



**Silex**  
Systems Limited

## Updated Investor Presentation

15 March 2021

Silex Systems Limited (Silex) (ASX: SLX) (OTCQX: SILXY) today provided an updated Investor Presentation.

Since the 2020 AGM in October 2020, Silex has announced several significant achievements. The attached updated Investor Presentation provides an overview of the Company's progress in commercialising its innovative laser enrichment technology across multiple markets.

**Silex CEO and Managing Director, Dr Michael Goldsworthy**, said: "The completion of the GLE acquisition announced in February 2021 represented a significant achievement for Silex, giving us greater control over the commercialisation of the SILEX laser-based uranium enrichment technology.

"This new ownership structure represents the start of an important new era for GLE and the SILEX technology, at a time when nuclear power is coming back into focus as a key source of zero-emissions base load electricity in an emissions constrained world", he added.

***Authorised for release by the Silex Board of Directors.***

Further information on the Company's activities can be found on the Silex website: [www.silex.com.au](http://www.silex.com.au) or by contacting:

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## ***Forward Looking Statements and Risk Factors:***

### **About Silex Systems Limited (ASX: SLX) (OTCQX: SILXY)**

Silex Systems Limited ABN 69 003 372 067 (Silex) is a research and development company whose primary asset is the SILEX laser enrichment technology, originally developed at the Company's technology facility in Sydney, Australia.

The SILEX technology has been under development for uranium enrichment jointly with US-based exclusive licensee Global Laser Enrichment LLC (GLE) for a number of years. Success of the SILEX uranium enrichment technology and the proposed Paducah commercial project remain subject to a number of factors including the satisfactory completion of the engineering scale-up program and uranium market conditions and therefore remains subject to associated risks.

Silex is also in the early stages of pursuing additional commercial applications of the SILEX technology, including the production of 'Zero-Spin Silicon' for the emerging technology of silicon-based quantum computing. The 'Zero-Spin Silicon' project remains dependent on the outcomes of the project and the viability of silicon quantum computing and is therefore at risk. The future of the SILEX technology is therefore uncertain and any plans for commercial deployment are speculative.

Additionally, Silex has an interest in a unique semiconductor technology known as 'cREO®' through its ownership of subsidiary Translucent Inc. The cREO® technology developed by Translucent has been acquired by IQE Plc based in the UK. IQE is progressing the cREO® technology towards commercial deployment for 5G mobile handset filter applications. The outcome of IQE's commercialisation program is also uncertain and remains subject to various technology and market risks.

### **Forward Looking Statements**

The commercial potential of these technologies is currently unknown. Accordingly, no guarantees as to the future performance of these technologies can be made. The nature of the statements in this Announcement regarding the future of the SILEX technology, the cREO® technology and any associated commercial prospects are forward-looking and are subject to a number of variables, including but not limited to, unknown risks, contingencies and assumptions which may be beyond the control of Silex, its directors and management. You should not place reliance on any forward-looking statements as actual results could be materially different from those expressed or implied by such forward looking statements as a result of various risk factors. Further, the forward-looking statements contained in this Announcement involve subjective judgement and analysis and are subject to change due to management's analysis of Silex's business, changes in industry patterns, and any new or unforeseen circumstances. The Company's management believes that there are reasonable grounds to make such statements as at the date of this Announcement. Silex does not intend, and is not obligated, to update the forward-looking statements except to the extent required by law or the ASX Listing Rules.

### **Risk Factors**

Risk factors that could affect future results and commercial prospects of Silex include, but are not limited to: ongoing economic uncertainty including the impacts of the COVID-19 pandemic; the results of the SILEX uranium enrichment engineering development program; the market demand for natural uranium and enriched uranium; the outcome of the project for the production of 'Zero-Spin Silicon' for the emerging technology of silicon-based quantum computing; the potential development of, or competition from alternative technologies; the potential for third party claims against the Company's ownership of Intellectual Property; the potential impact of prevailing laws or government regulations or policies in the USA, Australia or elsewhere; results from IQE's commercialisation program and the market demand for cREO® products; and the outcomes of various strategies and projects undertaken by the Company.



