



**TITANIUM**  
CORPORATION

# Creating Value from Waste in Alberta's Oil Sands

Presentation to APEGA December 12, 2019



Creating Value from Waste™

# Cautionary Notice

Certain statements made in this presentation are forward-looking statements and information that reflect the current expectations of management about the future results, performance, achievements, prospects or opportunities for Titanium Corporation Inc. ("Titanium" or the "Company"). Forward-looking statements, by their very nature, are subject to inherent risks and uncertainties and are based on several assumptions, both general and specific, which give rise to the possibility that actual results or events could differ materially from our expectations expressed in or implied by such forward-looking statements.

The Company has not commercially implemented Creating Value from Waste™ ("CVW™") technology and there can be no assurance that the Company's research, pilot programs, studies and commercialization efforts, including the completed FEED Study Project will prove to be accurate as actual results and future events could differ materially from those expected or estimated in such forward-looking statements. Unless otherwise noted, the data and anticipated future benefits contained in this presentation are based on results from the Company's demonstration piloting and have not been proven otherwise.

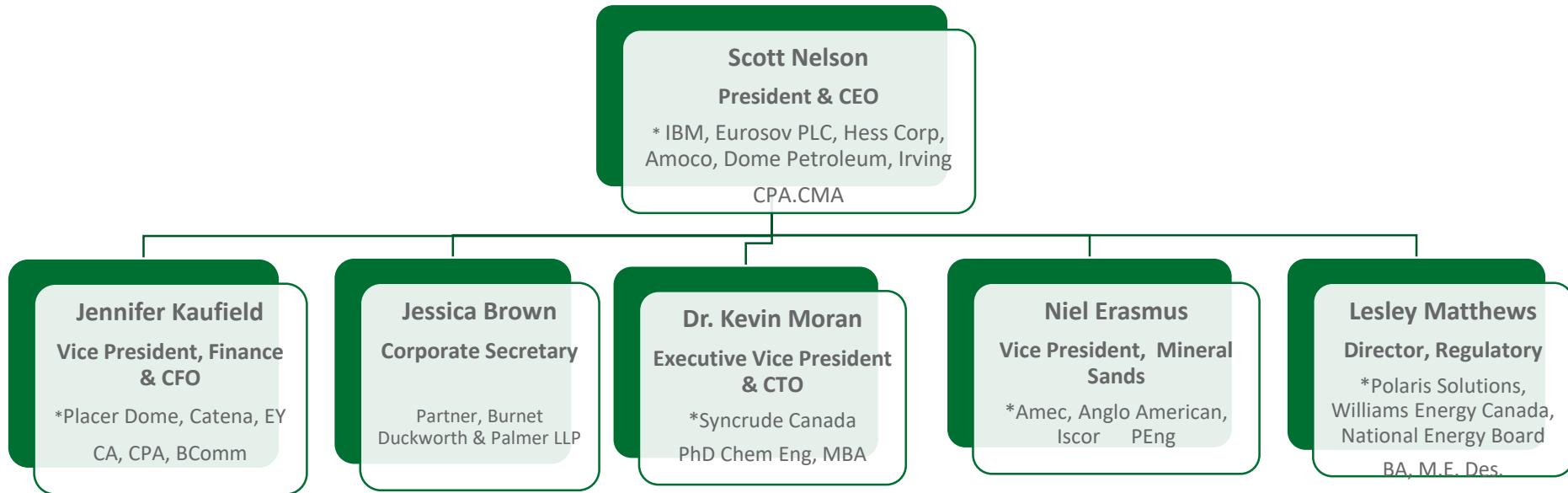
As a result, we cannot guarantee that any forward-looking information will materialize and we caution you against relying on any of this forward-looking information. Accordingly, readers should not place undue reliance on forward-looking information.

For a description of the assumptions and risks underlying the forward-looking statements in this presentation, refer to the slide at the end of this presentation entitled "Disclaimers" and consult Titanium's management's discussion and analysis for the nine month period ended September 30, 2019 dated November 18, 2019 and in other reports filed with the securities regulatory authorities in Canada from time to time and available on SEDAR ([www.sedar.com](http://www.sedar.com)).

