



TRACTEBEL

ENGIE

# Radioactive Waste Management



## Offering independent and tailor-made solutions to manage radioactive waste safely

Our engineers' expertise is based on state-of-the-art knowledge and experience in the management, minimization and characterization of radioactive waste produced during operational activities. It also includes the design of treatment, conditioning and storage facilities for all types of radioactive waste and the design of near surface, subsurface and deep geological repositories for final disposal .

### Minimisation & characterisation

- Support you to reduce the quantity of waste and limiting any discharge of radioactive effluents into the environment
- Optimise your waste management by defining the most cost-effective option
- Help characterize waste via validated and customized in-house tools taking into account the waste characteristics and flows

### Treatment, conditioning & storage

- Help you select the most suitable installation to meet your requirements for treatment, conditioning and interim storage
- Streamline your radioactive waste analysis processes and provide advice about managing different types of waste
- Design your radwaste treatment, conditioning and storage facilities, and your spent fuel dry or wet storage facilities

### Final disposal

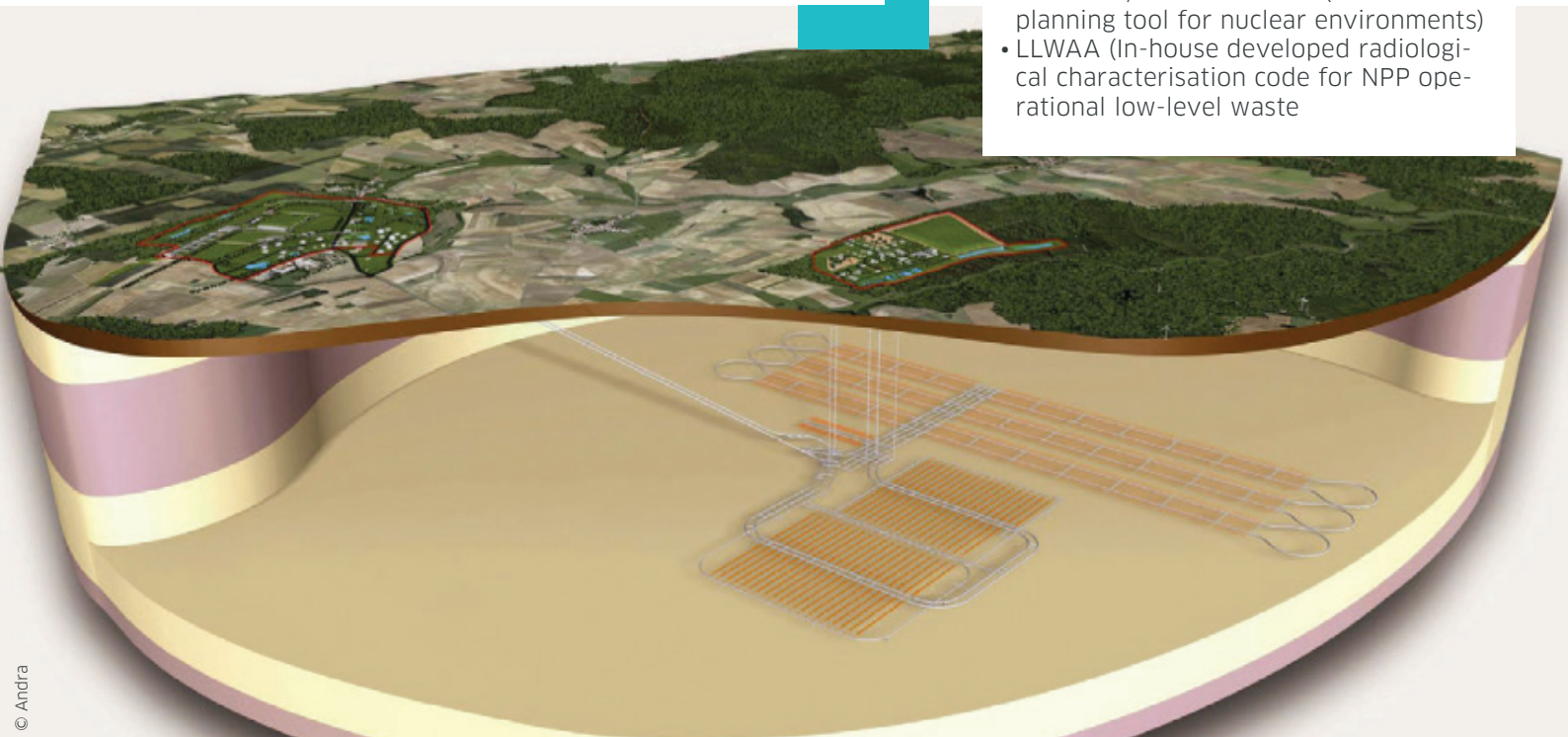
- Manage all aspects related to waste disposal from the site selection to the design of the disposal facilities.
- Develop repository concepts for near surface, sub-surface or deep geological facilities that comply with waste acceptance criteria