# Silex Systems Limited Investor Presentation

(ASX: SLX) (OTCQX: SILXY)

Dr Michael Goldsworthy  
CEO/Managing Director  
March 2021



# Forward Looking Statements and Risk Factors

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**Silex is commercialising its unique SILEX laser enrichment technology for application to:**

- **Uranium production and enrichment (nuclear power)**
- **Silicon enrichment (silicon quantum computing)**
- **Other potential markets (e.g. medical radioisotopes)**



## 51% Owned



SILEX Uranium Production via GLE

**Technology** SILEX laser-based uranium enrichment

**Revenue Model** 51% ownership of GLE + 7% (min.) perpetual royalty

**Partners** 

**Market Size<sup>1</sup>** Uranium: US\$7bn (est 2022)  
Uranium Enrichment: US\$3bn (est 2022)

## 100% Owned



SILEX Zero-Spin Silicon (ZS-Si) Production

**Technology** SILEX laser enrichment

**Revenue Model** Producer-based revenues for silicon quantum computing

**Partners**  

**Market Size<sup>2</sup>** Quantum Computing: \$50bn (by 2040)

## Royalty Agreement



Filter devices for 5G mobile handsets

**Technology** High frequency filter devices for 5G

**Revenue Model** 3% perpetual revenue royalty

**Partners** 

**Market Size<sup>3</sup>** 5G Front End Connectivity: US\$3bn (est 2025)

1. UxC, UMO and EMO Q4, 2020  
2. CSIRO, Growing Australia's Quantum Technology Industry, May 2020  
3. IQE Trading Update, March 2020 (Note: cREO<sup>®</sup> based products only a small fraction of this potential target market)

## Global demand for Uranium is set to rise:

### A significant potential uranium supply shortage is forecasted

- ❑ Structural supply deficit may occur without timely production from new resources
- ❑ Demand will continue to grow significantly as zero-emissions nuclear is embraced
- ❑ There are few low cost resources to supply increasing demand from the mid 2020's
- ❑ Uranium prices must increase soon to provide stimulus for increased production



### The SILEX-GLE uranium production opportunity

- ❑ Silex owns 51% equity interest in Global Laser Enrichment (GLE), with Cameco Corporation (49%)
- ❑ GLE has an agreement with US DOE<sup>1</sup> to purchase tails inventories owned by the US Government
- ❑ The Paducah Laser Enrichment Facility (PLEF) aims to enrich the tails to produce uranium
- ❑ GLE would produce ~5 million pounds uranium p.a. with SILEX technology from c. 2030 onwards
- ❑ Economic modelling indicates PLEF may be akin to a Tier 1 uranium mine in terms of cost and longevity

1. US Department of Energy



## Global race to develop Quantum Computers:

### Silicon Quantum Computing (QC) is a leading contender for QC technology

- ❑ Silicon QC is well placed to leverage off the existing silicon semiconductor industry
- ❑ Silicon QC requires highly enriched silicon, currently very limited supply and expensive
- ❑ An enriched silicon supply chain needs to be established quickly to enable first-mover advantage
- ❑ With a viable supply chain and timely commercial demonstration, silicon could lead global QC efforts

### The SILEX Zero-Spin Silicon (ZS-Si) production opportunity

- ❑ SILEX technology already proven capable of producing enriched silicon in the form of ZS-Si
- ❑ Project collaborators, Silicon Quantum Computing (SQC) and UNSW Sydney are potential end-users
- ❑ Current ZS-Si project aims to scale-up production to pilot commercial level by end of 2022
- ❑ First commercial production output would be sold to SQC under offtake agreement from 2023
- ❑ Will target engagement with other potential customers, including blue chip computing majors



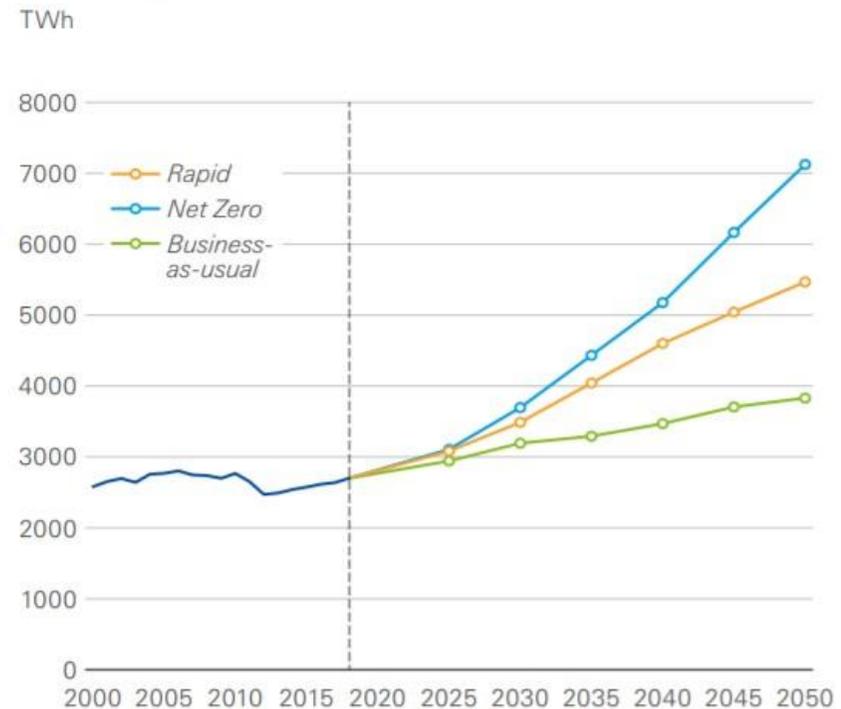
# Nuclear Power and the Nuclear Fuel Market Opportunity

