



GeoMelt®

A proven technology that is scalable, reliable, and highly flexible resulting in the lowest life-cycle cost for waste management

NUCLEAR SOLUTIONS

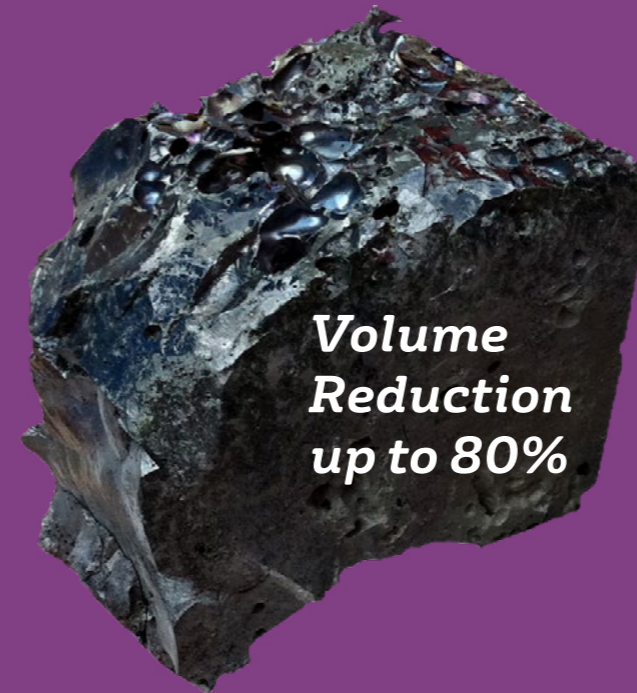
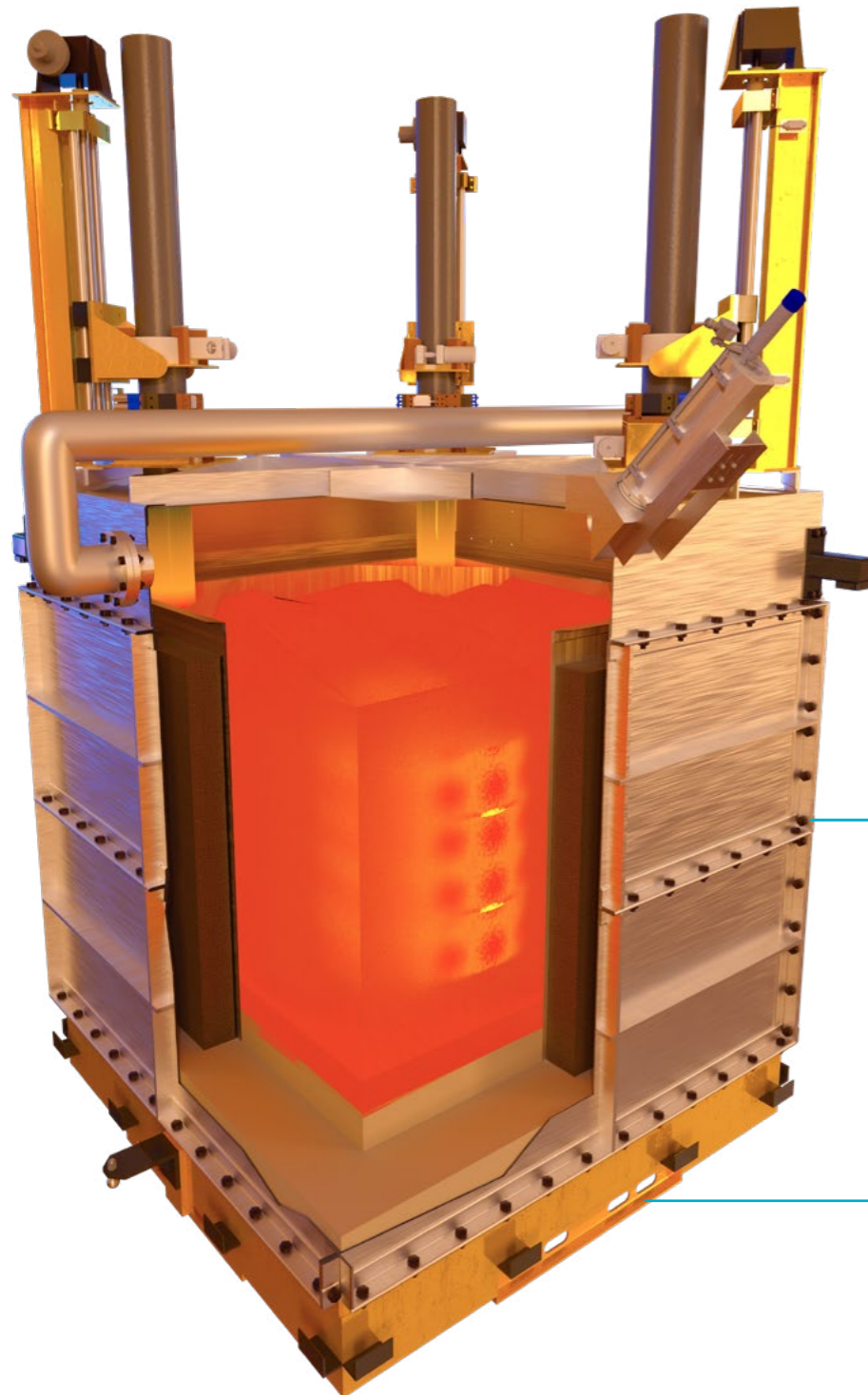
A Broad Range of Challenges...

