



## **Nuclear Institute - Position Statement**

### **SMALL MODULAR REACTORS**

#### **Position Summary**

**The Nuclear Institute supports the principle of Small Modular Reactors, which have the potential to provide safe and secure power to remote communities and developing nations based upon technology already well understood and demonstrated by UK industrial organisations.**

#### **Background**

Driven by its policy of adopting graphite moderated gas cooled the reactors the UK was forced to build large bespoke power reactors for electrical power generation. This has influenced subsequent thinking driven by economies of scale and the difficulty of identifying licensable new sites for new build power reactors. However the UK has a successful history of building and operating small modular reactors for submarine propulsion and has demonstrated the technology to build such a reactor in Barrow and transport it to a shore based location in Dounreay in the early 1980s. The Nuclear Institute is planning a seminar on Small Modular Reactors on 25 September 2014

#### **Discussion**

Advantages:

SMR have many advantages over large power reactors. These include:

- Low unit capital cost
- Low demands on local electricity distribution infrastructure
- Suitability for series production in a “factory” environment leading to economies from better productivity and multiple orders
- Lower potential release terms reducing worse case accident consequences
- Potential for inherently safe design using natural convection decay heat removal and use of partially buried containment to improve shielding and resilience to external hazard
- Potential for siting close to remote communities or industrial consumers reducing transmission costs and losses
- Ability to be “multiplied up” in a nuclear power park as demand grows.
- Greater flexibility to match nuclear capacity to demand by adjusting the number of reactors on load at any time.
- In theory SMR reactors can be removed from their operating site for maintenance and decommissioning provided appropriate transport arrangements are in place.

Disadvantages:

SMR do however have disadvantages:

- Overall they are unlikely to have either the thermal efficiency or the fuel efficiency of a large reactor with optimised secondary design and fuel zoning etc.
- They are likely to be more expensive per installed MWhr than large reactors
- They will have a larger demand for operators and maintainers
- There is not currently a commercial civilianised design available for GDA nor an obvious manufacturer ready to undertake design and construction



## Conclusion

In line with its non-partisan policy the NI is not entitled to comment on the purely commercial aspects of the SMR concept, however it is clear that there is potential for SMR technology to fill a void in the UK and wider world tapestry of civil power generation where large commercial reactors are inappropriate, could not be operated efficiently or represent too great a hazard for acceptable licensing. If a UK design could be developed and Intellectual Property accumulated, this could significantly enhance the UK's capability both at home and internationally. It would require a national focus to enable such a programme and government support. Advanced manufacturing capability could give the UK the "edge" should this happen. The UK is well placed to play a part in such development of SMR technology using organisations such as Rolls Royce, BAE Systems and the AMRC to develop civil designs based on military reactor experience. Small modular reactors lend themselves to series production and do not require the massive forgings and fabrications characteristic of large power reactors, they represent a great opportunity for established British businesses to compete with foreign suppliers based on the UK's long experience and demonstrated capabilities. The UK already holds many of the skills required to support a SMR programme but an expansion in this market would undoubtedly generate many more opportunities for British workers. Furthermore the UK has the potential in remote communities within the British Isles and the wider Crown possessions, such as the Falkland Islands, to utilise SMRs and gain experience prior to supporting a world-wide market for provision of reactor plant, technical support, material support, fuel services and training.