## Nuclear - carbon-free baseload electricity:

- ❑ Nuclear is forecast to play a key role in climate change mitigation strategies – e.g. Net-Zero 2050
- ❑ Proven, reliable base-load (24/7) electricity generation, complements renewables and provides grid stability
- ❑ Largest source of carbon-free power in the US, EU and significant growth in China, India, Middle East
- ❑ Affordable and reliable electricity to a growing global population – low generation cost (~\$100 / MWh<sup>1</sup>)
- ❑ 442 nuclear power plants around the world, 11 reactors connected globally to the grid in the last 2 years<sup>2</sup>
- ❑ 53 nuclear reactors currently under construction, 98 reactors planned and a further 326 units proposed<sup>2</sup>

1. LCOE ~\$100 /MWh, IEA World Energy Outlook 2020  
 2. World Nuclear Association, January 2021

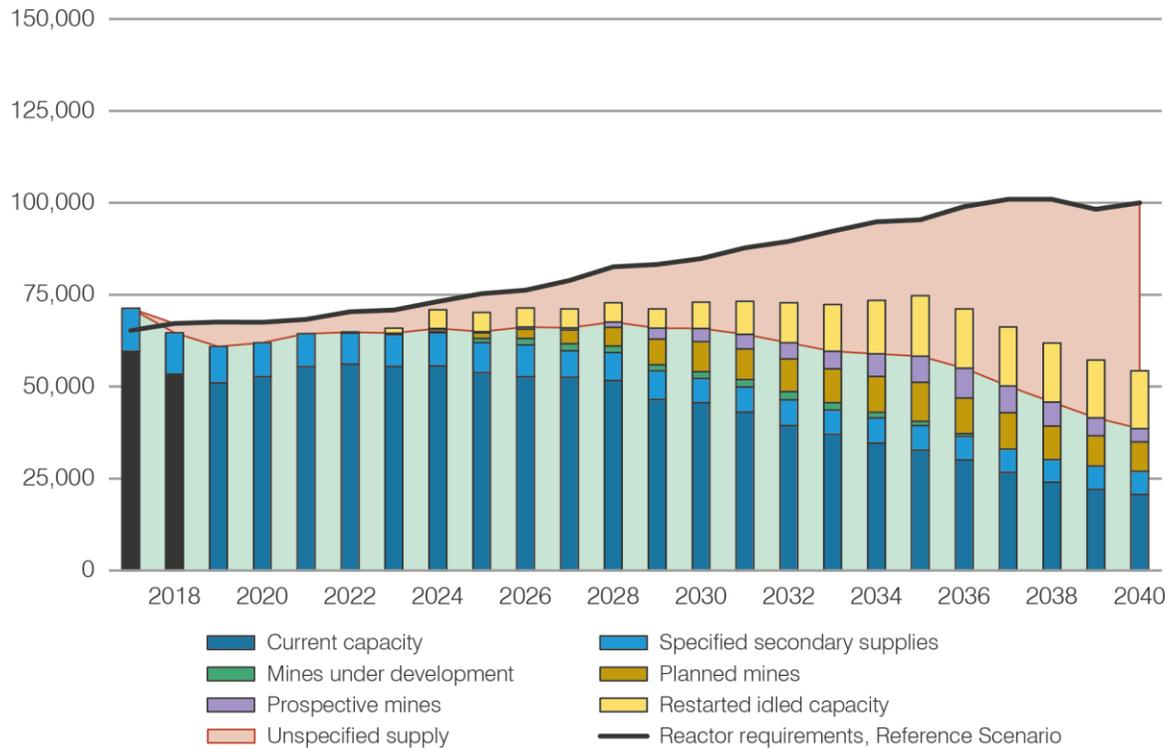
### Nuclear generation



Source: BP Energy Outlook 2020

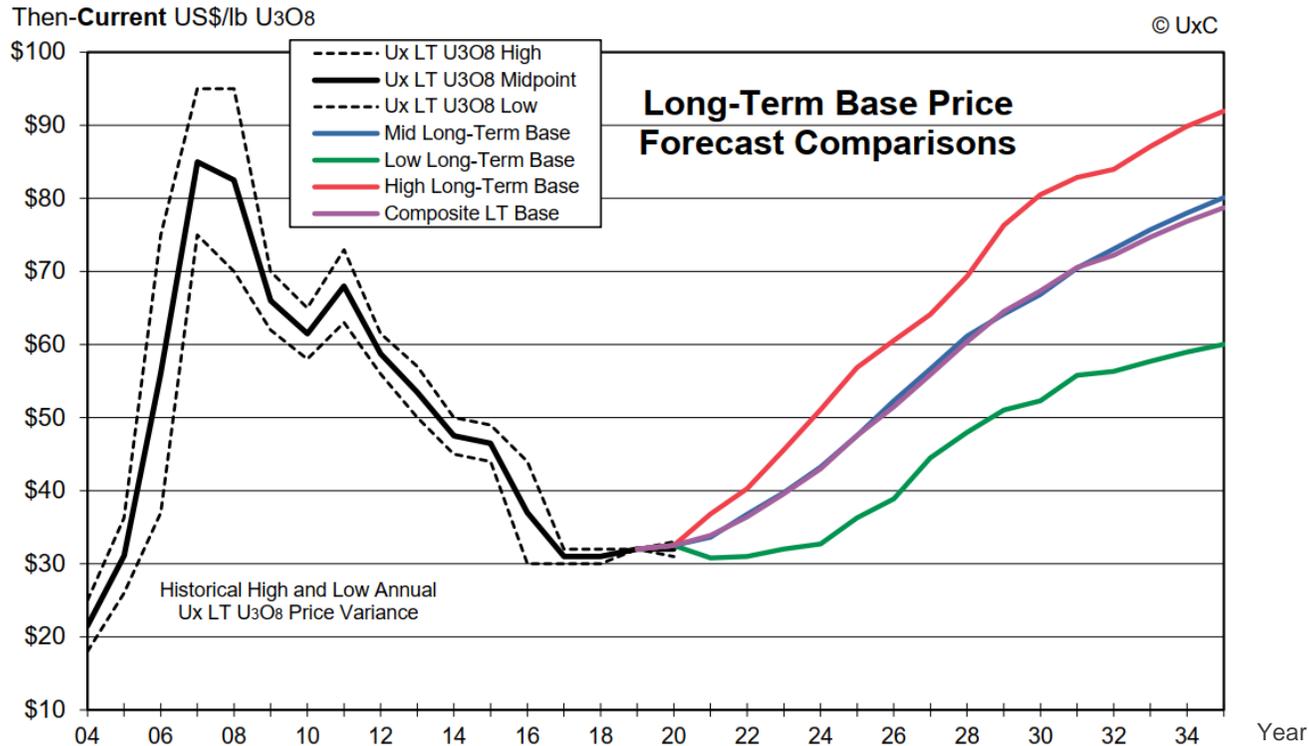
## Additional Uranium sources will be required to meet growing demand

Reference Scenario supply, tU



Source: World Nuclear Association

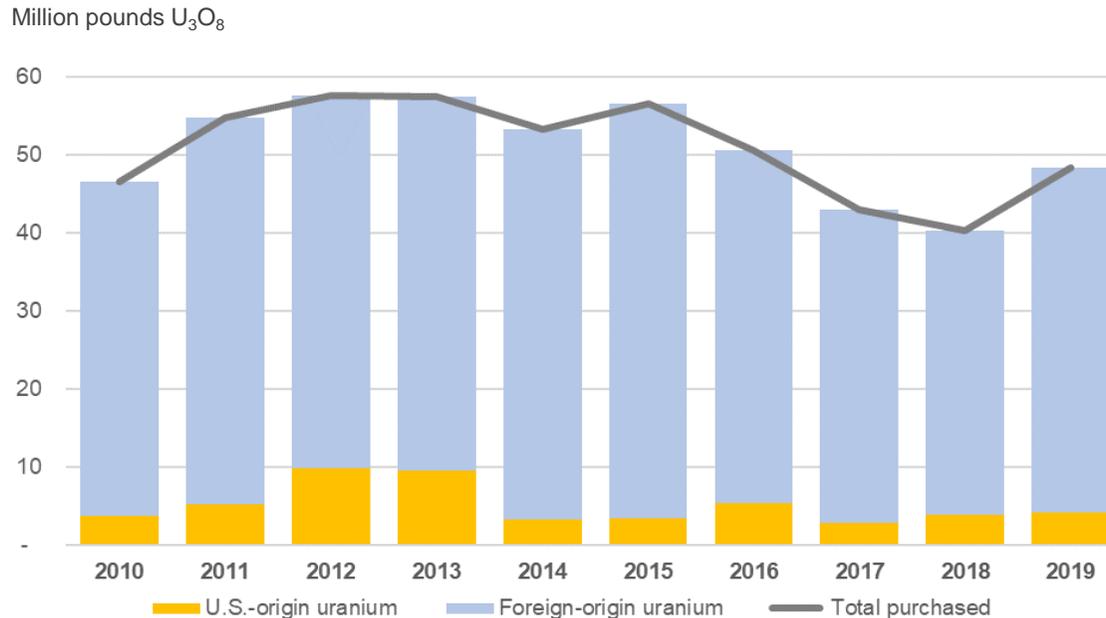
## Uranium Long-Term Base Price Forecast



