

Leadership, Sustainability and Clean Nuclear Technology

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Many issues face nuclear plants today, from financing, cost, licensing, designs and construction in a globally fragmented energy marketplace, to associated international proliferation, security of energy supply, climate change and national pride issues. Despite the

hurdles, costs and glacial timeframes, many owners and operators are successfully extending the life of the old and also committing to the process of building new plants. In countries unfettered by endless legal and societal wrangling, and now freeing themselves of energy and economic poverty, demand is expected to grow manyfold, while the “developed economies” largely stagnate or at best hold their own.

One issue should not go unnoticed: all current and under-construction reactors are based on an unsustainable once-through fuel cycle, which is incomplete. Not only is the resource unequally (even inequitably) spread around the world’s geology, there is a major mismatch between the resource location versus the world population and energy growth. This once-through use of a valuable resource would not be an issue except it is not in touch either with energy needs or with modern times. Nowadays, the social norm in any civilized town or debate is recycling, selective separations, renewable portfolios, waste to energy, emissions reductions, and waste stream reduction. The touchstone is “renewable,” so much so that hugely preferential energy rates and tariffs are gifted to those schemes that can claim sustainable renewability, namely wind and solar power. In the U.S.A., the situation is even more acute, with the failure of Yucca Mountain to attain social acceptance and/or political closure, despite theoretically being already full. What is clearly needed is new leadership in a successful direction.

The sustainability issues are: (a) finite resources ultimately affecting price; (b) finite energy content that is not being replaced; and (c) lack of other resources in the places that need it. With non-proliferation concerns about enrichment,⁵ no one trusts anyone to supply, provide or guarantee what may not exist readily or cheaply after the middle of the century anyway. There is no guaranteed 60-year fuel cycle.

Endless debate in the U.S.A. has been whether to pursue a “closed” or “alternate” fuel cycle; a Blue Ribbon Panel

will consider the options on what to do with the “waste.” This has always hinged on two factors⁶: the technical and the cost comparison of geologic disposal versus alternatives, like recycling or other fuel cycles. But this misses the point: the cycle has to be sustainable globally, and not just for the U.S.A. If we are prepared to foot the bill of increased cost for energy from renewable and sustainable resources, why would we not also foot the bill for an endless supply of nuclear fuel, that is used, recycled and bred forever in advanced reactor designs. Hopefully, the new DOE R&D effort on advanced concepts, and Advanced Research Projects Agency-Energy “clean energy technology” will now address this as integral with the Blue Ribbon Panel “waste” issue: it could sustain us forever not only in debate but hopefully also in energy. Everywhere. ■

References

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