# About Titanium Corporation

- Publicly listed Canadian company: TSXV symbol “TIC”
- Headquartered in Calgary, Alberta, Canada and working with the mining oil sands industry
- Developed a suite of proprietary technologies - Creating Value from Waste™ CVW™ technology designed to recover heavy minerals, bitumen and solvent from oil sands tailings
- Fills a gap in tailings management and delivers environmental benefits including reducing methane/GHGs and VOCs and producing cleaner tailings for deposition
- Creating a new minerals industry for Alberta and Canada with exports to meet global demand
- Titanium holds 21 patents for the CVW™ suite of technologies

# A team with deep resource, technology and finance experience



\* past experience

## Director

**David Macdonald, Chairman**  
**Brant G. Sangster**  
**Bruce Griffin**  
**Moss Kadey**  
**John Stevens**  
**Scott Nelson**

## Background

Investment/Merchant Banking  
Oil Sands, Petro Canada ret.  
Mineral sands (BHP, TZMI, Lomon)  
Private Investor  
Private investor/corporate law  
Resource & energy industries , Technology

## Other Boards

Glencoban Capital Management.  
Inter Pipeline Ltd.  
Lomon Billions Group  
Brita GmbH  
Arva Limited  
President & CEO Titanium Corp.

# About Creating Value from Waste™ Technology

- CVW™ is a suite of patented froth treatment technologies designed to reduce the environmental footprint of tailings ponds while recovering valuable products that would otherwise be lost in ponds
- These technologies recover bitumen, solvents, heavy minerals and rare earths from froth treatment tailings, preventing them entering ponds and the atmosphere
- Industry wide implementation could have a large impact on future GHG emissions from tailings and the extraction of heavy minerals

# Industry is committed to improving environmental performance and tailings management



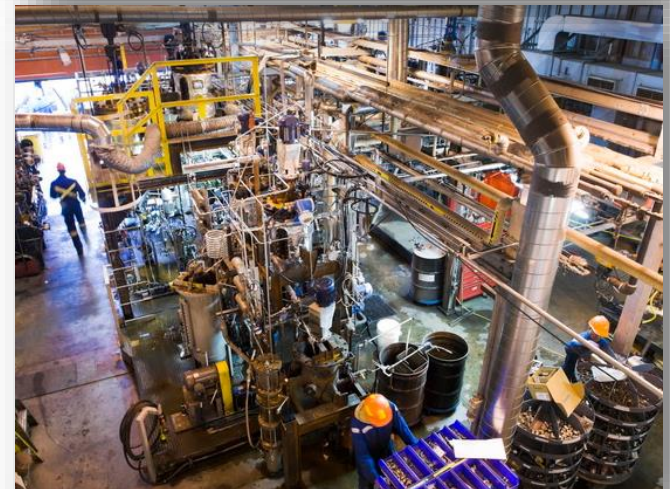
## Froth treatment tailings:

- 80% water
  - 17% solids (heavy minerals and sands)
  - 2% bitumen
  - 1% diluent
- 
- Over 12 million barrels of bitumen and solvent are lost each year in the mining sectors froth treatment tailings and discharged to ponds (33,000 bpd)
  - These hydrocarbons create methane/GHG and VOC emissions
  - Over 500,000 tonnes per year of valuable heavy minerals, primarily zircon, are lost in tailings ponds industry-wide
  - Remediation of tailings is an industry and government priority



# CVW™ Technology Value Proposition

- **Recovers valuable commodities**  
Bitumen, solvent, heavy minerals, rare earths
- **Reduces and avoids emissions from ponds and tailings**  
Methane/GHG and VOCs
- **Fills a gap in tailings management**  
Reduces tailings in ponds, progressive remediation, final deposition, improves water quality for recycling
- **Creates value for stakeholders**  
Attractive economics, new minerals industry, new jobs, opportunities for indigenous communities, increased government revenues, economic diversification and exports