A Single Solution

From the routine to the extremely hazardous, waste stabilization needs can present a range of challenges, especially for markets that lack disposal site access or are faced with long-term storage considerations. The challenge is finding a solution that is safe, proven and that has the flexibility to stabilize a wide range of waste forms while being cost effective throughout the lifecycle of the process.

Veolia's patented electrical-joule heated vitrification process is that solution. GeoMelt® yields the lowest lifecycle cost for waste management by merging technological flexibility and scalability to create an effective, reliable treatment approach. Simply put, GeoMelt® is the industry's choice for treatment by offering significant advantages over competing technologies for radioactive, hazardous and as well as mixed waste treatment and site remediation needs.

10X stronger than concrete and stable for thousands of years



GeoMelt® provides a common platform allowing it to be uniquely configured to address a wide range of treatment challenges. The high temperature vitrification process transforms radioactive, hazardous and mixed wastes into a volume-reduced robust, obsidian-like inert glass waste form for safe storage, transportation and disposal.

Unlike encapsulation processes such as cementation, asphalt or polymers, where the wastes retain their identity and can be exposed during mechanical crushing or erosion, vitrification results in a chemical bonding at the molecular level of the wastes that have been melted or dissolved and chemically oxidized while being incorporated into the glass. This creates an insoluble robust leach-resistant product that remains stable and maintains its physical and chemical integrity for over thousands of years.

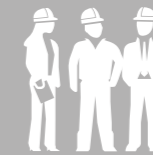
Lowers Lifecycle Costs

By leveraging GeoMelt®'s flexibility and unique approach to vitrification, long-term stabilization, operational and disposition costs are reduced.



Scalable for Every Challenge

Configurable and based on a common platform, GeoMelt® can handle a range of treatment challenges – from the routine to the extremely challenging.



Flexible to Fit Your Needs

GeoMelt® is uniquely capable of processing a range of inorganic and organic waste streams either individually, or in many cases, simultaneously, In-Container, In-Cell, and In-Situ.



Proven Track Record of Success

GeoMelt® has been treating nuclear and hazardous waste in the early 1990s, producing more than 26,000 metric tons of waste were treated for disposal in the U.S., UK, Australia and Japan.



Why vitrification?

Proven

Safe Scalable

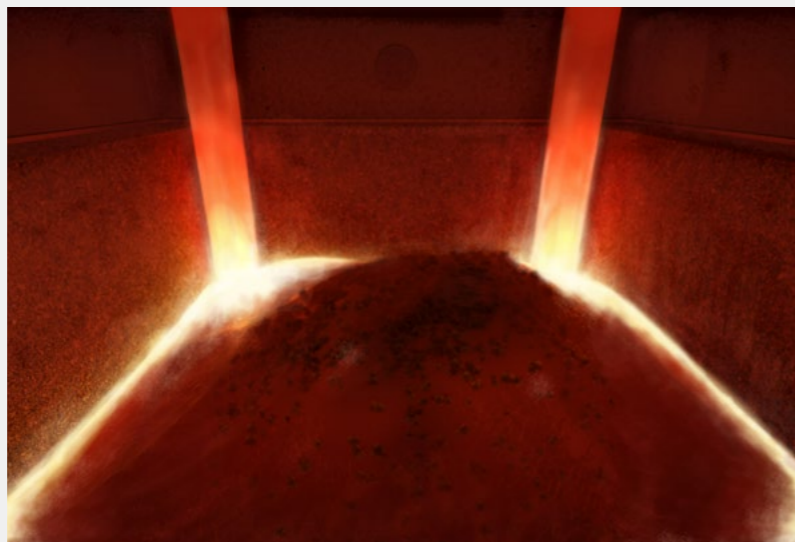
At a merchant facility



Lifecycle cost

Flexible Reliable

Melting process



Mature

Robust

Durable

Flexible for every challenge:

