

## 100 YEAR PLAN:

### South Koreans Develop 100-Year Plan for Managing Spent Nuclear Fuel

#### Researchers use GoldSim to evaluate storage options and ask “what if” questions

The world is focused on nuclear energy. Japan and Russia recently signed a pact on nuclear energy use, the US Department of Energy announced \$44 million in nuclear energy spending, and Saudi Arabia is signing a nuclear energy deal with France. South Korea is no exception to this intense drive for clean energy. By 2030, South Korea intends to operate 38 nuclear reactors, accounting for nearly 60% of the country’s power generation.

South Korea’s commitment to expanding its use of nuclear energy will result in an increase of Spent Nuclear Fuel (SNF) from approximately 80,000 metric tons of uranium to 130,000 MTUs.

SNF is fuel from a reactor that has lost its ability to efficiently create energy yet continues to emit radiation. As a result, SNF must be stored until the radioactivity decreases to safe levels to allow reprocessing or disposal.

**A vision for a better future required innovative planning.** The Korea Atomic Energy Research Institute (KAERI), the nation’s sole national nuclear energy laboratory, embarked on an ambitious program to develop an integrated, comprehensive approach.

“Comprehensive planning is the key to a successful nuclear program in South Korea,” said Yongsoo Hwang, of KAERI. “Our goal is to create a comprehensive framework, not only for short-term management, but also for determining the long-term outcome of SNF in South Korea.”

**What makes the South Korean approach unique** is the development of an “integration model” with technology partner GoldSim. The model predicts the generation, storage, transport, shipping, reprocessing and disposal of SNF and associated wastes over the course of the next 100 years. The model is referred to as ENVI (Environmentally friendly Nuclear option with Vision and Innovation).



Scientists and engineers use GoldSim to predict the annual rising of Spent Nuclear Fuel.



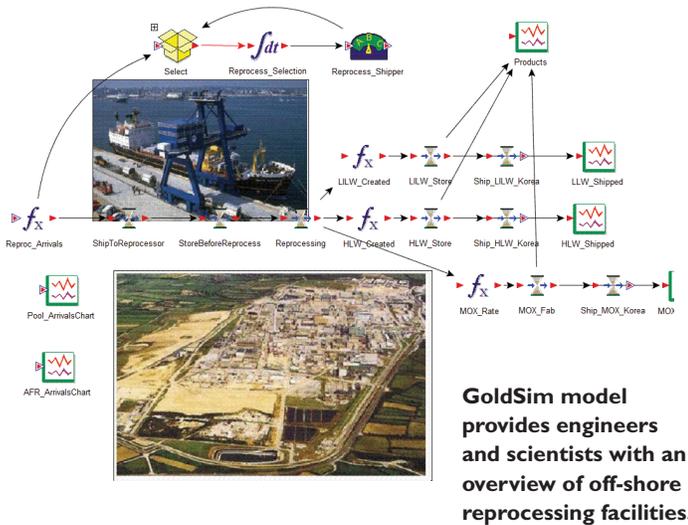
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The GoldSim model has been designed to address the SNF from both existing and projected nuclear power plants as South Korea raises its nuclear power generation to 60% in 2030. ENVI focuses on the cost and time required to construct and operate each facility.

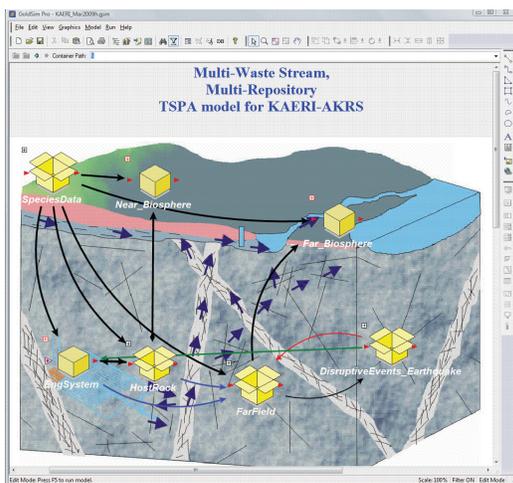
ENVI is designed to evaluate various options including: constructing a repository for SNF and high-level waste, storing SNF at reactor sites or at centralized storage facilities, or using offshore or domestic SNF reprocessing facilities.

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GoldSim’s technology enables researchers to ask “what if” questions by evaluating various scenarios and determining the short and long-term implications. This innovative approach enables stakeholders, engineers and researchers to rapidly evaluate possible options and communicate their findings to all necessary personnel.

The ENVI framework is a transparent model that provides ease of use for decision-makers. Graphic illustrations permit different scenarios to be analyzed in a manner that is both efficient and transparent. Dashboards can be constructed for direct experimentation — enabling users to ask “what if” questions when evaluating various scenarios.

The integrated GoldSim ENVI model is a breakthrough in management models. It is a flexible and powerful probabilistic simulation framework to help South Korea develop safe and abundant energy for its people.



Engineers use the Performance Assessment Model to evaluate the performance of different waste streams and disposal concepts. Users select which of the waste systems to evaluate in any given simulation.

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