Source: UxC Uranium Market Outlook, Q4 2020

- ❑ UxC forecasts mid-case uranium price ~\$45/lb by 2025 and ~\$65/lb by 2030
- ❑ Spot price now around \$28/lb – up over 50% since 2016 low (\$18/lb)

## Uranium purchased for US nuclear power reactors – 90% imported



Source: U.S. EIA *Uranium Marketing Annual Report*, May 2020

- ❑ US energy security concerns – triggered major government review of nuclear industry (2020)
- ❑ US has the largest nuclear fleet with 94 operating reactors - 20% of US electricity generation
- ❑ US uranium requirements currently met ~90% by imports (33% from Russia & Kazakhstan)
- ❑ Annual output from PLEF project could supply ~10% of US uranium requirements

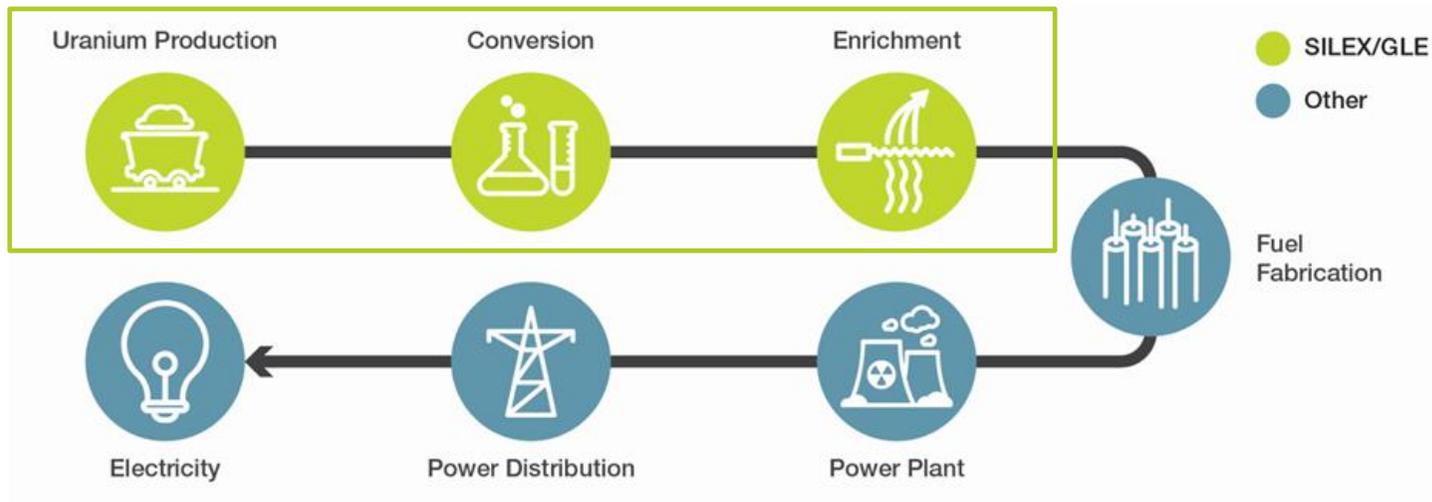


# **SILEX Uranium Technology Commercial Opportunities**

The SILEX technology provides GLE with multiple opportunities in the production of nuclear fuel:

- 1) produce **natural grade uranium** via enrichment of depleted tails inventories (Paducah project)
- 2) capture the **value of conversion** contained in the depleted  $UF_6$  tails material (Paducah project)
- 3) enrich natural uranium to produce **low enriched uranium (LEU)** to fuel nuclear power plants
- 4) enrich uranium further - **high assay LEU (HALEU)** to fuel advanced Small Modular Reactors