*Demonstration piloting CVW™ technology*

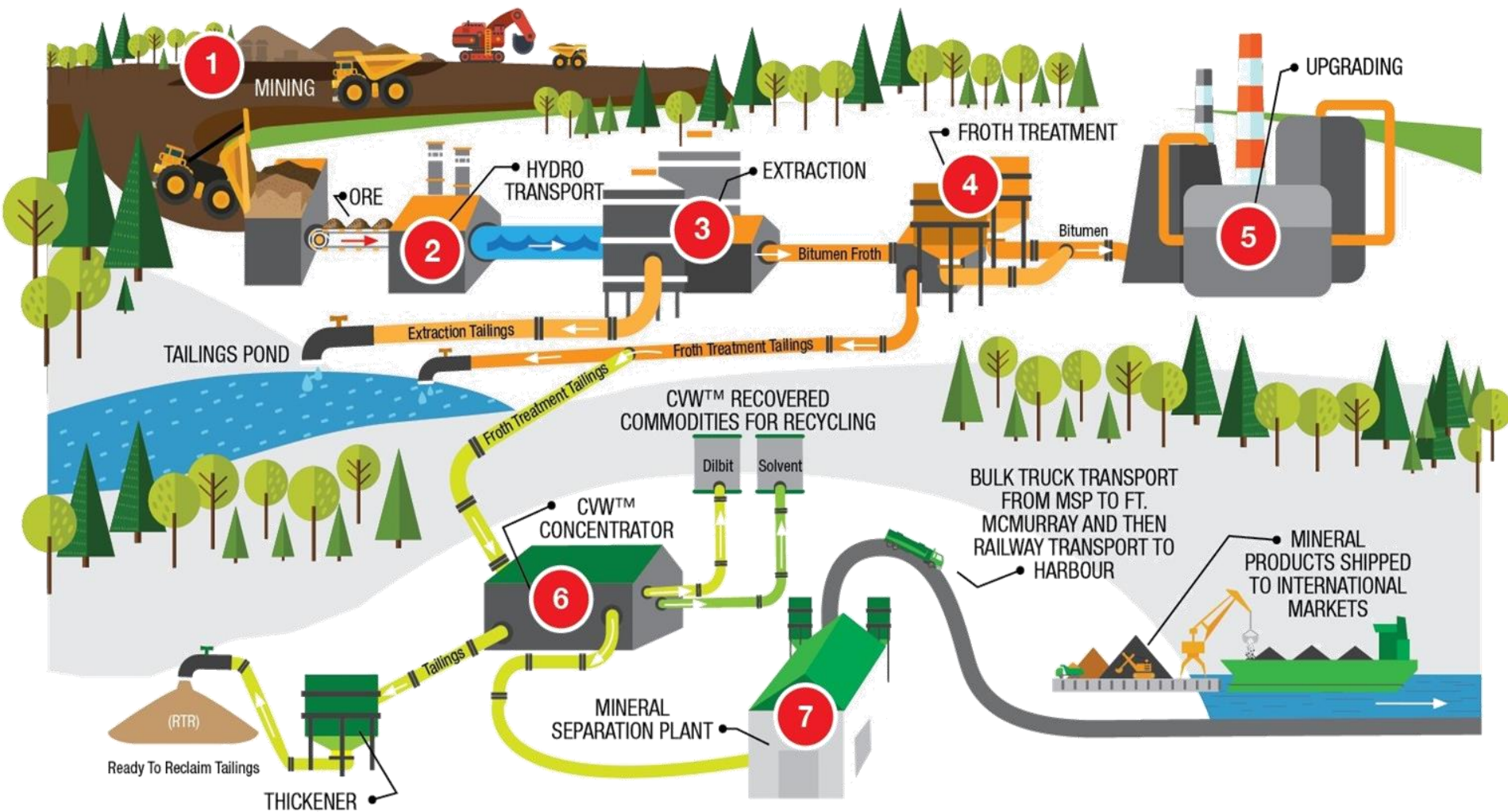
# Status of the first commercial project

- Titanium and Canadian Natural Resources Limited worked together to develop a design for the first commercial scale plant for CVW™ technology
- In 2019, we completed the front end engineering design (FEED) phase for implementation at Horizon
- Work is underway on key commercialization steps including minerals analysis and marketing, economic modelling and business structuring
- The technology has been developed with broad stakeholder support and collaboration including the Governments of Alberta and Canada, Canadian Natural and other oil sands operators, COSIA, ERA, SDTC, Alberta Energy, NRC, IRAP and others



## CVW™ TECHNOLOGY

Titanium's CVW™ technology intercepts oil sands froth treatment tailings and recovers lost bitumen and solvents 6 Valuable minerals 7 and reduces greenhouse gases, VOC emissions and other environmental impacts.



