

RTA TABLES

IAEA RTA 15 Key Elements Table
Must provide the rationale for weights (justification)

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| **#** | **Key Element** | **100%** | **Rationale for Weights (Percentage)** |
| **1** | Site Specific Considerations (7) |  |   |
| **2** | Grid Integration (6) |  |  |
| **3** | Nuclear Plant Safety (19) |  |  |
| **4** | Technical Characteristics and Performance (10) |  |  |
| **5** | Nuclear Fuel and Fuel Cycle Performance (14) |  |  |
| **6** | Radiation Protection |  |  |
| **7** | Environmental Impact (6) |  |  |
| **8** | Safeguards |  | All reactor designs implement the IAEA safeguards standards and requirements.  |
| **9** | Plant and Site Security |  |  |
| **10** | Owner's Scope of Supply | 0 |    Not included in the present Case Study |
| **11** | Supplier/Technology Holder Issues | 0 |
| **12** | Project Schedule Capability | 0 |
| **13** | Technology Transfer and Technical Support | 0 |
| **14** | Project Contracting Options | 0 |
| **15** | Economics | 0 |

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| **Key element: 1. Site specific considerations %** |
| ***Key topics*** | **%** | **Rationale for percentage** | **SMART** | **HTR-PM** | **NuScale** | **Rationale for****score** |
| **Ambient site environmental conditions and ecology** |  |  |  |  |  |  |
| **Heat sink temperature, condenser cooling water source** |  |  |  |  |  |  |
| **Magnitude and frequency of all external events** |  |  |  |  |  |  |
| **Site size requirements, population and environment** |  |  |  |  |  |  |
| **Transportation routes/facilities and access to required infrastructure** |  |  |  |  |  |  |
| **Site development and preparation requirements** |  |  |  |  |  |  |
| **Site structure plan; single- or multi-unit site requirements** |  |  |  |  |  |  |

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| **Key element: 2. Grid integration %** |
| ***Key topics*** | **%** | **Rationale for percentage** | **SMART** | **HTR-PM** | **NuScale** | **Rationale for** **score** |
| **Grid stability, size, existing and future capacity, plant connectivity** |  |  |  |  |  |  |
| **Plant operation under normal grid, disturbed grid and isolated grid conditions** |  |  |  |  |  |  |
| **Off-site power requirements for the plant** |  |  |  |  |  |  |
| **Ability to house load the power station** |  |  |  |  |  |  |
| **Grid code restrictions applicable to plant** |  |  |  |  |  |  |
| **Grid breaker switching capability under blackout transitions** |  |  |  |  |  |  |

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| **Key element: 3. Nuclear plant safety %** |
| ***Key topics*** | **%** | **Rationale for percentage** | **SMART** | **HTR-PM** | **NuScale** | **Rationale for** **score** |
| **Regulatory requirements in the Member State and the standards applied by the technology holder for the design** |  |  |  |  |  |  |
| **Regulations in the Member State on radiation and safety for nuclear power plant siting** |  |  |  |  |  |  |
| **Safety approach (e.g. fully active, fully passive, combination)** |  |  |  |  |  |  |
| **Defence in depth programme in design and multi-barrier approaches for operational transients and accidents, both with and without core damage** |  |  |  |  |  |  |
| **Degree of diversity and redundancy in providing the above key safety features** |  |  |  |  |  |  |
| **Spent fuel pool safety** |  |  |  |  |  |  |
| **Defence against external events** |  |  |  |  |  |  |
| **Severe accident releases and response** |  |  |  |  |  |  |
| **Safety equipment testing and surveillance requirements.** |  |  |  |  |  |  |
| **Classification of components and related quality requirements** |  |  |  |  |  |  |
| **Reliance on off-site power** |  |  |  |  |  |  |
| **Probabilistic safety assessment (PSA) scope, maturity and results** |  |  |  |  |  |  |
| **Safety margins against deterministic requirements** |  |  |  |  |  |  |
| **Plant control and protection logic architecture** |  |  |  |  |  |  |
| **Provisions to ensure a high level of safety** |  |  |  |  |  |  |
| **Due consideration of human factors engineering (including equipment accessibility post-accident)** |  |  |  |  |  |  |
| **Fuel and water supply for diesel generator, emergency feedwater and primary system make-up** |  |  |  |  |  |  |
| **Integration of technical specifications with safety analysis report (SAR) and PSA** |  |  |  |  |  |  |
| **Completeness of operating technical specifications (OTS), SAR and PSA** |  |  |  |  |  |  |

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| **Key element: 4. Technical characteristics and performance %** |
| ***Key topics*** | **%** | **Rationale for percentage** | **SMART** | **HTR-PM** | **NuScale** | **Rationale for** **score** |
| **4.1 Unit size** |  |  |  |  |  |  |
| **4.2. Plant lifetime** |  |  |  |  |  |  |
| **4.3 Proven technology** |  |  |  |  |  |  |
| **4.4 Standardization** |  |  |  |  |  |  |
| **4.5 Simplification** |  |  |  |  |  |  |
| **4.6 Constructability** |  |  |  |  |  |  |
| **4.7 Operability, inspectability, maintainability and reliability** |  |  |  |  |  |  |
| **4.8 Plant availability and capacity factors** |  |  |  |  |  |  |
| **4.9 Manoeuvrability** |  |  |  |  |  |  |
| **4.10 Major systems and component evaluations** |  |  |  |  |  |  |