## The Nuclear Fuel Cycle



- ❑ GLE has a path to develop the largest ‘Tier 1 uranium resource’ in the US with the Paducah Laser Enrichment Facility (PLEF)
- ❑ Sales Agreement between GLE and DOE provides depleted UF<sub>6</sub> tails for enrichment with SILEX in the PLEF
- ❑ The PLEF project is akin to a large, low cost uranium mine producing ~5 million pounds U<sub>3</sub>O<sub>8</sub> p.a. for ~3 decades
- ❑ Potential for second stage enrichment of PLEF output from natural uranium to LEU and/or HALEU with additional capacity at Paducah
- ❑ Subject to technology commercialisation progress and market conditions, PLEF anticipated to be operational from around 2030



Paducah, KY Enrichment Plant Site

## SILEX Uranium Enrichment Technology Target Commercialisation Timeline:



\* Engineering, Procurement and Construction

- ❑ Several next generation SMR designs use High Assay Low Enriched Uranium (HALEU)
- ❑ SILEX technology may provide a flexible low cost alternative to produce HALEU for SMRs
- ❑ SMRs are modular, smaller size (50 MWe to 300 MWe) allows greater flexibility in deployment
- ❑ Designed for production-line manufacturing rather than conventional custom built capital projects, with significant reduction in capital costs and shorter construction times
- ❑ Leading contenders anticipated to be introduced commercially in early 2030's in the US



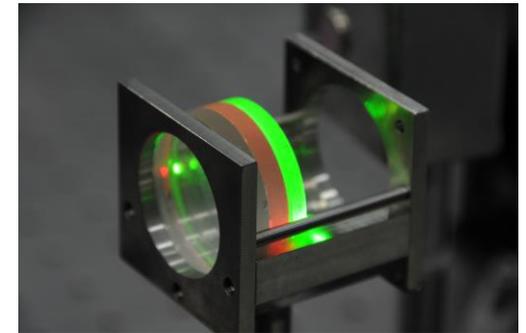
Small Modular Reactor (concept)

V



Conventional Large Scale Reactor

- ❑ GLE holds the exclusive worldwide license for the use of SILEX laser technology for uranium enrichment
- ❑ License agreement includes US\$20 million in payments to Silex triggered by commercial development milestones:
  - Commercial pilot demonstration US\$5m
  - Commencement of PLEF EPC US\$5m
  - PLEF commercial operations US\$10m
- ❑ Perpetual royalty of 7% (min.) on revenues generated by GLE from use of SILEX for production of natural and enriched uranium
- ❑ Royalty and milestone payments are in addition to equity-based distribution of profits payable from GLE's commercial operations

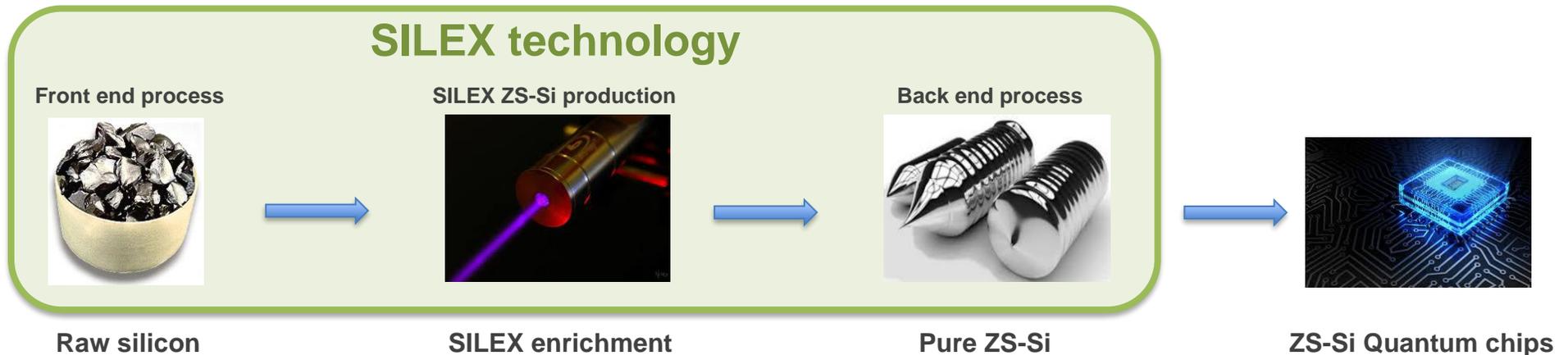




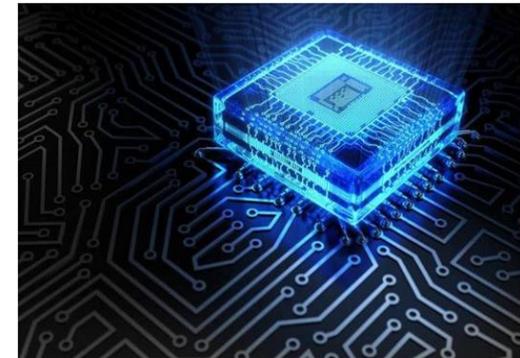
# Zero-Spin Silicon Project for Quantum Computing

