UxC Special Report **April 2008**

Nuclear Reactor Technology Assessments

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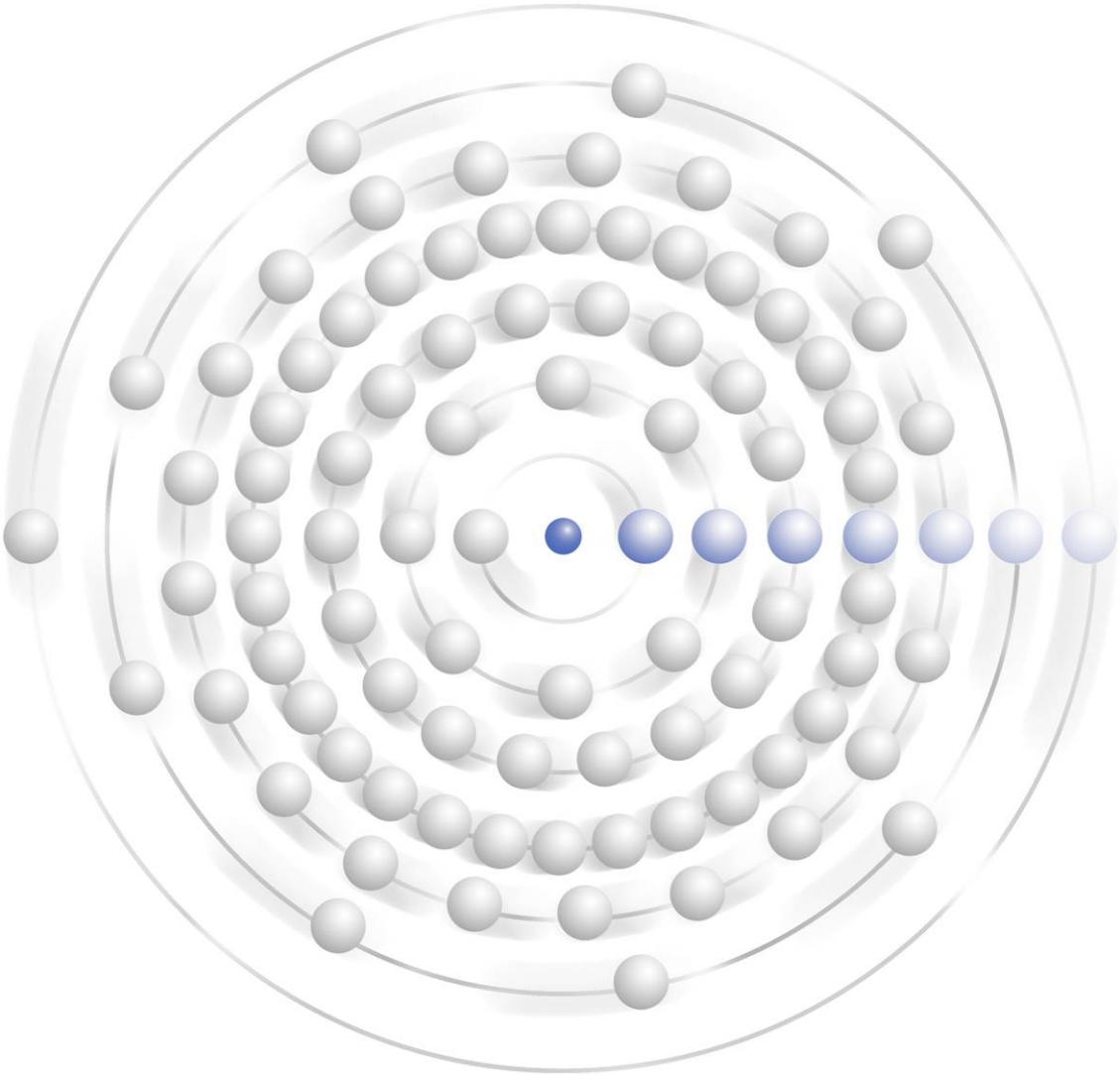

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1 – Introduction

The Ux Consulting Company (UxC) has prepared this special report in order to provide nuclear reactor technology assessments and overall evaluations of the major reactor designs currently available in the world. Our evaluations are based on a number of crucial factors, but the major focus is the technical pros and cons of each of the reactor designs themselves. Additional considerations, such as economic factors and regulatory licensing issues are also evaluated, providing for a comprehensive assessment of the reactor designs. As a third-party, unbiased observer of the reactor technology market, UxC's analysis should be viewed as completely impartial and based on our expert technical and commercial knowledge within the nuclear industry. As the saying goes, we have no dogs in this fight.

