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Analyzing Small Nuclear Power Reactors

https://marketpublishers.com/r/A0254675E54EN.html
Date: February 2012
Pages: 170
Price: US$ 325.00 (Single User License)
ID: A0254675E54EN

Abstracts

The global energy jigsaw is constantly and increasingly being rearranged with the nuclear power supply. Nuclear power is increasingly presenting an alternative to become the mainstay of energy needs for the new society till the time developments are further underway for cleaner energy sources. The harnessing of this energy would not have been possible without the inventing effort of Le? Szil?rd in 1933. This was further presented in application in the Chicago Pile 1 which went critical on Dec 2, 1942. Thereby the first nuclear reactor was born. Therefore as a train cannot be in motion without its engine, nuclear energy needs reactor technology to constant progress in order to achieve global energy needs.

Historically, it was a general opinion that the bigger a reactor the better the energy yield. Though, the thumb rule remains in effect the changing geo political forces have ensured that new qualifiers ne added to this equation as efficiency, adaptability, control and scalability. This has led the scientific community to pursue a different direction of whether small can also be beautiful and as efficient as the big one? Thereby is it possible to answer this question by more small reactors geographically spread in a grid rather than depending on a big one with bigger environmental concerns as also allowing independent mobile application.

Aruvian’s R’search’s report on Analyzing Small Nuclear Power reactors is a comprehensive evaluation of this future defining scenario as under:

a) Historical summary of nuclear reactors beginning from 1930 and further powered into the industrial era by the military civil axis.

b) Theoretical basics of how reactor technology which helps a kg of U235 generates 3 million times more energy than a kg of coal.

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c) Analysis of the important reactor components as the core and the vessel and classification of reactors as the Light Water, Graphite, Gas Cooled Thermal, Heavy Water, Liquid Metal & Molten Salt reactors.

d) Global emplacement of reactors as per their classification.

e) The case for small reactors wherein the IAEA has studied a possible high case of at least 93 new placements by 2030 or at least 43 in a low case without any being in the USA.

f) An observation on the Indian and Chinese effort to develop more reactors in the range of 220 MWe & upwards.

g) Tabulation of the global medium and small reactor emplacements.

h) Need for cost competitiveness of small reactors on per watt cost basis and operational approach needed to achieve such advantages.

i) Benefits associated with small reactors.

j) Tabulation of characteristics of small nuclear power reactors & explanation on the various types by coolant used as LWR’s, SMART, Gas cooled, MHTGR, Liquid Metal, Molten Salt.

k) Challenges for small reactor technology to overcome

l) Market oriented early mover approach modifications needed on part of developed nations as the US to garner chunks in the $ 6 trillion global energy market.

m) Overview on issues facing small reactor tech as Safety, Cost, technology, funding etc.

n) Special section on Small LWR including its global commerce and some products offered by respective countries as the AP1000, Babcock and Wilcox MPower, NuScale MASLWR, VVER-1000, VVER-1200, AREVA EPR etc.

o) The design, fuel process used in LWR’s along with the various types as LWR’s as the ABV, CAREM, IRIS, KLT-40S,mPower,MRX,

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NHR-200,NP-300,NuScale,RITM200, SMART,TRIGA, VBER-150, VBER-300,VK-300, VKT-12 etc.

p) Analysis of 9 types of HTGR

q) LMCFN reactors with the role of Mercury, Na & NaK, and Lead as coolants & 12 types of such reactors explained.

r) Comprehensive section on Molten Salt reactors, its issues, advantages and explanation on salt selection decisions as also comparison to LWR's.

s) Comprehensive Corporate, Business, Financial, SWOT analysis for 7 major players & profiles for 11 other player in this industry.

Aruvian's R'search's report on Analyzing Small Nuclear Power Reactors is a detailed observation on this industry which is aimed at assisting investors, analysts and commercial interests gain insights for decision making. In a world driven by science and technology where the buzzword is Nano, it is imperative to understand the full potential of applying the same to Nuclear reactors in relation to their present sizes. The future of the planet is riding on what steps are taken by the present generation and thereby places a responsibility on humanity to achieve solutions for needs in consonance with the planet.

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