PhosEnergy, delivering sustainable power solutions

PHOSENERGY

AGM Presentation

29th July 2021

Board and Management

Mr Tim Wise
B.Sc
Executive Director

- Corporate and technical advisor with over 25 years experience in public companies and markets
- Founder Kalina Power Ltd
- Director Tamaska Oil & Gas Ltd
- NED Graft Polymer plc
- NED Melchor Pty Ltd

Mr Bryn Jones
BAppSc MMinEng FAusIMM
Managing Director

- Evaluation, development and operational experience in the minerals and technology industry
- Director Boss Energy Ltd
- NED DevEx Resources Ltd
- NED Australian Rare Earths Ltd

Mr Tim Goyder
Non-Executive Director

- Highly successful entrepreneur and company Director
- Over 30 years experience in the resources industry
- Exec. Chair Chalice Gold
- Chair of Liontown Resources
- Chair of DevEx Resources

Mr Anthony Kiernan
Non- Executive Chairman

- Corporate advisor with over 35 years experience in the operation of public companies
- Lead Independent Director – Northern Star Resources Ltd
- Chair of Pilbara Minerals
- Chair Redbank Copper

A proven and highly credentialed team

The Team
Technical and Management

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Mr Bryn Jones
BAppSc MMinEng FAusIMM
Managing Director

- Evaluation, development and operational experience in the minerals and technology industry
- Director Boss Energy Ltd
- NED DevEx Resources Ltd
- NED Australian Rare Earths Ltd

Dr Julian Kelly
PhD, BSc, HONS
Chief Scientist

- Chemical Physics professional with a career in technical commercialisation
- Former ANSTO Researcher
- SA Nuclear Royal Commission
- Thor Energy (Norway) – Thorium fuel development

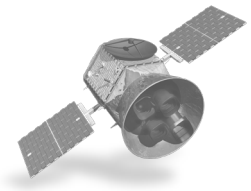
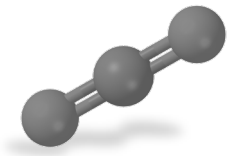
Dr Andrew Barton
PhD, MSc, BEng 1st hons
Strategic Space Advisor

- Aerospace professional specialising in space commercialisation
- Exec. Dir. – SmartSat CRC
- Fmr. Head of Engineering – Southern Launch
- Fmr. Technical Director – Google Lunar XPRIZE

Leigh Whicker
MBA, AdvDipRBM
Corporate Manager

- Technical and management professional with key strengths in defence, space and oil & gas.
- Extensive Space and Defence networks – Industry and Government
- Executive – Defence Teaming Centre (SA)

The PhosEnergy Technologies

Sector	PhosEnergy Technology	Application	PhosEnergy advantage
 **Agriculture**	**PhosEnergy Process –** Proven technology for recovering uranium from phosphate fertilizer streams	The PhosEnergy process can be retrofitted to existing phosphate production facilities to produce uranium	✓ Production of Uranium with out the need for traditional mining ✓ Cleans up the food chain through the removal of radioactive material from Phosphate fertiliser streams
 **Space - Green energy provision**	**Gen X –** Electron harvesting technology generating long term, reliable power using beta isotopes as a 'fuel' source	Provision of power to satellites, space vehicles and sensors	✓ Reliable long term maintenance free power ✓ No requirement for solar recharging
 **Industry – Carbon capture and utilisation**	**Carbon X –** Utilises Beta Activated Ceramic technology to destabilise CO_2 molecules and convert them to useful chemicals	Converting CO_2 produced by industry into useful chemicals such as methanol	✓ Utilising waste to produce useful chemicals
 **Industry – Recycling, waste heat recovery**	**Gen T-** Reduces energy loss by capturing waste heat and turning it into useable power	Capturing waste heat to produce power and decrease energy costs for industry	✓ Efficient utilisation of industrial waste heat

Developmental timeline

Phos technology	Early stage	Developing	Advanced	Commercial partners
Phos Process	PFS Completed (2015): Facility producing estimated 400,000lb U3O8 per annum over 25 years Operating cost within lowest quartile of all uranium production worldwide – low $20's /lb U3O8			Cameco
Gen X	Uni SA Phase 1 and 2 studies completed with prototype testing (TRL7 – Space Ready) completed 1H 2023			
Carbon X	Beta Activated Catalyst POC testing completed in 2020 with larger scale optimization testing occurring 2H 2021			
Gen T	POC Completed. Demonstration planned for 2H 2021			