# CVW™ Applied Processing Technologies

## Concentrator Processes (Classified area)

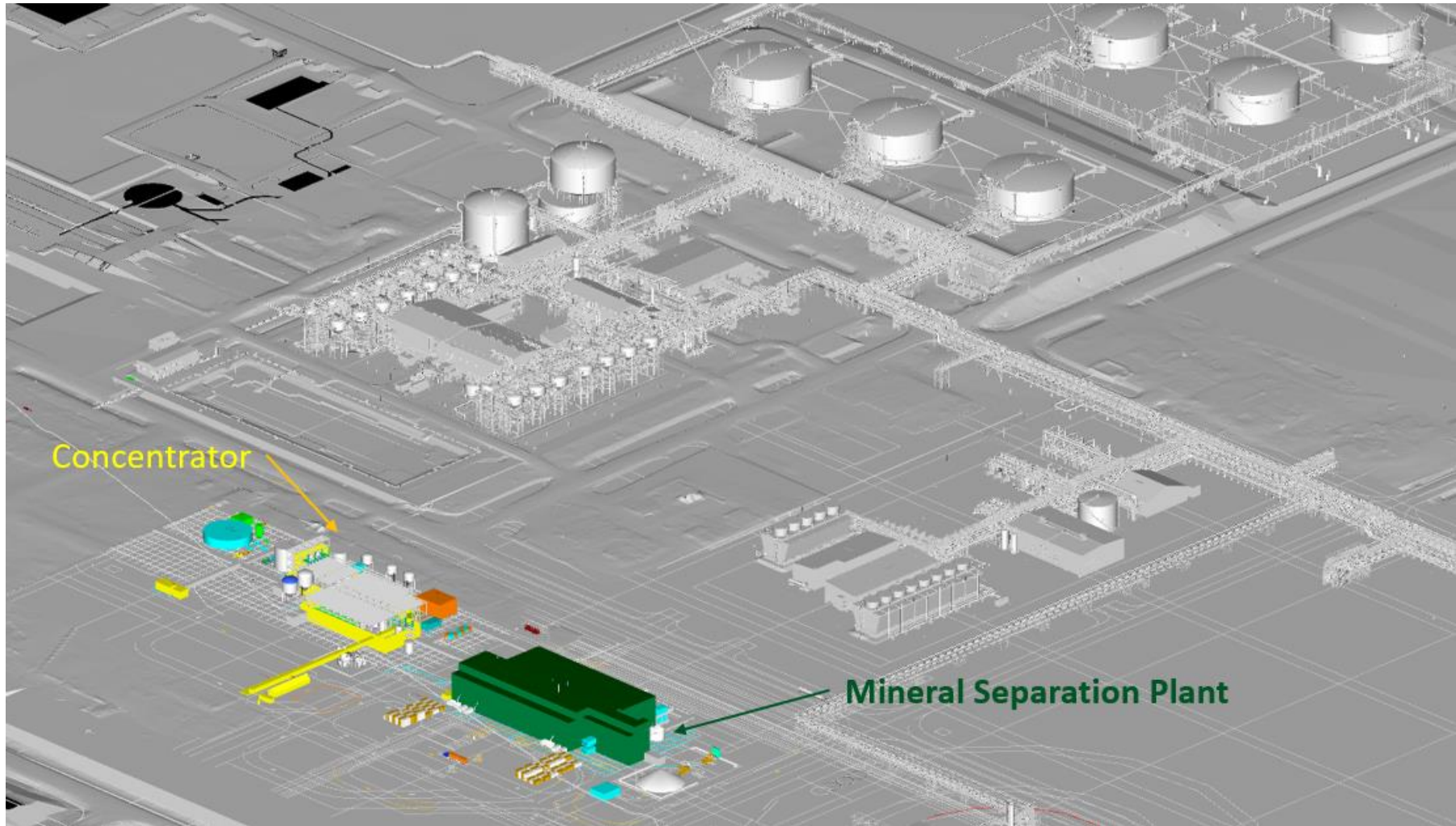
- Classification Cyclones
- Selective Flotation
- Solvent Extraction CCDs
- Distillation columns
- VRU (with utility flare tie-ins)
- Thickening (optional)