The decision on which reactor design to pursue is an extremely important one and must be based on many factors, such as the robustness of the technology, the constructability of the plant, the plant economics – both initial and operating, the type of fuel used, the ability to license and regulate, among a variety of other considerations. This special report's main objective is to provide technical, economic and other commercial assessments of the leading light water reactor (LWR) and heavy water reactor (HWR) designs as well as some of the more advanced reactor concepts, such as pebble-bed modular reactors (PBMR), high temperature reactors (HTR) and fast breeder reactors (FBR). Each reactor technology is discussed both on an individual level as well as through a comparative matrix of pros and cons. Additional thoughts on what issues to consider when choosing a reactor design in the context of specific energy or commercial situations are also provided.

As this report presents an overview of all the leading reactor technologies, it is not intended to focus on every possible detail related to each of the designs. Still, through UxC's analysis, the reader should be able to obtain a reasonably complete understanding of the positive and negative characteristics of each of the designs under discussion. However, given the broad scope and nature of this current report project, it is simply not possible to analyze all of the specifics of each design. Therefore, for any entity that is seriously involved in developing a nuclear power plant, it may be highly advisable to consider follow-on analyses that take the four to six designs of most interest and delve much more deeply into all the issues surrounding the chosen reactor designs.

Ultimately, the analysis and conclusions included in this report are intended to provide an overall picture of the current status of reactor technology and a roadmap for how best to evaluate each of the available designs.

Why Buy this Report

We believe there are likely numerous potential uses for the information contained in this study. Some logical examples include:

- For any nation considering a commercial nuclear power program, these assessments should help in evaluating the global offering of different reactors.
- For an electric power utility looking to develop a nuclear power plant, the decision of to choose the best fitting reactor design is paramount, and this study should help in that process.
- For those in the financial community considering investments within the nuclear power industry, these reactor assessments can offer crucial perspectives on which companies may be the winners in the global reactor race.
- For nuclear fuel and reactor service suppliers, the future direction of their industry sectors depends greatly on which technologies take the lead. The information in this study may be highly useful in developing appropriate market strategies.
- For government agencies and research organizations looking at the longer term potential of nuclear power, these reactor evaluations should help in providing thoughts on what technologies are best suited for the future.

Thus, we believe this report has broad appeal and can be adapted to a great number of specific uses. In addition, as discussed above, since this is a generalized overview of the majority of the major reactor technologies in the world today, this report may lead the reader to additional questions that had not been considered before.

Structure of Report

As described, this special report aims to provide UxC's technical and commercial analyses on the available nuclear reactor technology in the world. The report has the following structure:

In **Chapter 2 – Nuclear Reactor Overview** we examine some of the generic issues related to reactor technologies. This includes the evaluation of costs, the various design commonalities and specific technical characteristics that differentiate these reactors.

Chapter 3 – Individual Reactor Discussions offers detailed descriptions and analyses of each of the leading reactor designs. A total of ten individual commercial reactor designs as well as three types of advanced reactor technologies are discussed separately. The reactors are discussed based on their unique technological characteristics, economics, and regulatory status.

UxC next provides a comprehensive numerical rating for each of the reactor designs in **Chapter 4 – Reactor Comparisons: Pros & Cons**, which takes a comparative view of the different designs and presents UxC's overall ratings of each of them.

In **Chapter 5 – Additional Thoughts on Reactor Deployment**, we focus on some of the key parameters of the reactor designs that may impact their ability to be deployed by a country or company. Although UxC cannot divine the specific characteristics of each potential user of this information, the point of this chapter is to raise some key questions about each of the reactor designs when considering their deployment in a specific country or by a specific company.

Chapter 6 – Summary and Conclusions wraps up this report with some final thoughts on reactor assessments and ideas for next steps on detailed reactor analyses.

Some additional supporting evidence is also provided in the **Appendix** attached at the end of this report.