## Commercialisation of the SILEX technology for Silicon Enrichment:

- ❑ Silicon-based QC is a leading technology contender for the emerging QC industry
- ❑ Opportunity to produce ZS-Si - the key enabling material for silicon-based QC
- ❑ Initial revenues under offtake agreement with first customer (SQC) anticipated from 2023

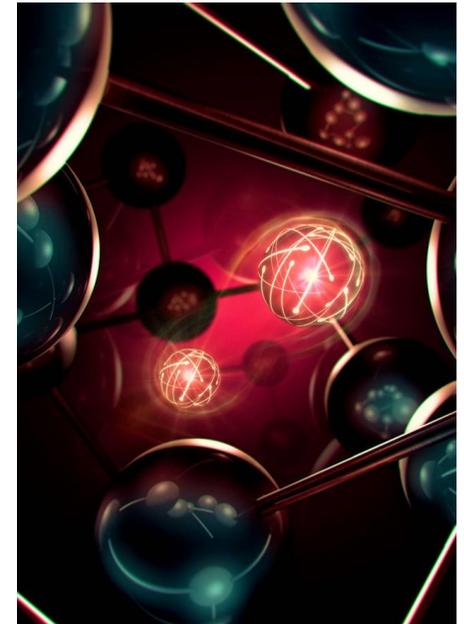


- ❑ ZS-Si is the key enabling material for silicon-based quantum processors which can leverage off the incumbent global silicon semiconductor industry
- ❑ Current centrifuge production of enriched silicon is limited and costly
- ❑ SILEX technology anticipated to produce much higher purity for lower cost
- ❑ QC's will be 1000's times more powerful than today's computers, creating new opportunities in medicine, AI, cybersecurity, finance, logistics etc
- ❑ Many governments around the world and key corporates such as Intel, Google, IBM, Microsoft are vying for leadership in QC development
- ❑ Project partners SQC and UNSW part of the Federally funded 'CQC2T Centre of Excellence' – a world leader in QC technology development
- ❑ Project completion targeted at end of CY2022 - supported by \$3 million Federal CRC-P funding grant and \$1.8 million product Offtake Agreement with SQC, representing the first commercial customer



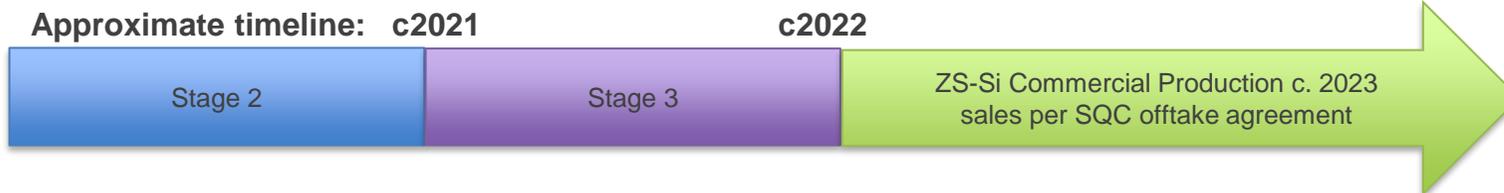
- ❑ Project aims to produce a secure supply of ZS-Si to support emerging global silicon quantum computing industry
- ❑ **Stage 1:** (Completed) Established ‘proof-of-concept’ for the LIS process, successfully completed on schedule in June 2020
- ❑ **Stage 2:** (Underway) Validation of the LIS technology and scalability for ZS-Si production - scheduled for completion at the end of CY2021
- ❑ **Stage 3:** Full technology demonstration for ZS-Si production at commercial pilot scale - targeting completion at the end of CY2022

***Stage 3 pilot plant anticipated to be able to produce initial commercial quantities for SQC and other customers from 2023 onwards***