## Mineral Separation Plant (MSP) (Non-Classified)

*Typical for Mineral Sands industry:*

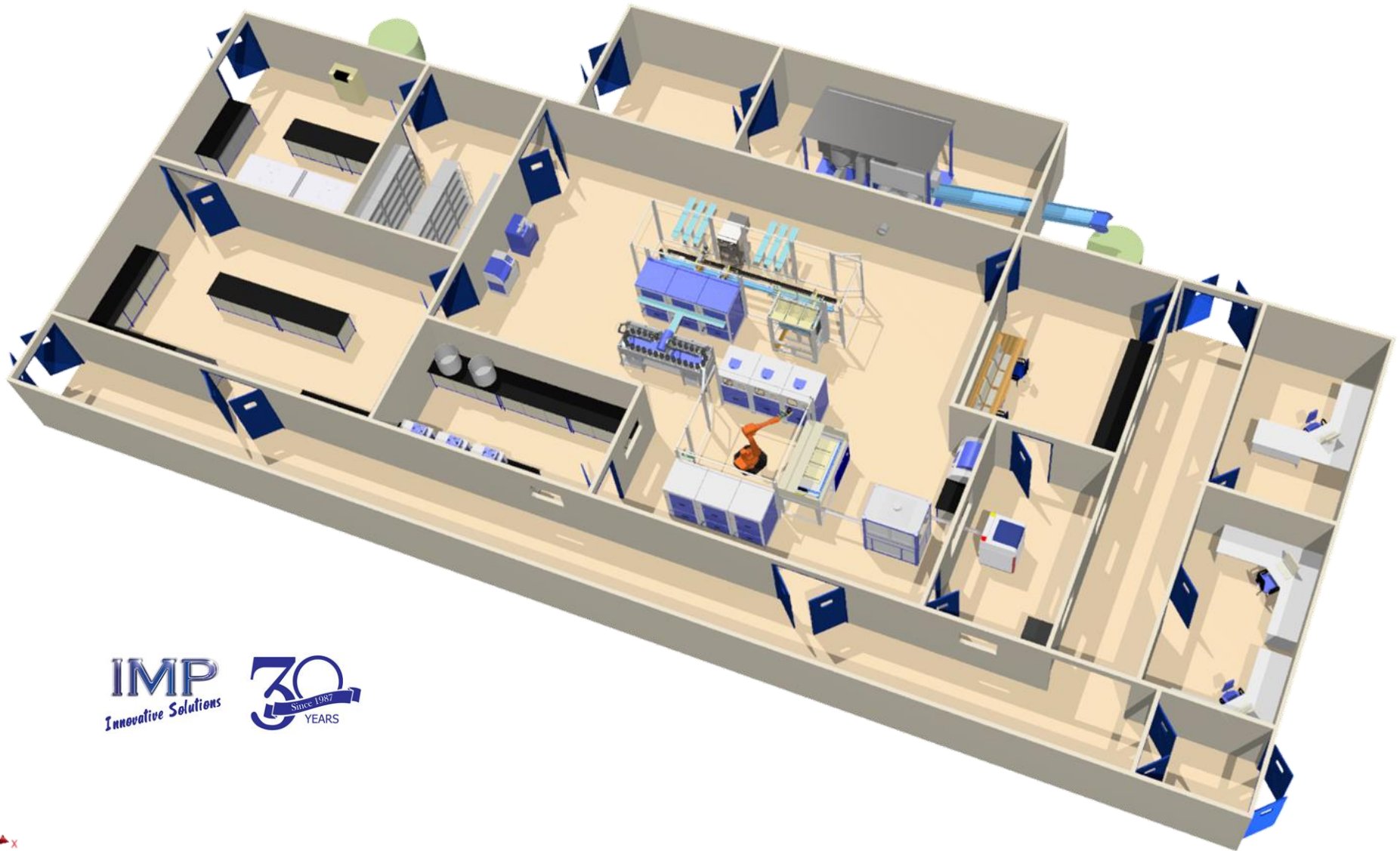
- Materials Handling and storage
- Wet Gravity Concentration
- Dewatering & Drying
