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## **Empowering Emerging Nuclear Nations: Wastimate's Open-Source Approach for Small Modular Reactor Radioactive Waste Management**

Countries embarking on nuclear technology face challenges in evaluating waste burdens due to limited expertise and tools. Government-level decisions are further complicated when SMR's enter the picture –the lack of large-scale fleet deployment limits already lacking information on radioactive waste management. In order to provide more information on waste quantities, characteristics, optimal management, and disposal means, a novel and easy-to-use waste estimation software, Wastimate, has been created using Python. The open-source waste package tracking software is implemented with a large degree of automation, making it possible for radiation protection specialists and other stakeholders to conduct general waste system studies. Its design allows for the modeling of non-standard scenarios, including SMR deployment in emerging nuclear nations. Recognizing the absence of benchmarks specifically tailored to waste disposal systems, one is proposed with a focus on nuclear waste disposal and management. Demonstrating its versatility, Wastimate is effective in modeling waste quantity, activity, decay heat, and isotope flow over time, even under uncertain conditions. By providing comprehensive insights into complex systems, Wastimate empowers policymakers to navigate the complexities of nuclear waste management and make well-informed choices regarding the adoption and implementation of SMRs in emerging nuclear nations.

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### **Confirm that the work is original and has not been published anywhere else**

YES

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