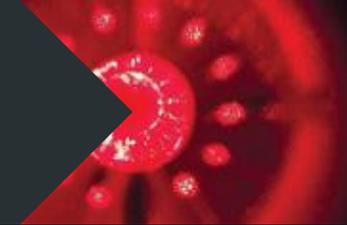
Prof. Michelle Simmons team at UNSW/CQC2T demonstrated the fastest 2 qubit gate in silicon using atomic qubits. Nature 571, 371 (2019) (Illustration by Tony Melov)

## ZS-Si Production Commercialisation Timeline:





# **cREO<sup>®</sup> Advanced Semiconductor Technology**



## The Global Transition to 5G Mobile Communications:



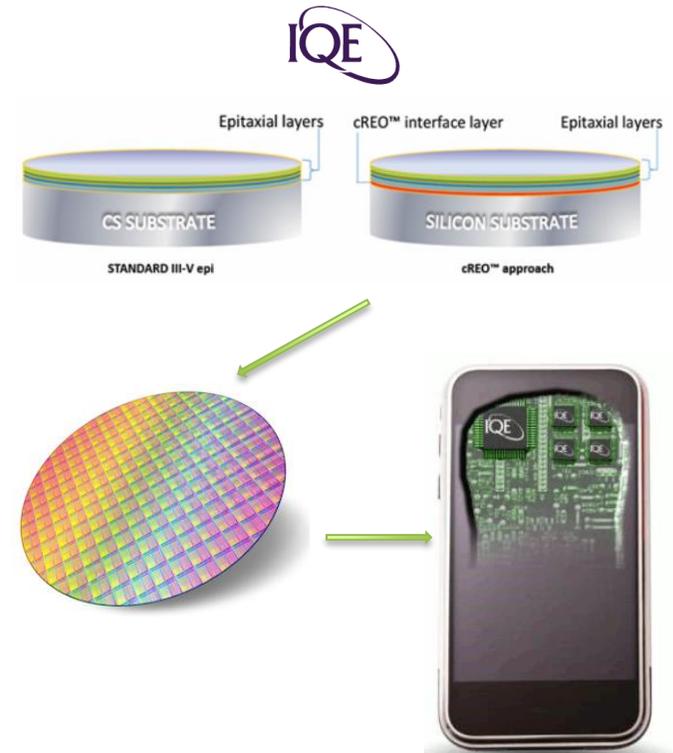
### 5G Handset Filter Technology Experiencing High-end Frequency Challenges

- ❑ Signal processing filters made with traditional materials experience problems at higher 5G frequencies
- ❑ Specifically, there are fundamental challenges for incumbent Bulk Acoustic Wave (BAW) filter devices
- ❑ The 5G industry is looking for solutions compatible with current 5G infrastructure and processes

### The IQE Solution – IQepiMo<sup>™</sup> based on cREO<sup>®</sup> Template Technology

- ❑ IQE has developed a new filter device using its proprietary IQepiMo<sup>™</sup> technology to eliminate this issue
- ❑ IQE's IQepiMo<sup>™</sup> device is enabled by use of the cREO<sup>®</sup> template technology
- ❑ cREO<sup>®</sup> may also open up other possibilities beyond 5G filters including Power Electronics applications

- ❑ Silex's 'Rare Earth Oxide' (cREO<sup>®</sup>) technology purchased by UK-based IQE in 2018 with payment of US\$5 million (in IQE shares)
- ❑ IQE is global leader in the supply of advanced semiconductor wafer products used in many of today's semiconductor devices e.g. wireless communications, sensing, power and photonics
- ❑ IQE is a key supplier to the emerging global 5G wireless communications market, including smart phone handsets
- ❑ A perpetual royalty of at least 3% of IQE's revenues derived from use of the cREO<sup>®</sup> technology payable to Silex
- ❑ Second minimum royalty payment (US\$400k) received February 2021



Source: IQEp.com



# Summary

-  Silex (51%) and Cameco (49%) supporting GLE's efforts to complete commercialisation of SILEX uranium enrichment technology
-  GLE's path to market focused on the PLEF opportunity - a large, low cost uranium production project with additional potential for uranium enrichment to produce LEU and HALEU nuclear fuels
-  Long-term fundamentals for global growth in nuclear power remain very positive, with a significant potential uranium supply deficit looming in the absence of timely new production
-  SILEX silicon enrichment technology being developed to produce Zero-Spin Silicon in support of global efforts to commercialise silicon quantum computing
-  cREO<sup>®</sup> technology being advanced by IQE towards commercial deployment in the emerging 5G communications market with the successful demonstration of 5G filter devices

***Company's balance sheet remains solid with net assets of ~\$27.3m, including ~\$15.1m in cash and approximately ~\$12.2m in IQE shares (as at 31/12/20)***



**Thank you**