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| **Key element: 5. Nuclear fuel and fuel cycle performance %** |
| ***Key topics*** | **%** | **Rationale for percentage** | **SMART** | **HTR-PM** | **NuScale** | **Rationale for** **score** |
| **Considerations related to the design, procurement and operating experience for the nuclear fuel — materials, fabrication, operational expectations and experience** |  |  |  |  |  |  |
| **Flexibility of plant operation with respect to different fuels, including higher enrichment levels or mixed oxide (MOX) fuels** |  |  |  |  |  |  |
| **Services offered for the front end and back end supply** |  |  |  |  |  |  |
| **Availability and competitiveness of different fuel materials and components for the facility design** |  |  |  |  |  |  |
| **Assurance for fuel supply and for availability of related component and replacement parts** |  |  |  |  |  |  |
| **Agreements with UF6 and associated fuel product suppliers** |  |  |  |  |  |  |
| **Demonstrated ability to manufacture fuel bundles** |  |  |  |  |  |  |
| **Characteristics of primary and alternate fuel and materials suppliers** |  |  |  |  |  |  |
| **Experience with similar fuel** |  |  |  |  |  |  |
| **Length of refuelling cycle and economic evaluation** |  |  |  |  |  |  |
| **Special nuclear materials management** |  |  |  |  |  |  |
| **Impact of the fuel cycle on the facility operation, including refuelling outage frequency and duration, fuel storage throughput requirements, spent fuel pool storage capacity, dry fuel storage requirements** |  |  |  |  |  |  |
| **Potential for increasing the spent fuel pool storage capacity in the future** |  |  |  |  |  |  |
| **Dry fuel storage experience base.** |  |  |  |  |  |  |

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| **Key element: 6. Radiation protection %** |
| ***Key topics*** | **%** | **Rationale for percentage** | **SMART** | **HTR-PM** | **NuScale** | **Rationale for** **score** |
| **Separation of clean and radiation areas; radiation area zoning in the design plan** |  |  |  |  |  |  |
| **ALARA (“as low as reasonably achievable”) and radiation protection procedures, shielding and radiation monitoring implementation in design, including rationale for ALARA improvements via design** |  |  |  |  |  |  |
| **Procedures and shielding required for exposure reduction during operation, refuelling and maintenance** |  |  |  |  |  |  |
| **Remote maintenance equipment design and usage** |  |  |  |  |  |  |
| **Access control and layout design criteria** |  |  |  |  |  |  |
| **Estimated total annual site personnel dose exposure** |  |  |  |  |  |  |
| **Personnel exposure estimates during operation, refuelling and maintenance activities** |  |  |  |  |  |  |
| **Available projections versus actual exposure and exposure reduction comparisons during operation, refuelling and maintenance activities** |  |  |  |  |  |  |
| **Post-accident vital areas accessibility and shielding** |  |  |  |  |  |  |

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| **Key element: 7. Environmental impact %** |
| ***Key topics*** | **%** | **Rationale for percentage** | **SMART** | **HTR-PM** | **NuScale** | **Rationale for** **score** |
| **Water usage, impact on aquatic life, birds, plants and animals** |  |  |  |  |  |  |
| **Visual impact expectations versus projections** |  |  |  |  |  |  |
| **Impacts on wetland and natural terrain** |  |  |  |  |  |  |
| **Radiological releases to the environment (normal operation and accident)** |  |  |  |  |  |  |
| **Effect on local industry and economy** |  |  |  |  |  |  |
| **Archaeological impact assessment (owner/operator responsibility)** |  |  |  |  |  |  |

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| **Key element: 8. Safeguards %** |
| ***Key topics*** | **%** | **Rationale for percentage** | **SMART** | **HTR-PM** | **NuScale** | **Rationale for** **score** |
| **Design features incorporated to facilitate the implementation of IAEA safeguards** |  |  |  |  |  |  |

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| **Key element: 9. Plant and site security %** |
| ***Key topics*** | **%** | **Rationale for percentage** | **SMART** | **HTR-PM** | **NuScale** | **Rationale for** **score** |
| **Security plans (note: the evaluation of all physical security systems should be performed under a confidential process, independent of the rest of the technology evaluation process)** |  |  |  |  |  |  |
| **Integrated plant access control system to include in the general plant design, for example:** |  |  |  |  |  |  |
| **Diversity and redundancy of security facilities** |  |  |  |  |  |  |
| **A dedicated security communication system with external support services** |  |  |  |  |  |  |
| **The security access building and related security facilities design against security related threats** |  |  |  |  |  |  |