modular, portable or fixed based deployments

The GeoMelt® Value Proposition

Lowens Lifecycle Costs

Veolia's GeoMelt® provides the lowest waste management lifecycle costs relative to both competing processing approaches and other vitrification methods, especially for markets that lack disposal site access and are faced with long term storage. The configurability and flexibility of the platform provides a number of benefits:

- Individually or simultaneously process a range of different organic and inorganic waste streams, providing a high tolerance for debris that delivers an unequalled combination of leach resistance, strength and weather resistance.
- Uniquely utilize contaminated wastes (e.g. zeolite or contaminated soil) as the glass former while co-processing other waste streams, thereby simultaneously achieving very high waste loading and volume reductions.
- Eliminate storage, transportation or disposal concerns from hydrogen generation by radiolysis, natural disasters, seismic, corrosion-deterioration, water intrusion, or terrorism.
- Batch processing approach eliminates costly plant shutdowns experienced by conventional continuous melters.
- Avoids waste feed variability challenges of other approaches and the high capital costs associated with expensive refractories.

Scalable for Every Challenge

GeoMelt® is a configurable family of technologies based on a common platform allowing it to be uniquely constructed to address a wide-range of treatment challenges across a range of scales. Mobile, modular and fixed-facility solutions can be achieved to client specifications, whether it be:

- In-Container Vitrification (ICV™) melts from bench scale to 50 metric tons.
- In-Cell to more than 100-tonne melts.
- In-Situ (ISV™) where melts can exceed up to 1000 metric tons when that is the best solution to resolve difficult or dangerous to retrieve materials.
- At an off-site fixed based processing facility.

Proven Track Record of Success

GeoMelt® has become the go-to vitrification technology because of its growing acceptance, advanced technology readiness level (TRL), scalability, and robust co-processing capabilities. That has been built on more than two decades of commitment to providing clients with the successful solutions to address their waste challenges. GeoMelt® has:

- Been operating commercially globally since 1993.
- Treated a range of hazardous, radioactive and mixed wastes, treating more than 26,000 tonnes of wasteful government and commercial clients.
- A successful track record of stakeholder acceptance.
- Been used at sites in Japan, Australia, the United Kingdom and United States.
- Has successfully processed a broad range of hazardous wastes (e.g. dioxin contaminated soils, PCBs, asbestos), sludges, reactive metals, inorganic and organic ion exchange resins, aluminum, graphite, and steel drums and waste containers.

Flexible to Fit Your Needs

GeoMelt® is a highly flexible technology that can treat contaminated materials where the contaminants are hazardous (e.g. chemicals, heavy metals and other non-radioactive materials hazardous to health), radioactive (materials emitting radioactivity) and mixed wastes (a combination of hazardous and radioactive). The platform can:

- Individually or simultaneously process a range of different organic and inorganic waste streams, providing a high tolerance for debris that delivers an unequalled combination of leach resistance, strength and weather resistance.
- GeoMelt® provides significantly more flexibility in the treatment approach by allowing tailoring of the process to maximize waste loadings while optimizing the final waste form to meet performance criteria established for the treated waste.


About Veolia

Veolia group is the global leader in optimized resource management. With over 171,000 employees worldwide, the Group designs and provides water, waste and energy management solutions which contribute to the sustainable development of communities and industries. Through its three complementary business activities, Veolia helps to develop access to resources, preserve available resources, and to replenish them.

In 2018, the Veolia group supplied 95 million people with drinking water and 63 million people with wastewater service, produced nearly 56 million megawatt hours of energy and converted 49 million metric tons of waste into new materials and energy. Veolia Environnement (listed on Paris Euronext: VIE) recorded consolidated revenue of €25.91 billion in 2018 (USD 30.6 billion). www.veolia.com

GeoMelt® is designed and developed by Veolia Nuclear Solutions

Veolia Nuclear Solutions includes the most comprehensive range of technologies and services for facility restoration, decommissioning of plants, and the treatment of radioactive waste, all nurtured by our nuclear experts and backed by thousands of Veolia staff worldwide.

 www.nuclearsolutions.veolia.com

Veolia Nuclear Solutions Value Chain



Resourcing the World