- Selective Flotation
- Magnetic Separation

# Engineering Design of CVW™ Facilities at Horizon





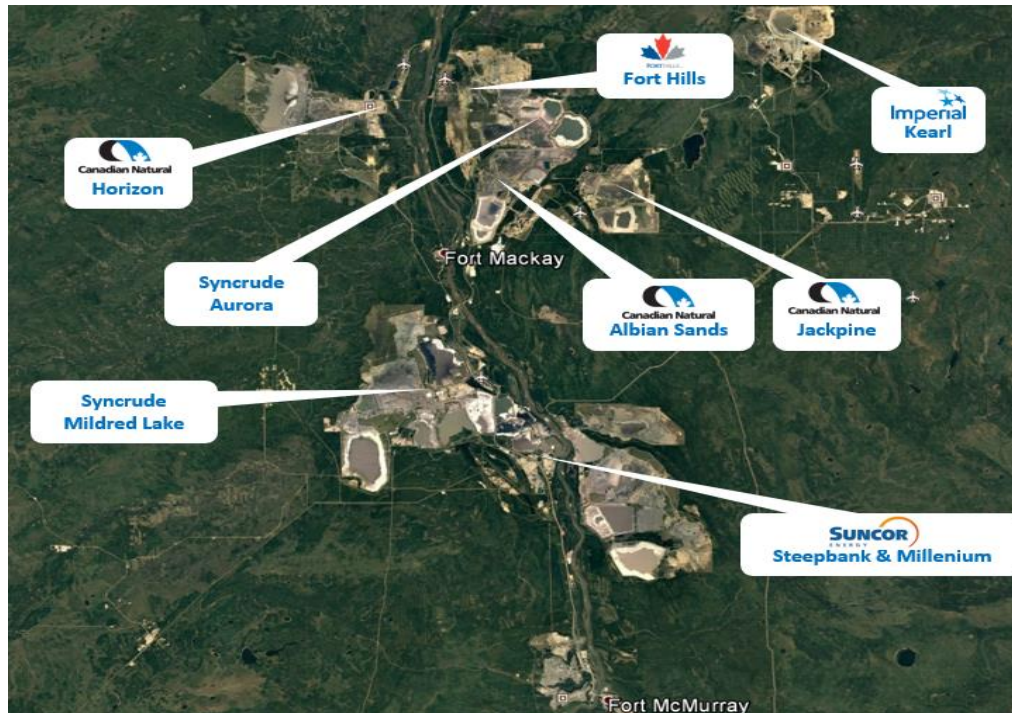
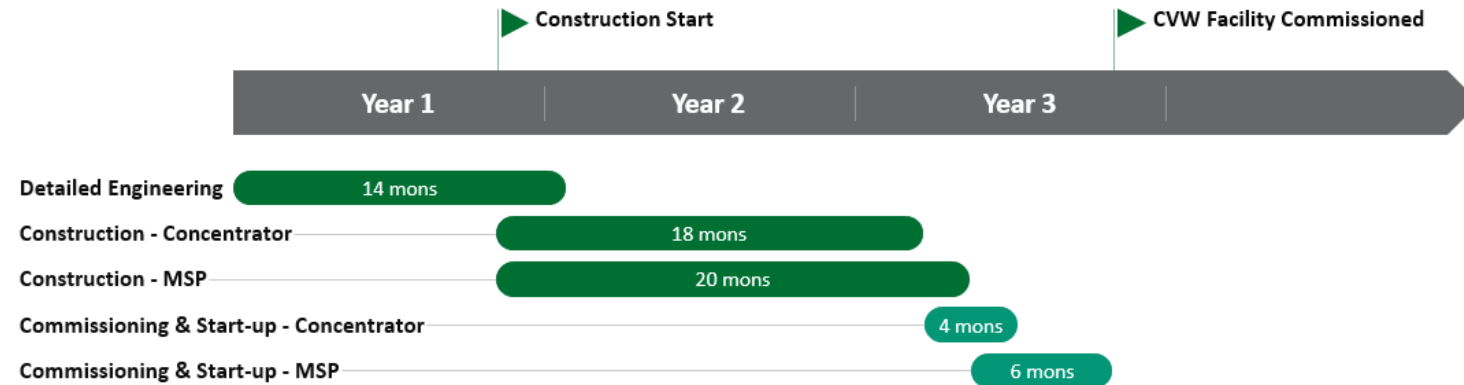
# Automated Minerals Laboratory