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The PhosEnergy Process

Advanced technology to recover uranium from phosphate fertilizer streams

PhosEnergy
A Global Opportunity

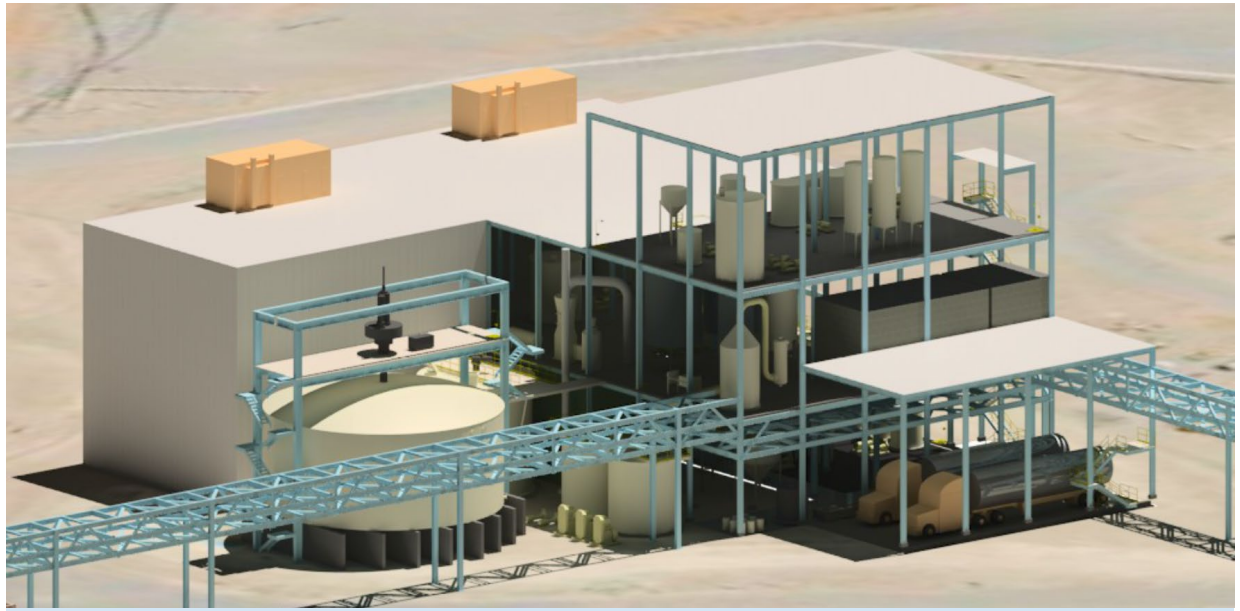
Worldwide >140Mt* phosphate processed annually

- ~20Mlb of contained U3O8
- ~6Mlb potential in USA
- Not currently recovered
- Multiple potential development opportunities globally

