Supplier Opportunities: Traveling Wave Reactor Program - Key Equipment Development

The following announcement provides a summary of select supplier opportunities related to development and commercial implementation of equipment to support TerraPower's Traveling Wave Reactor (TWR) Program. This is an initial list of opportunities and will be updated periodically. The opportunities below will be part of the development effort for the first-of-a-kind TWR300 (300-MWe) plant to be located in China. Multiple/separate supplier awards may form the supply chain; however, it is also possible that a single supplier may be able to provide a solution in multiple areas. A competitive selection process is envisioned with the goal to bring the best technical and value solution to the program. The initial contract work-scope will bring the subsystem or equipment design to 30% (Conceptual Design phase).

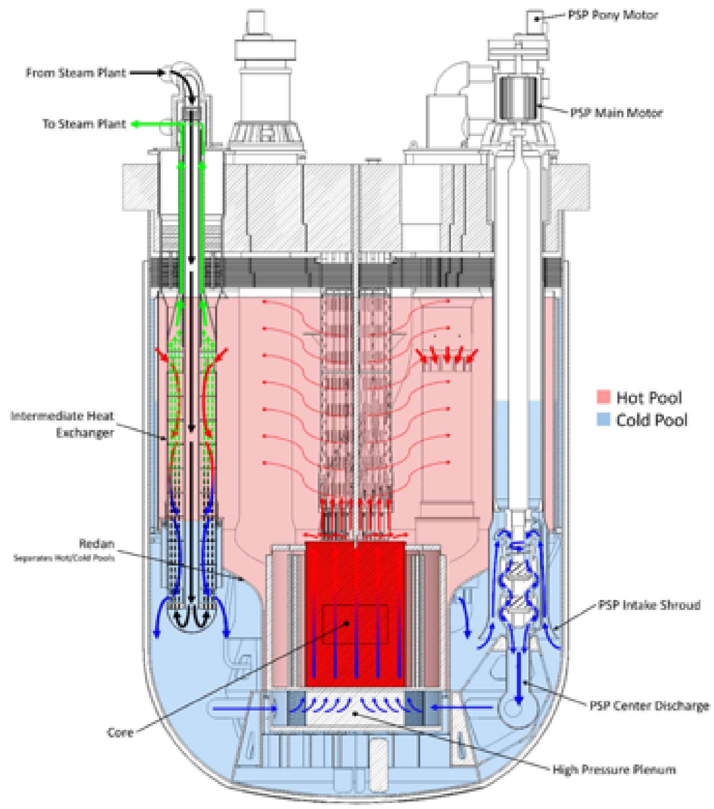
Quality requirements for the development of these components will be appropriate to the phase of work being conducted. However, final design and commercial production will invoke quality requirements applicable to the safety classification of the product; as such, work will need to be performed under a quality program consistent with nuclear reactor application in a plant constructed in China. Suppliers external to China will be required to obtain the needed authorizations to transfer the technology and deliver equipment; e.g., HAF604.

To be considered as a potential supplier for any opportunities listed below:

Please complete the registration form at http://www.terrapower.com/suppliers to share information about your company's capabilities with us.

Primary Sodium Pumps

This task will develop the primary sodium pumps (PSP) and related system interfaces. The PSPs (2 total) draw hot-pool liquid sodium through the intermediate heat exchangers into the cold-pool and circulate it through the core and return to the hot pool. The PSPs are large, mechanical centrifugal pumps. A single-stage pump is preferred, though the final arrangement will be determined after a pump supplier is identified and additional evaluations have been performed. The figure below illustrates the basic arrangement of the PSPs and primary flow loop orientation of the reactor. The configuration also requires a Pony Motor as an independent means to maintain pump flow at a minimal rate during reactor shutdown conditions.

