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P3.170 Enhanced tritium production in fusion-fission hybrids for the external consumption

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While the future fusion power reactors will consume and reproduce tritium for their operations, essential amounts of tritium will be required from external sources for their initial start-ups in the commissioning periods. Up-to-date evaluations of the start-up inventories are comparable with or even exceed the available commercial tritium resources in the world nuclear industry. At present the neutron rich fusion-fission hybrid systems with subcritical blankets are generally considered as possible producers of several products as nuclear fuel, energy and neutrons for waste burning. In this study, the hybrids were regarded as multifunctional systems including also a function of expanded tritium production. Some intrinsic properties and distinctive of such systems as nuclear performance variation in operation periods were remarked. It is shown that a surplus tritium of a few kilograms may be produced even in a relatively small of a DEMO scale fusion driven neutron source during 3-4 operation years that exceeds essentially the tritium inventory from a commercial CANDU type heavy water nuclear reactor. The assessments showed that a fusion – fission hybrid with changeable blankets and/or mobile blanket compositions, apart from the known nuclear-engineering feasibilities, can come up into place of an efficient tritium supplier in the developing fusion power industry.

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