Major phosphate production

- USA
- Morocco
- Tunisia
- Saudi Arabia
- China

25% Partner with Cameco, A$23M spend

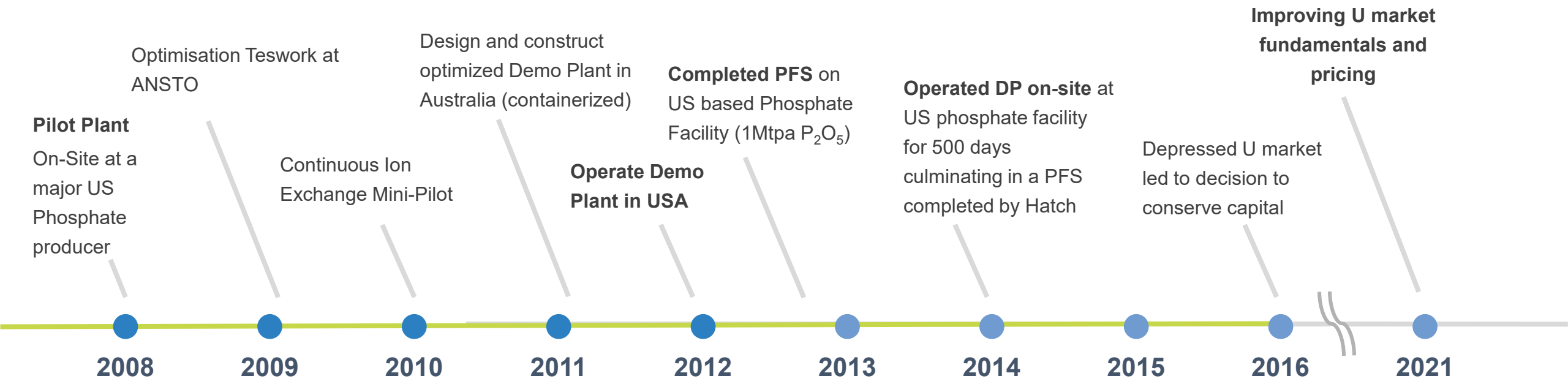


- **PFS Completed** for producing ~400,000lb U3O8 per annum over 25 years +; AACE Class IV estimate by top tier engineering house
- Operating cost within lowest quartile of all uranium production worldwide – low $20's /lb U_3O_8
- Uranium loaded resin transported to licensed facility for processing
- Opportunity co-produce significant amounts of vanadium with little additional processing

** Source: IFDC Market Report June 2011 – World Phos Acid Capacity*

PhosEnergy Process
Developmental Timeline

Technical Achievements



Pilot and Development | **Demonstration** | **Positive PFS – market recovery**

GenX
Filling a need in Space

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The Need

- Reliable, maintenance free, fuel free power supplies that can outlast mission objectives, particularly where solar energy is ineffectual

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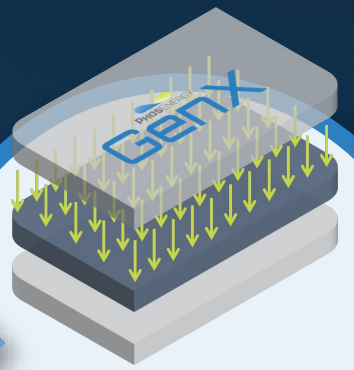
The Technology

- GenX Energy aims to provide a scalable solution, tailored for mission power requirements and durations to fill this need.



GenX Energy

- Smart, light weight electrode systems with ‘on board’ beta radiation energy source provides reliable power over decades without external fuel requirement.

GenX
Overview

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- GenX is a beta-voltaic power generator meaning it converts energy from beta radiation emissions into power without the need for an external fuel supply – the ‘fuel’ is the inherent energy in the beta-emitter.
- In recent proof of concept experiments GenX’s unique semiconductor-metal electrode configuration has been shown to effectively harvest power from the semiconductor layer when excited.
- A demonstration unit is currently under construction with a prototype unit planned to follow which will be tested in a space equivalent environment to allow commercial demonstration.

