

*International Water Mist Conference , Czech Republic, November 3-4, 2010*

## **Fire Protection With Water Mist In Nuclear Power Plants**

Eng. Marco Pesaola  
Eusebi Impianti  
Via M.Natalucci, 6, 60131, Ancona  
+39.0712856622 / [mpesaola@eusebi-impianti.it](mailto:mpesaola@eusebi-impianti.it)

### **Introduction**

It appears that the world is resigned to a steady move towards nuclear energy as a solution to its energy problems – and, arguably, an eco-friendly one at that. Ironically, one of the most eco-friendly fire extinguishing solutions is increasingly being chosen for electricity-producing nuclear power stations – the watermist option.

One of Eusebi's inventions is the EI MIST watermist system, which operates at between 100 and 120 bar, producing droplets of water no larger than 100 microns in size.

In the last two years, has been noticed an upward trend in the uptake of watermist solutions for nuclear power stations – particularly from Russia and Kazakhstan, but also from east Europe.

That these countries are heavily investing in nuclear power is no secret.

Russia plans to double its output from nuclear energy by 2020, with exports being a major economic objective.

Although Chernobyl took the steam out of Russia's nuclear ambitions, since 2000 nuclear construction has revived with the Volgodonsk-1 and the Kalinin-3.

The aim today is to have almost half of Russia's electricity from nuclear and hydro by 2030, and there are 31 operating reactors totalling 21,743 MWe at the moment.

Today, eight more plants are under construction, 11 are planned for future construction, and there are proposals for a further 25 units.

Kazakhstan, on the other hand, has 15 per cent of the world's uranium resources, and it has a major plant making nuclear fuel pellets. It aims to sell value-added fuel rather than just uranium, and its goal is to supply 30 per cent of the world fuel fabrication market by 2015. Kazakhstan and Russia have three joint venture agreements for new nuclear reactors.

Watermist systems are a good solution for these types of applications for many reasons, two in particular.

Firstly, watermist solutions require small volumes of water in comparison to constant water and foam mix systems. "In the case of a fire the large volumes of water could potentially mix with radiation contaminants, which could then be spread outside the

e-mail: [eusebi@eusebi-impianti.it](mailto:eusebi@eusebi-impianti.it)  
[www.eusebigroup.com](http://www.eusebigroup.com)

facility by the water. But in the case of watermist, only a few litres of agent is discharged, so the contamination risk is much less.”

Secondly, nuclear plants are not small. “It is not easy to supply a sprinkler system with water from a kilometre away. And with systems like that it is easy to lose high pressure in the piping.”

Although no official standard exists for watermist systems and nuclear plants (outside the generic NFPA 750, Standard on Watermist Fire Protection Systems), Eusebi Impianti has carried out several tests in Russia and Kazakhstan to prove the effectiveness of the watermist option. “And the word is spreading rapidly because there are a limited number of companies that have the right technology and know-how to build such plants”.

Quite many projects have been carried out so far in the area, and there are many more planned for the future. Interestingly, some are retrofit projects in facilities that are between 20 and 30 years old. “There are savings to be made by changing over to watermist. For one, the stainless steel pipes used by our system do not need replacing after 30 years. Additionally, a watermist pumping system can be installed in a room that’s no more than four by five metres square, and maintenance is much easier when the extinguishing agent is water and not foam or powder.”

Nuclear installations need a higher engineering task due to seismic and safety aspects that systems and components have to fulfil in order to meet the whole nuclear concept. This implies that the water mist system has to be designed in accordance to local Nuclear Authority Requirements, therefore systems are quite different from the ones used in industrial applications.

Enormous amount of tests, and relevant certificates dossier, have to be performed .

In conclusion, a High pressure water mist system allows several benefits with regards to conventional FF systems: further developments by the technical committees of CEN/TC 191 WG3 (EN 14972) are expected in the new revision of EN TS 14972