**Introduction**

IRIS is a novel light water reactor with a modular, integral primary system configuration. The concept is being pursued by an international group of 20 organizations from nine countries. IRIS is designed to satisfy four key requirements: enhanced safety, improved economics, proliferation resistance and waste minimization. Its main features are: medium power (up to 335 MWe/module); a simplified compact design where the primary vessel houses steam generators, pressurizer and pumps; a novel, extremely effective safety approach; and, optimized maintenance with intervals of at least four years.

**Safety Approach**

IRIS philosophy is based on “Safety by Design”. Thanks to its integral configuration, in IRIS a variety of accidents are, by design (i.e., with no intervention of either active or passive systems), either eliminated or their consequences and/or probability of occurring are greatly reduced. In fact 88% of Class IV accidents (the ones with the possibility for radiation release) are either eliminated outright or downgraded. This provides a superb defense in depth which may allow IRIS to claim no need for an emergency response zone. Better safety means a simpler, more economical design; for example IRIS does not need an emergency core cooling injection system, because the design is such to guarantee core coverage under all design accidents. Simplified passive systems are featured for those few accidents not affected by the safety by design.

**Fuel Cycle**

The IRIS core is an evolutionary design initially based on conventional UO$_2$ fuel enriched to 4.95%. This fuel can be fabricated in existing facilities and is licensable to current requirements and limitations. Fuel assemblies are constructed in a 17x17 lattice, and include standard Westinghouse design features. The core contains 89 assemblies each with an active fuel height of 4.27m. Refueling intervals up to four years are possible. IRIS is designed to accommodate, without modification, a variety of core designs to keep up with technology advances.

Future core designs will include higher enriched UO$_2$ fuel and the capability to use MOX; both will deliver higher discharge burn-up and enhanced economics. In the MOX case, IRIS is a quite effective actinide burner.
The overall aim of any modular reactor system is to match the construction of generating capacity to a utility’s future power requirement. IRIS offers utilities this schedular flexibility, with construction time of each power module of two to three years.

IRIS is available in single modules or multiple units, which can be configured in a “park”. The basic block of the park is a twin unit which maximizes shared components. The units would be started up in sequence as major activities are completed, providing the utility with generating capacity in the shortest possible timeframe. The utility has the ability to initiate operation of a completed twin whilst construction of the subsequent twin proceeds in a “slide-along” manner. Shown below is a site arrangement of two twin units totalling 1340 MWe.

IRIS is designed to lengthen the interval between maintenance outages to at least 48 months, to match the capability of four years between refuelings. The reduction in the O&M cost versus current LWRs is projected to be of the order of 20% due to the increased capacity factor, reduced forced outages and reduction in staff personnel.

Two Twin-Unit Site Arrangement (1340 MWe)

The Integrated Solution

Key Contacts:
Dr. M.D. Carelli
Westinghouse Electric Company LLC
carellmd@westinghouse.com

Mr. K. Miller
British Nuclear Fuels plc
km10@bnfl.com