GenX

Space: Big business, getting bigger

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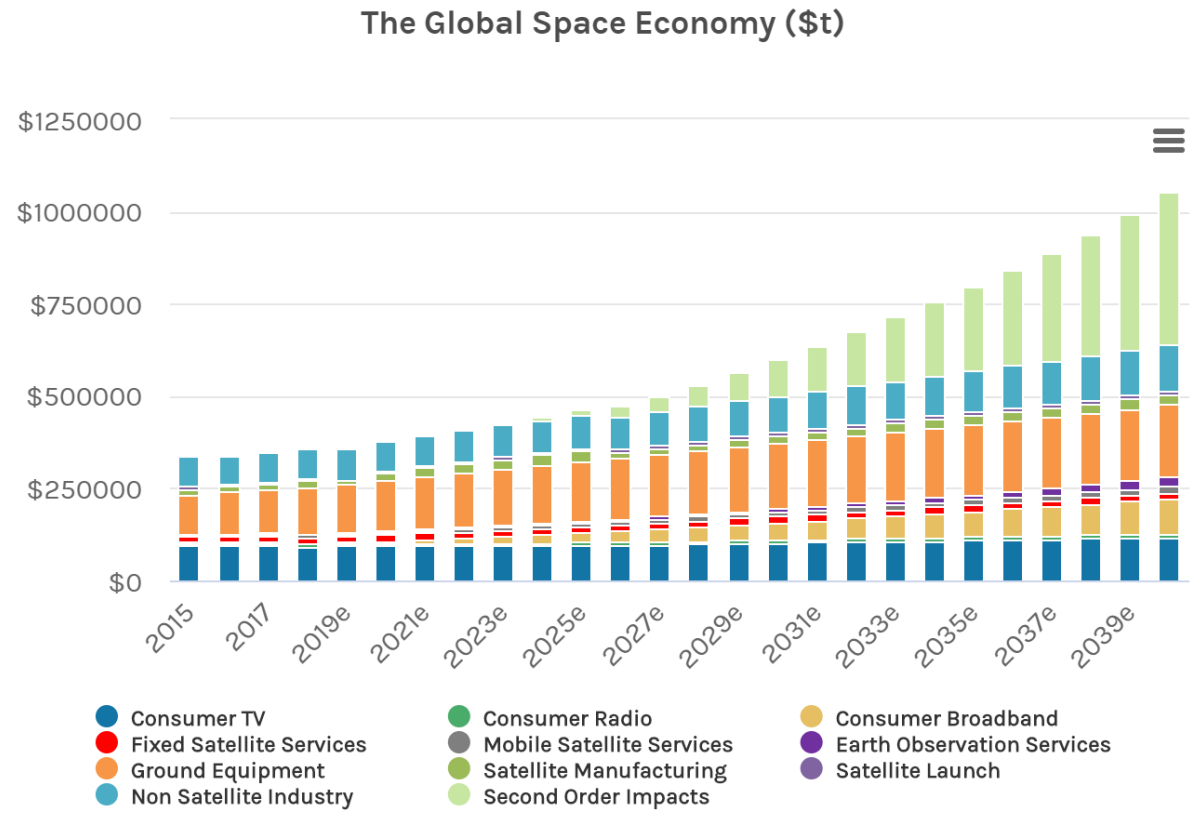
- Globally the '**New Space Economy**' is being driven by*:
  - Reduced cost to access Low Earth Orbit (LEO)
  - Increase in global data demand (Internet of Things)
  - Global coverage telecommunications
- The Australian Federal Govt aims to increase its spending in the space sector to $12 billion by 2030. A CAGR of 8.5%**
- DOD (Aus) will invest up to $7 billion over the next decade on space capabilities***

