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Joint Standing Committee on Treaties  
PO Box 6021  
Parliament House  
Canberra ACT 2600

To the Committee Secretary,

Thank you for the opportunity to provide a submission to the examination of Australia's accession to the Generation IV Forum Framework Agreement. The Joint Standing Committee and more broadly the Australian Parliament is to be commended most highly for its work in involving the nation in this international effort.

Paragraph 22 of the National Interest Analysis touches on the specific technologies which ANSTO, our Implementing Agent, anticipates being involved with: Very High Temperature Reactor (VHTR) and Molten Salt Reactor (MSR). This is important because these reactor systems are expected to represent next generation industrial heat and power supplies without coolant-critical accident hazards as featured by conventional water-cooled reactor systems, or, even more importantly, the production of greenhouse gas emissions during operation.

A recognised world-leading precursor to the VHTR is the High Temperature Reactor Pebble-bed Module (HTR-PM) technology currently in the final stages of construction in Shidao Bay, Shandong, China.<sup>1</sup> The reactor will produce helium heated to 750°C, suitable for a range of industrial applications currently serviced exclusively by fossil fuels in Australia. If helium coolant flow is interrupted in an accident scenario, the design intrinsically lowers its own reactivity and shuts down.<sup>2</sup> Future VHTRs will feature this level of operational security, while supplying temperatures closer to 1000°C.

Similarly, the MSR, based on the successful Molten Salt Reactor Experiment operated at Oak Ridge National Laboratories in the 1960s,<sup>3</sup> will represent a compact and efficient source of heat in the 600°C to 700°C range. In 2015 a particular design was put forward in a submission to the South Australian Nuclear Fuel Cycle Royal Commission by Canadian vendor Terrestrial Energy.<sup>4</sup> Its Integral Molten Salt Reactor has entered into the Canadian licensing process, with the confident expectation of building and operating the first power plant in Ontario in the middle of the 2020s.

While Australia's electricity needs will increasingly be served by renewable sources, the Generation IV related nuclear technologies represent a potential

expansion of clean energy options which, in principle, will be available in the near future. However, only these deployable nuclear technologies can enable decarbonisation beyond electricity, by displacing conventional industrial heat sources.

A recommendation of the Royal Commission, endorsed by the South Australian government, was for the expert monitoring of emerging, economical reactor designs which might be viable in Australia.<sup>5</sup> The nation's accession to the Framework Agreement will compliment this effort and can be viewed as a confident first step. Among the many positive objectives of the Framework Agreement, an engagement of Australia's regulatory resources with those of Canada, China and other appropriate nations will serve to build expertise that should be vital when the time comes for Australia to take its next big step with regard to nuclear technology.

Once again, thank you for the opportunity to provide this brief submission.

Oscar Archer PhD

References:

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