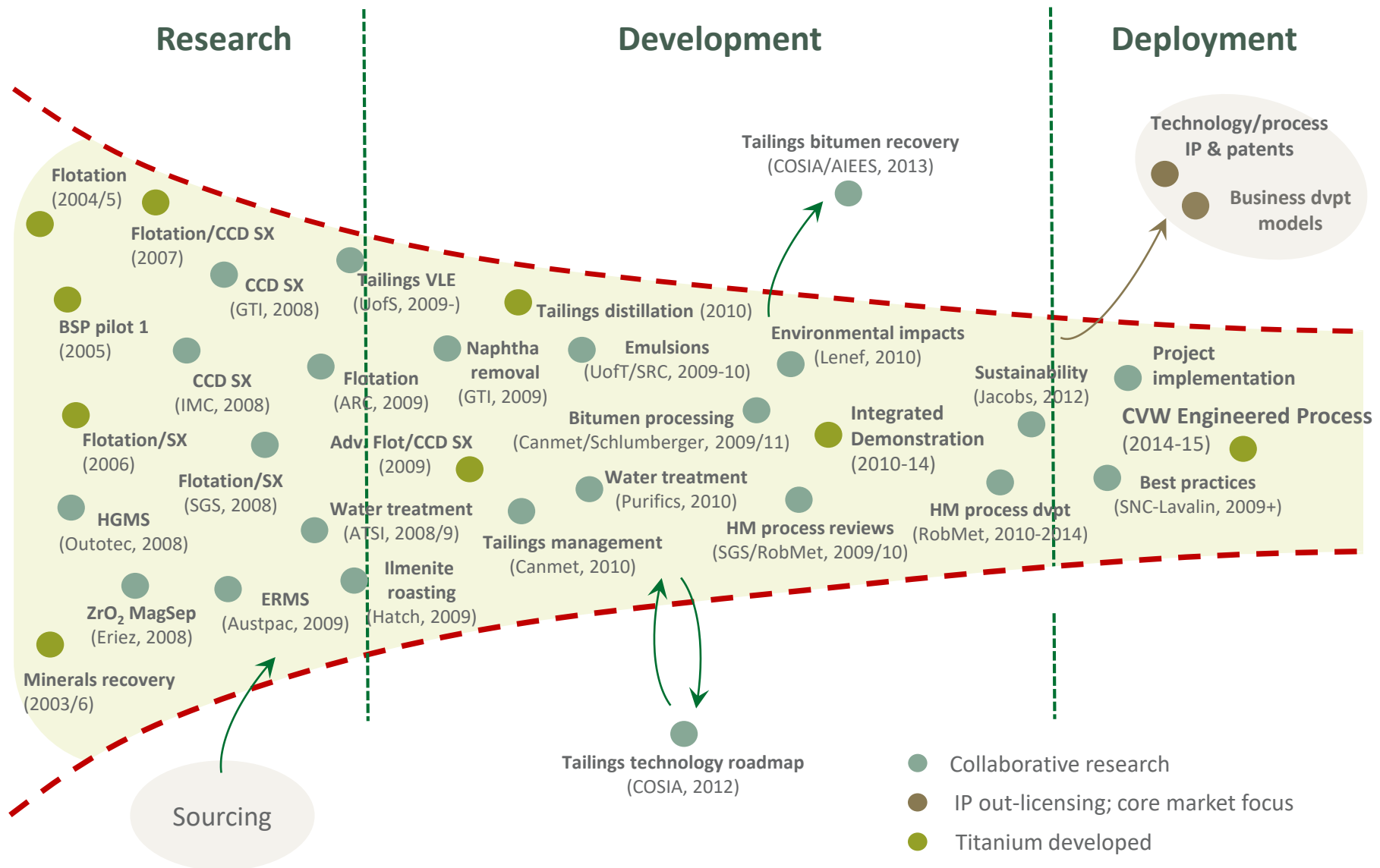
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30  
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YEARS