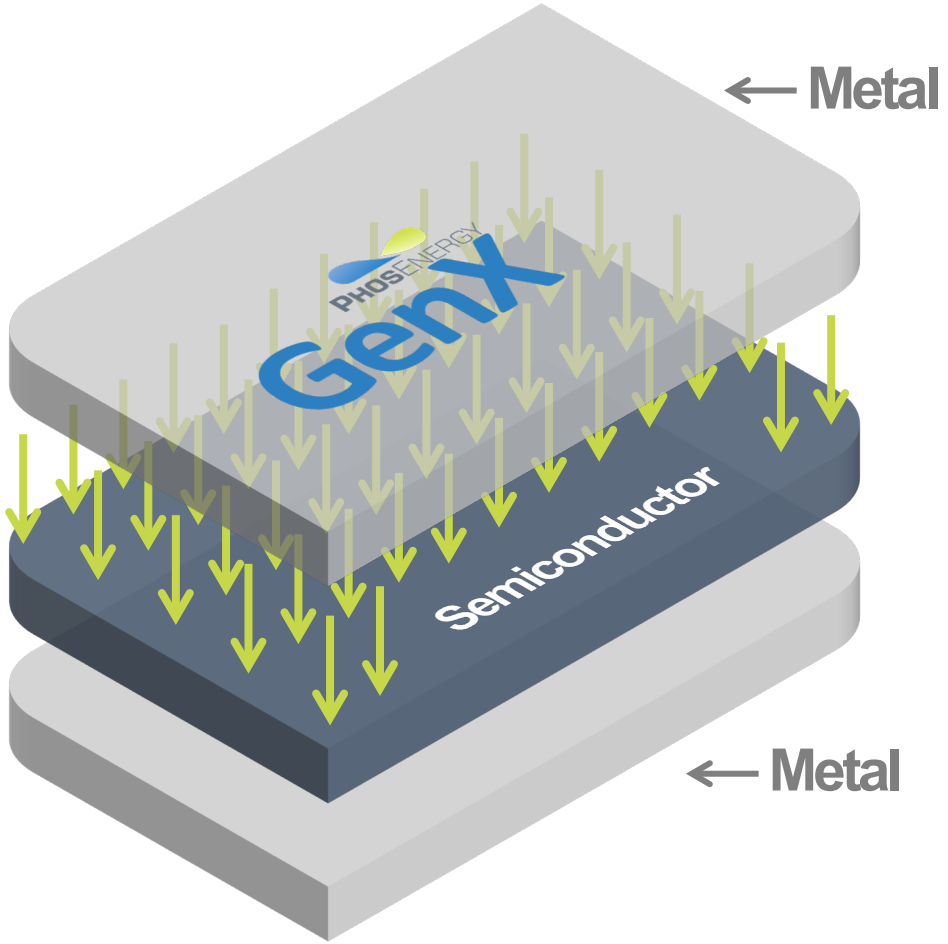


Source: Haver Analytics, Morgan Stanley Research forecasts

** Space – Investing in the Final Frontier – Morgan Stanley Jul 24, 2020*
*** Advancing Space – Australian Civil Space Strategy 2019-28*
**** 2020 Force Structure Plan (Chapter 7)*