# Benefit from our in-depth experience acquired in the fields of design, technical specifications and commissioning of radwaste management facilities and repositories

## Computer codes

- MICROSHIELD (comprehensive photon/ gamma ray shielding and dose assessment code)
- MCNP(X) (Monte-Carlo N-Particle transport code for simulations of interactions between multiple particles and matter)
- QAD-CGGP (code for calculating fast-neutron and gamma-ray penetration through various shield configurations)
- ANISN (neutron and gamma transport in one-dimensional plane, spherical and cylinder geometry)
- VISIPLAN/VISIMODELLER (3D-ALARA planning tool for nuclear environments)
- LLWAA (In-house developed radiological characterisation code for NPP operational low-level waste)



## SOME REFERENCES RADIOACTIVE WASTE MANAGEMENT

**Belgium - ENGIE Electrabel** - Setting up qualification files for the radioactive waste treatment and conditioning installations of Doel and Tihange NPPs

**Belgium - ENGIE Electrabel** - Architect Engineering mission for the dry and wet storage facilities of spent fuel assemblies of Doel and Tihange NPPs

**Belgium - ONDRAF Belgian Waste Management Agency** - Architect Engineering mission for:

- the centralized Belgian treatment and conditioning facility for low-level waste
- the HRA-Solarium facility for the retrieval, treatment and conditioning of historical waste
- the interim storage buildings for low-level, medium-level, alpha-bearing and high-level waste
- the design of the HADES experimental tunnel in deep layers for disposal of high-level waste

**Belgium - ONDRAF - Belgian Waste Management Agency** - Site selection, generic and specific conceptual design and detailed design studies for the low-level waste surface repository

**Belgium - ONDRAF Belgian Waste Management Agency** - Conceptual studies for the future Belgian deep geological disposal of medium- and high-level waste, including the waste conditioning and the underground disposal facilities

**France - ANDRA French Waste Management Agency** - Complete preliminary and final design studies of the two sub systems "SS2 surface facilities" & "SS4 Underground infrastructures and tunnels" of CIGEO deep geological disposal facility for radioactive waste

**France - ANDRA French Waste Management Agency** - Feasibility studies related to the vertical and horizontal transport systems of the deep geological disposal facility for high-level waste

**France - ANDRA French Waste Management Agency** - Design of handling equipment of waste packages for sub-surface storage graphite and radium-bearing waste

**France - CEA** - Basic design of retrieval facilities for historical waste (FOSSEA)

**France - EDF** - Conceptual studies of pools for the storage of spent fuel assemblies (ECU project)

**South Africa - ESKOM** - Technical support for a dry storage facility for spent fuel assemblies

**Switzerland - AXPO** - Technical support for the licensing of a spent fuel dual purpose cask

**Italy - SOGIN** - Radiological characterisation of the Trino NPP's primary system with LLWAA-DECOM computer code

**Italy - EC** - design review of the radioactive waste interim storage building of the Ispra site

**Bulgaria - EC** - Radiological characterisation of the systems and equipment of the Kozloduy NPP units 1 and 2 which are due to be decommissioned

**Lithuania - EBRD** - Radiological characterisation of the systems and equipment of the Ignalina NPP units which are due to be decommissioned