EuroSciCon

Annual Summit on
Renewable & Sustainable Energy

August 13-14, 2018
Paris, France

I Khamis et al., Trends in Green chem 2018, Volume: 4
DOI: 10.21767/2471-9889-C1-008

NUCLEAR COGENERATION: A VIABLE OPTION TO ENHANCE GLOBAL SUSTAINABILITY

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The use of nuclear power for cogeneration of heat and power is a well proven technology with over 750 reactor year of operation in different applications. These nuclear cogeneration projects serve towards achieving sustainable development by contributing to cover part of the continuously growing energy demands worldwide for industrial processes, transportation, industry, residential applications, along with many other sectors. In addition, three main elements of sustainability are reserved and saved through nuclear cogeneration, these are: energy, environment, and cost. The recovery of waste heat and wider utilization of nuclear power results in the 'save energy' element. The accompanied reduction in nuclear power rejected heat and CO_2 emissions leading to the 'save environment' aspect. Simple calculations show that if only one quarter of the rejected heat of current nuclear power plants worldwide is recovered for desalination and district heating applications, this would result in annual reduction of around 1–2 million tonnes of CO_2. The implementation of nuclear cogeneration projects proved to be a feasible option, considering the applicability of applying retrofitting to currently operating and current design nuclear reactors, especially for desalination and district heating applications, which have been operating in several countries worldwide for over more than three decades. In addition, most of future designs of advanced reactors already consider the use of high temperature heat for non-electric applications. The value added of nuclear cogeneration projects are seen in two levels, for public: drinking water, and residential district heating and cooling, and for industrial use: heat and steam process, synthetic fuels, as well as hydrogen. This paper highlights the main promising and currently operating nuclear cogeneration technologies and their added value and benefits on operational, economic, social, and environmental facets. In addition, the IAEA activities and available tools to support member states pursing the use of nuclear energy for non-electric applications are introduced and discussed.

Biography

I Khamis has received his MSc (1986) and PhD (1988) in Nuclear Engineering from the University of Arizona, Tucson, Arizona, USA. Currently, he is the Project Manager of the Non-electric applications of nuclear energy at International Atomic Energy Agency (IAEA), Section of Nuclear Power Technology Development. His duties involve the non-electric applications of Nuclear energy including Nuclear Seawater Desalination, Hydrogen Production, District Heating and other industrial Applications. He has authored and co-authored more than 150 refereed journal and conference papers, book chapters, and technical reports. His main interest includes non-electric applications of nuclear energy, simulation and tools development, and nuclear reactor engineering.

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