Overview

Silex invented and developed the ‘SILEX’ laser isotope separation technology in Sydney during the 1990s. The uranium enrichment application of the SILEX technology was licensed exclusively in 2006 to Global Laser Enrichment LLC (‘GLE’), a joint venture business today owned by Silex (51%) and Cameco Corporation (49%).

GLE is the US-based commercialisation vehicle for the SILEX uranium enrichment technology.

The development and commercialisation program for the SILEX uranium enrichment technology is being undertaken jointly by Silex (at its Lucas Heights, Sydney facility) and GLE (with sites in Wilmington, NC and Paducah, KY).

The SILEX laser uranium enrichment technology achieved Technology Readiness Level 6 (TRL-6[1]) in October 2025.

A) Technology Readiness Level 6 (TRL-6), as defined by DOE Technology Readiness Assessment Guide (G 413.3-

Background

The SILEX Laser Uranium Enrichment Technology was invented by Silex Systems scientists Dr Michael Goldsworthy (our CEO) and Dr Horst Struve (retired), in the 1990s at Lucas Heights, Sydney. In order to facilitate the potential commercial deployment of the technology in the United States, an Agreement for Cooperation between the governments of the United States and Australia was signed in May 2000. In June 2001, the technology was officially Classified by the United States and Australian governments, bringing the SILEX technology commercialisation project formally under the strict nuclear safeguards, security and regulatory protocols of each country.

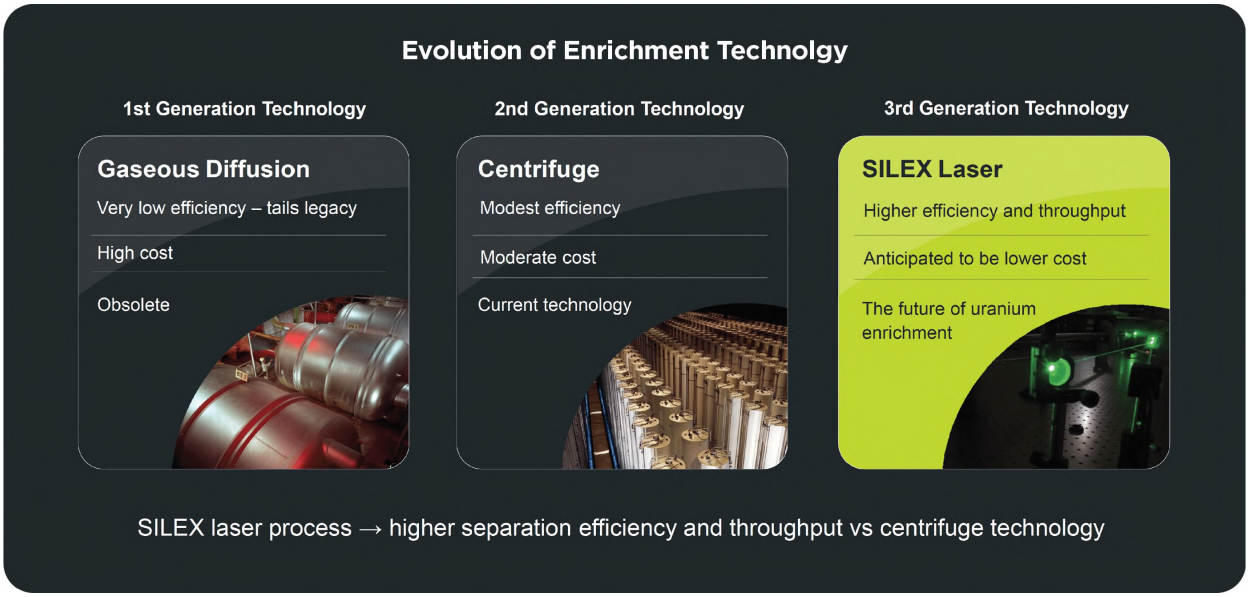
In 2016, GLE signed a landmark agreement with the US Department of Energy for the purchase of over 200,000 metric tonnes of depleted uranium hexafluoride (UF_6) being tails material stockpiled from previous decades of enrichment operations at the DOE's gaseous diffusion facility in Paducah, which was shut down in 2013. This material will be the feedstock for GLE's potential Paducah Laser Enrichment Facility (PLEF).

Uranium Enrichment

Naturally occurring uranium consists of two main isotopes, U^{235} and U^{238}. Nuclear energy is produced by the splitting (or 'fission') of the U^{235} atoms. Natural uranium is made up of ~0.7% of the 'active' U^{235} isotope with the balance (~99.3%) comprised of the inactive U^{238} isotope. Uranium enrichment is the process of concentrating or enriching the U^{235} isotope for use as fuel in a conventional nuclear power reactor. Enrichment is a technically difficult process and accounts for around 30% of the cost of nuclear fuel and approximately 5% of the total cost of the electricity generated by nuclear power.