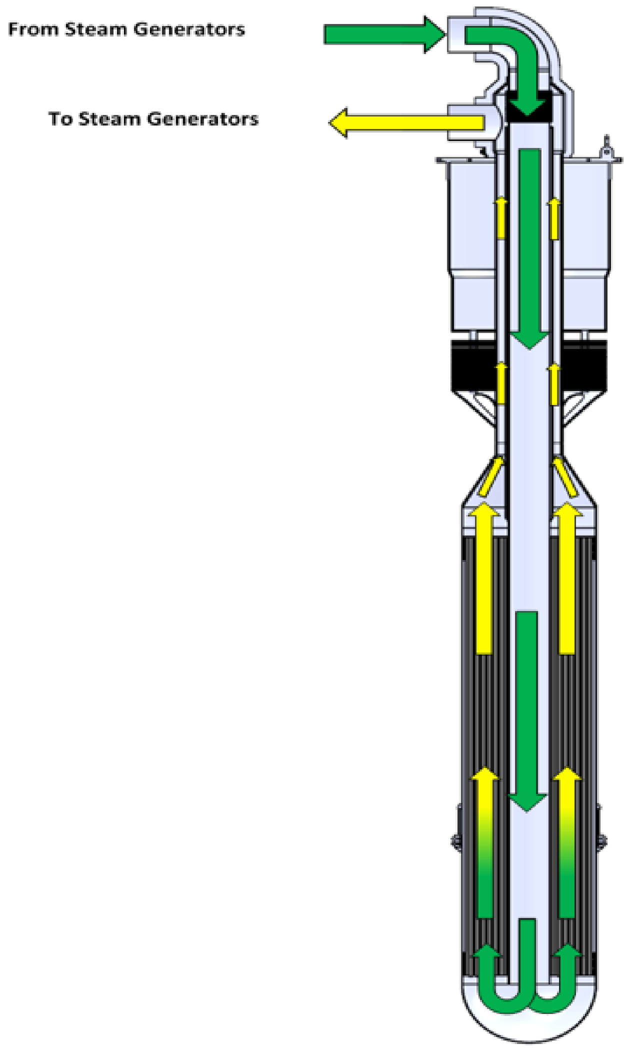


The large motor driving the pump is anticipated to require, in addition to a lubricating oil system, a motor cooling system. The pump coast-down characteristics following shutdown are of importance in terms of maintaining fuel cladding integrity during a loss of flow transient. Therefore, the Primary Sodium Pump is considered to be important for nuclear safety. Features of the pump structure will form a portion of the reactor coolant boundary; as such, will require design per ASME code (as applicable for high temperature sodium application).

Intermediate Heat Exchangers

This task will develop the Intermediate Heat Exchanger (IHX). The IHXs (4 total) are once-through, tube and shell type heat exchangers and transfer heat from the primary sodium to the Intermediate Sodium system loops. A cross-section of the IHX is shown below. The IHX's extend through, and are sealed to, the redan structure in the reactor vessel. Incoming cold leg IHTS flows downward through a downcomer from the top to the bottom bowl of the IHX. Once the fluid enters the bowl, it reverses direction and flows upward through the tubes where heat from the Primary Heat Transport System (PHTS) is transferred to the Intermediate Heat Transfer System (IHTS). Once the fluid reaches the top, it enters a conical reducer and then an annular pipe around the inlet. Both the inlet and outlet lines penetrate the head above the thermal shield. System cover gas pressure on the primary side will be 2.5 kPag (approx.); and cover gas pressure on the intermediate side will be 300 kPag (approx.).

The heat exchanger portion of each IHX is completely submerged in the reactor sodium pool. Since the shell is perforated, PHTS sodium flows freely into and out of it exposing the outside of the tubes to the pool. The portions of the IHX that separate primary sodium from intermediate sodium form a portion of the reactor coolant boundary.



Each IHX is nominally 2m diameter at the shell, 2.7m maximum diameter and 17.5m overall height. Flow into and out of the heat exchanger is coaxial with differential thermal expansion managed by bellows at the top of the central cold leg. The IHXs are expected to be fabricated from SS304H Austenitic Steel.