of the national repository.

The Italian case should become a useful example for every country involved or interested in nuclear energy. Allowing public opinion to influence or even determine national energy policy is a risk to the rationality of the decisions to be taken, subjugating to the lack of information and scientific culture in general the ability to plan a balanced energy mix.

In this sense, an important lesson can be actually learned from the Fukushima accident: the urgent need for a wide dissemination of a sound scientific culture amongst the population. This would allow people to be aware of the energy and environmental issues, perceiving the need for energy availability and getting acquainted with all the aspects of the different energy sources. A strong and deep scientific (and energy in particular) culture is the only key to have public opinion set on a rational rather than emotional basis.

The dissemination of a scientific culture requires, as its foundation, the unconditioned support of education, research and development. The consolidation of a strong *intelligentia* will represent the reference for maintaining and further developing competences to support policy makers and to distribute knowledge to the people.

Footnote

[1] It is important to recall that ENEL, the main Italian electric utility, already owns and operates nuclear power plants abroad, and in particular, 7 reactors (6 PWR and 1 BWR) in Spain through the controlled ENDESA and 4 VVER in Slovakia through the controlled Slovenské Elektrárne. It is also engaged in the construction of two reactors at Mochovce, in Slovakia; owns a share of the 2 EPRs under construction at Flamanville and planned at Penly in France, and is involved in the construction of the second unit at the Cernavoda nuclear power plant, in Romania.

Fukushima's Challenge *(continued from page 35)*

Footnotes

[1] Nuclear energy produces almost no carbon dioxide, and no sulfur dioxide or nitrogen oxides whatsoever. One gram of uranium yields about as much energy as a ton of coal or oil. Nuclear waste is correspondingly about a million times smaller than fossil fuel waste (to the factor of a million). Moreover, nuclear waste is to be deposited in deep geological storage sites, so it does not enter the biosphere.

[2] A 150 MW nuclear power plant ended its useful life in 2006 (Jose Cabrera), and another 480 MW nuclear plant is in the latency phase after completion of its decommissioning (Vandellós I).

References

CNE, National Energy Commission, http://www.cne.es
IEA, International Energy Agency, http://www.iea.org
European Commission (2001), Directive 2001/77/EC.
European Commission (1997), RES – E White Paper, COM, 599.
European Commission (2011), A roadmap for moving to competitive low carbon economy in 2050, COM, 112.
European Commission (2011), Energy Efficiency Plan- COM, 109.
OMEL, Electricity Market Operator, http://www.omel.es.
Royal Decree, 661/2007 in Boletín Oficial del Estado 178, 26/07/2007.