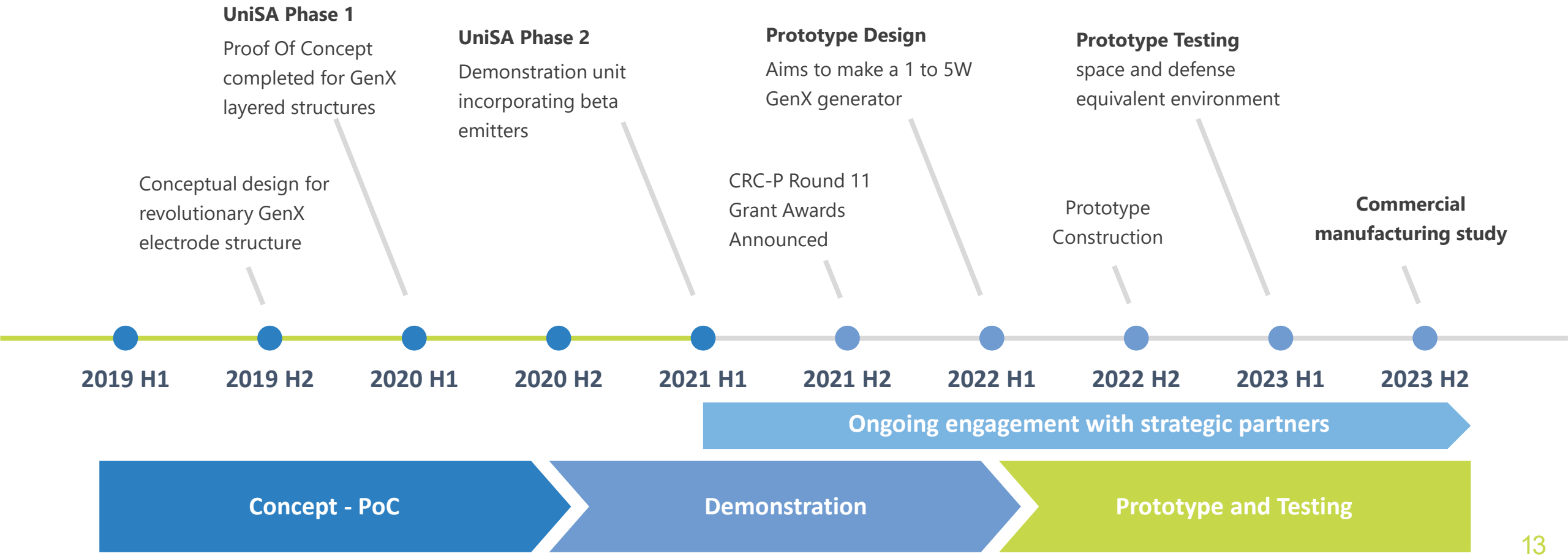
GenX
How it Works

- A smart 'sandwich' electrode structure provides a strong electric field which enables excited electrons to be efficiently harvested, thereby creating a usable electric current (ie, power).
- The physics principles underpinning GenX Units are very similar to that of traditional photo-voltaic cells however the use of beta radiation has significant advantages over sunlight:
    i. It is 100s to 1000s of times more energetic, per particle, than UV photons;
    ii. A beta-source can be loaded into the power generating unit with no impact on size or weight;
    iii. Beta-sources emit energy continuously, and for long periods (many years);
    iv. Energy can be deployed at the site where the power is required.
- The radioactive isotopes that 'fuel' the system are safe: GenX Units are designed so that no radiation emanates from the power generating device.
- The isotopes used by GenX Units are by-products from a range of industrial processes, giving an energy value to material typically considered a ‘waste’ liability.



GenX
Developmental Timeline

Technical Achievements



GenX
CRC-P Application Lodged

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CRC-P Partners

University of South Australia

DEWC SYSTEMS

Duromer

THE UNIVERSITY OF WESTERN AUSTRALIA

INTERNATIONAL SPACE CENTRE

Letters of Support

ADELAIDE SOUTH AUSTRALIA | Government of South Australia

AMGC ADVANCED MANUFACTURING GROWTH CENTRE

THE UNIVERSITY of ADELAIDE

SOUTH AUSTRALIAN SPACE INDUSTRY CENTRE

Government of South Australia
Department for Innovation and Skills

The Andy Thomas Space Foundation

CarbonX
How it Works

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CarbonX
Overview

- CarbonX is a groundbreaking technology, which has the potential to profitably convert CO_2 to methanol and other commercial products without prohibitive energy input.
- POC experiments in 2018 successfully converted CO_2 to methanol and other compounds.
- In 2020 PEL produced the first beta-activated catalyst (BAC) and successfully demonstrated a specific reaction rate of 10^4 chemical conversions per beta emission.
- PEL is now planning optimization testing to develop commercial parameters feasibility analysis.

CarbonX

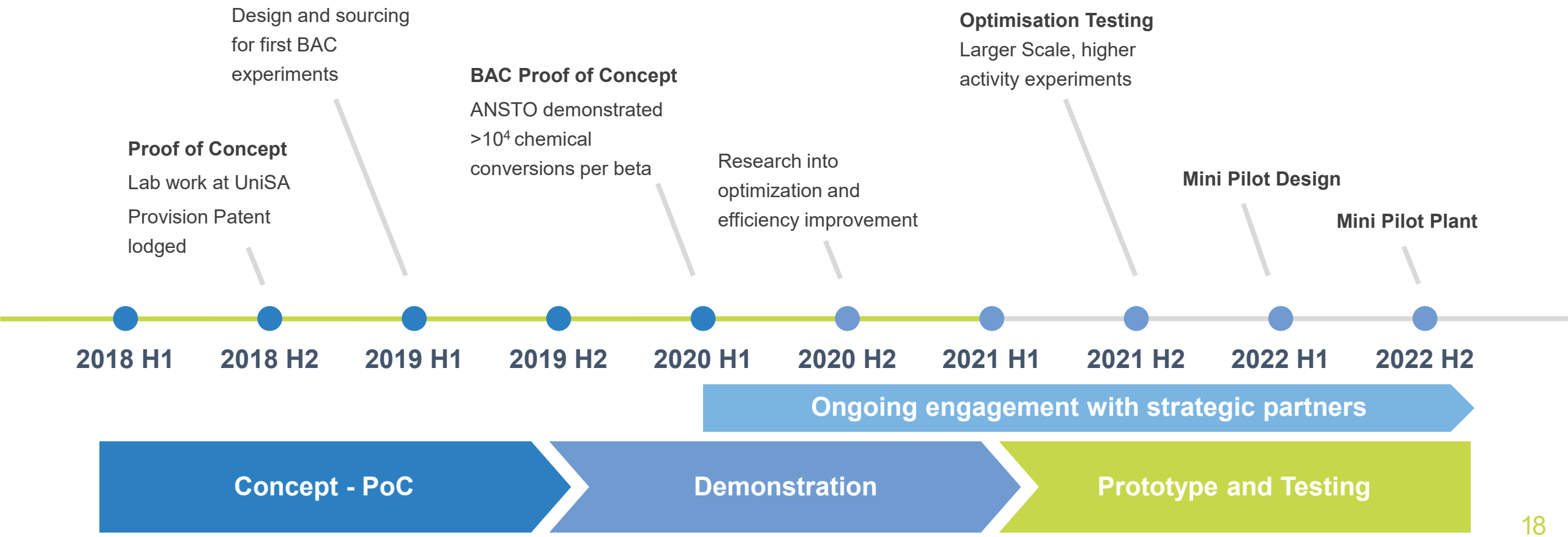
How are we different?