The **S**eparation of **I**sotopes by **L**aser **EX**citation (SILEX) process is the only third-generation enrichment technology known to be in the advanced stages of commercial development today. The SILEX technology can effectively enrich uranium through highly selective laser excitation of the $^{235}UF_6$ isotopic molecule to produce 'reactor fuel grade' uranium which contains an assay of U^{235} of around 5%. UF_6 is the fluorinated gaseous form of uranium, which is made via chemical conversion from the uranium oxide produced by miners.

The two methods of uranium enrichment used to date are Gas Diffusion (first generation – obsolete) and Gas Centrifuge (second generation). Silex's third-generation laser-based process provides much higher enrichment process efficiency compared to these earlier methods, potentially offering significantly lower overall costs.



The 'Triple Opportunity' for GLE and the SILEX Technology

The '***Triple Opportunity***' for nuclear fuel production is emerging as a result of international developments which are driving a transformation of the global nuclear fuel supply chain.

The '***Triple Opportunity***' could involve production of three different grades of nuclear fuel – all via the deployment of the SILEX laser-based uranium enrichment technology in the US, including:

U_{nat}

Natural Grade Uranium (U_{nat})

production of natural grade UF_6 (with U^{235} assays of 0.7%) via processing of depleted UF_6 tails (U^{235} assays of 0.25% to 0.5%) with the SILEX technology, which, being already converted, would also help alleviate UF_6 conversion supply pressures

LEU / LEU+

Low Enriched Uranium (LEU) / LEU+

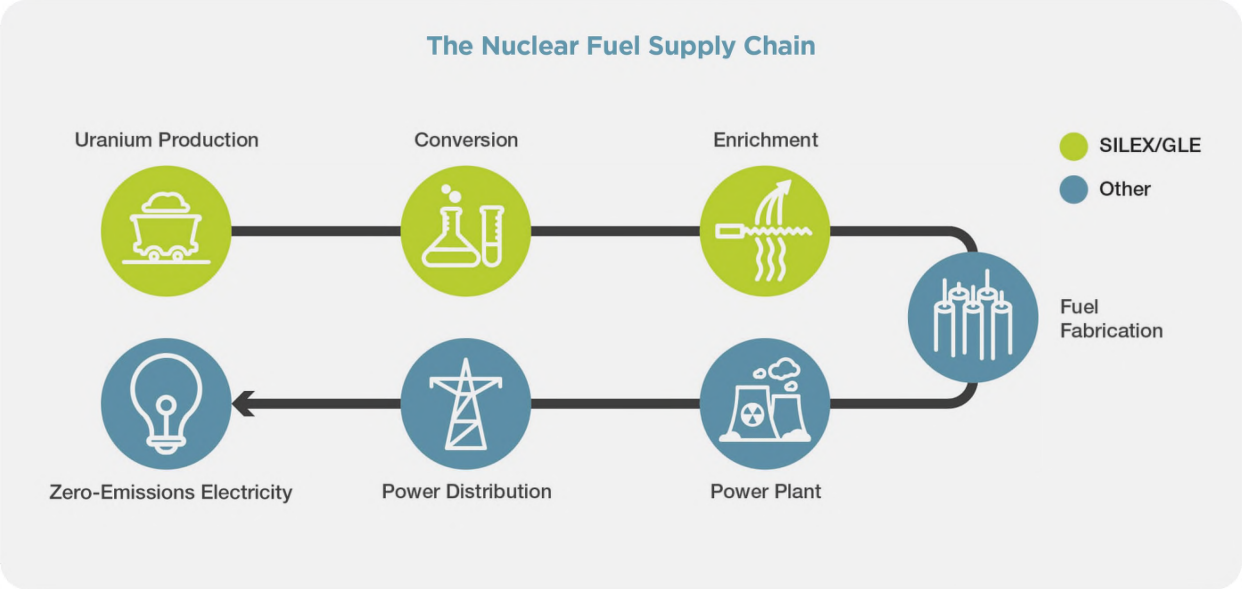
production of LEU (U^{235} assays up to 5%) and LEU+ (assays from 5% to 10%) achieved with additional SILEX enrichment capacity – to supply fuel for existing and future large-scale conventional and advanced reactors

HALEU

High Assay LEU (HALEU)

production of HALEU (U^{235} assays up to ~20%) via enrichment with the SILEX technology – to supply fuel for next-generation advanced reactors, including SMRs

Uranium production, conversion and enrichment are the key value drivers of the nuclear fuel supply chain, accounting for nearly 85% of the value of a reactor fuel bundle.



Key features of the SILEX Uranium Enrichment Technology

The SILEX technology is a unique laser-based process that has the potential to economically separate uranium isotopes (as well as commercially valuable isotopes of several other elements). It has a number of advantages over other uranium enrichment processes including:

Inherently higher efficiency and throughput resulting in lower enrichment costs;

Smaller environmental footprint than centrifuge and diffusion plants;
Greater flexibility in producing fuels for advanced reactors, including SMRs; and
Anticipated lowest capital costs.