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A "New Generation" of Nuclear Power Plants- Electric Utility Aspects

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A 50% increase in worldwide energy consumption in the next 20 years is anticipated, due to the global population growth and to higher standards of living. Meeting these energy demands with the fossil energy sources such as coal, gas and oil may lead to atmospheric accumulation of greenhouse gases, resulting in global warming of several degrees with catastrophic climatic consequences. Implementation of various energy conservation measures may bring only insignificant reduction in demand levels. Hopes that the renewable energy sources (such as hydroelectric, solar, wind power, biomass and geothermal) may supply the growth in the demand - are unrealistic. Only nuclear power (providing already 16% of world electricity) may meet all the energy demand growth with negligible greenhouse emission.

Therefore, a comeback of momentum in the worldwide construction of nuclear power plants is anticipated for the next decade.

Mechanisms for providing electric utilities with economic incentives of turning to nuclear power may include penalties such as "greenhouse tax" per kilowatt produced as well as various subsidy schemes provided by national and international bodies.

It is also anticipated that various government and national public information and education resources would be used in overcoming the present public fear and misunderstanding of nuclear power. This would permit utilities to concentrate efforts on fast construction and safe, reliable and cost-effective utilization of nuclear power plants.

We would like to address in our presentation various desirable features of possible future NPP designs. As an old Chinese proverb says - "It is difficult to predict, especially for the future". We suppose that the most probable candidates for "the 21 Century Reactor" will be in the range of design modifications of light water reactors (both of the pressurized and the boiling types), the pressurized heavy water reactor and the high temperature gas reactor. Relative merits of these designs will be discussed mainly in regard to various electric utility aspects.