The science of CO_2 utilisation to produce usable compounds is well understood. So how are we different?

- The team has a proven capability of developing complex chemical processes and delivering step changes to industry.
- Previous approaches have used low powered UV light, electrical power or high pressure and heat to energise the conversion reaction.
- PhosEnergy utilises beta emitters to provide a reliable driving force for the reaction.
- Potential sources of revenue include toll CO_2 removal, technology supply/licensing, CO_2 offset trading, etc.

CarbonX
Developmental Timeline

Technical Achievements



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Other Technologies

Leveraging the GenX electrode system and construction methodology to additional applications

GenT
Overview

- The successful in demonstrating the effectiveness of the Company's unique electrode-semiconductor arrangements in GenX has opened a range of commercial opportunities for additional technology deployment.
- GenT is the first of these technologies to be patented and leverages the GenX technology to convert infrared energy from waste heat sources (heat) into electrical power cheaply and efficiently
- Additional technology applications are being ranked for development priority and will be announced as they progress.

The Company sees the electrode technology developed for the GenX opportunity as a platform for multiple technology deployments servicing many industries.

RHU Overview

- The Company recently announced a successful application for a $90k Moon2Mars demonstration grant through the **Australian Space Agency**
- The grant considers the development of an Australian supply chain sourced Radioisotope Heather Unit (RHU) for deep space and lunar applications to enable electronics systems to remain functional in these environments
- The RHU casing designs will have synergies with the GenX casing design

The Company is working toward achieving flight heritage for its RHU design which will ultimately build on the GenX overall design.

Patent and IP protection

- PhosEnergy Process:
  - A portfolio of patent protection exists covering key phosphate producing countries;
- GenX:
  - International application filed under the PCT (WO/2020/232507)
  - Developing umbrella of know-how and trade secrets to compliment patent
- CarbonX:
  - International application filed under the PCT (WO/2020/124169)
- GenT:
  - Australian provisional application filed (Australian Provisional Patent Application No. 2020903248)

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Corporate Snapshot

Corporate Snapshot

- Successful placement of **$4.195 million** to new sophisticated and institutional investors at $0.10 psh
- 1:5 rights issue aiming to raise a further $2.0 million closed on 27th July with $1.3 million raised
- The company may seek to place the remaining rights issue shortfall over the coming months

Shares post rights issue	113.2M
Shortfall shares	6.9M
Fully Diluted	113.4M
Cash (post offer)	$5.2 million

- Major Shareholders following placement:
  - Tim Goyder - 12.6%
  - Devex Resources – 5.1%

Sources and uses of funds

Sources	$m	Comments
Offer proceeds	6.0	Placement and Entitlement offer, excluding costs
Total sources	6.0	

Uses	$m	Comments
Gen X	2.95	▪ Complete stage 1 Demo unit (2021) ▪ Complete stage 2 prototype unit test in space equivalent environment (TRL7) ▪ Develop manufacturing methodology and plan ▪ Continue to engage with customers, beta-emitter suppliers and customers ▪ Develop commercialization model
Carbon X	1.5	▪ Additional testing in high CO2 environment under varying conditions ▪ Assess various BAC options for manufacturability and performance ▪ Design and manufacture preferred BACs for pilot testing ▪ Continue to engage with CO2 emitters and product end-users
Other Projects	0.45	▪ Gen-T: Leveraging the GenX electrode system to generate power form waste heat sources ▪ PhosEnergy: Continue to evaluate uranium market opportunities for monetization of the technology ▪ Investigate additional opportunities to leverage PEL's expanding IP portfolio
Offer costs and general working capital	1.1	
Total uses	6.0	

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