# Construction timeline of typical CVW™ project and satellite image of potential project sites



# Research to Deployment Funnel





# On-site Pilots



- Flotation and naphtha extraction at 1:20 scale (20 L/s)
- Classification (cyclone) at 1:1 scale (400 L/s)



# Development: Regina Wet & Dry Pilot Facilities



- Minerals wet processing (classification, gravity, flotation)
- Minerals dry processing (electrostatic and magnetic separation)
- Full scale minerals flow-sheet testing
- Hydrocarbons separation research and development



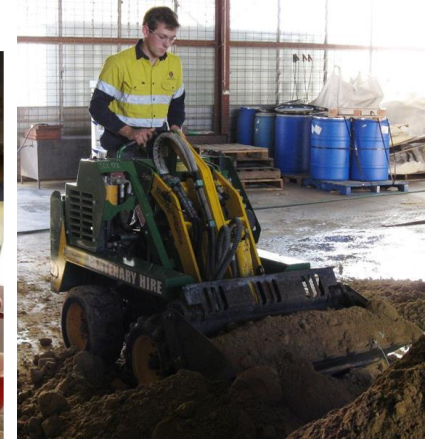
# Demonstration piloting at Canmet



Bitumen & solvent recovery, minerals recovery piloting for industry and government consortium



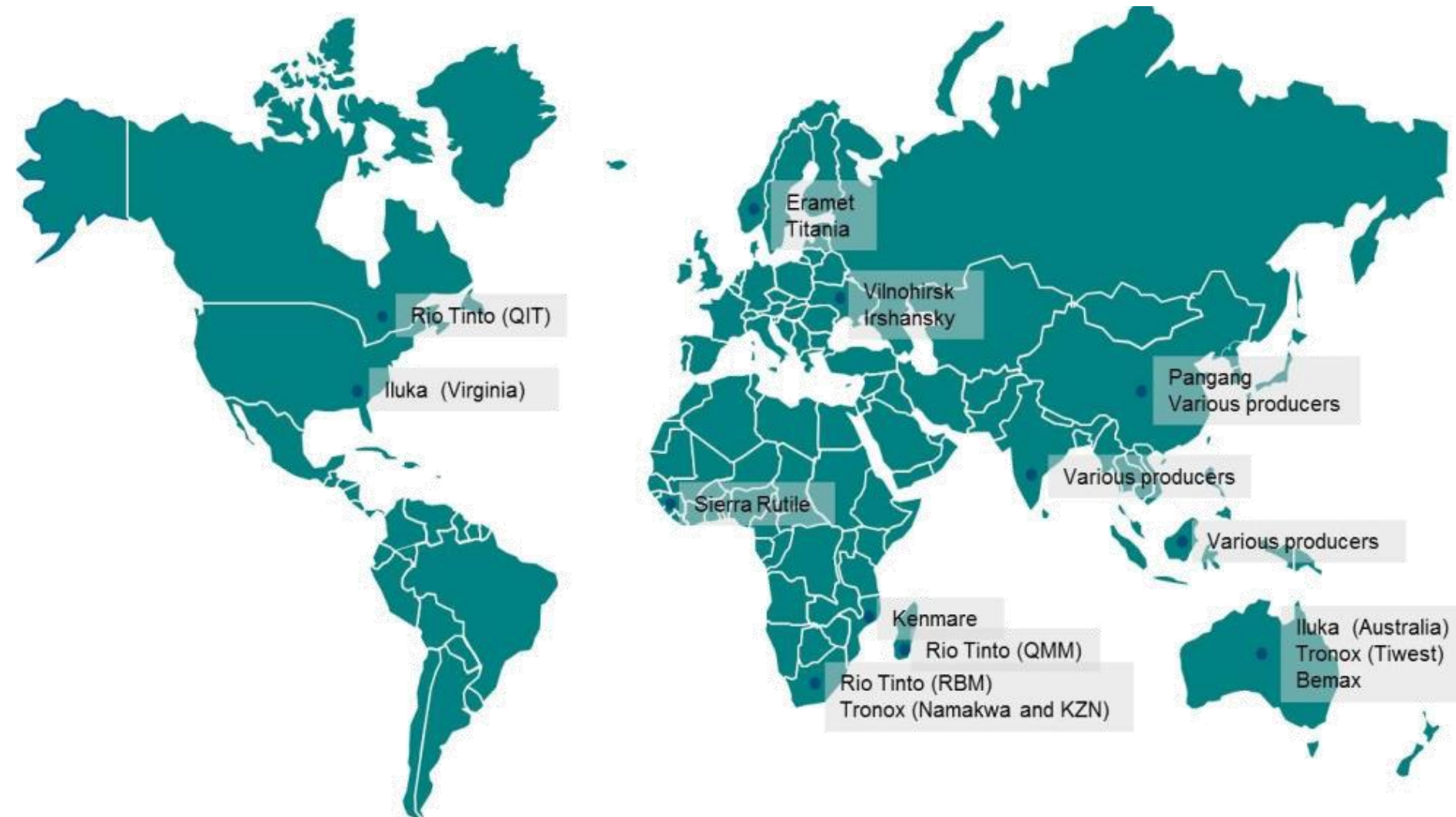
# Minerals Piloting



**IHC ROBBINS**

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# The Mineral Sands Industry





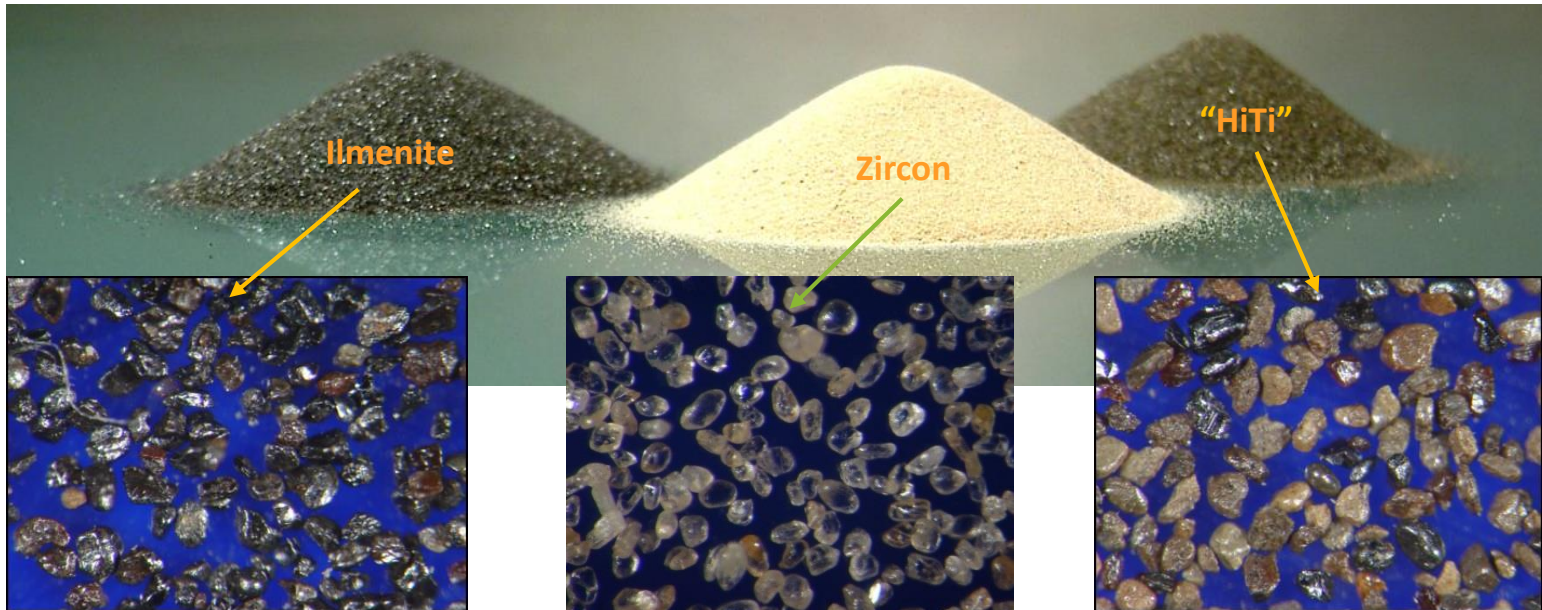
# The Mineral Sands Industry





# Valuable Mineral Sand Products

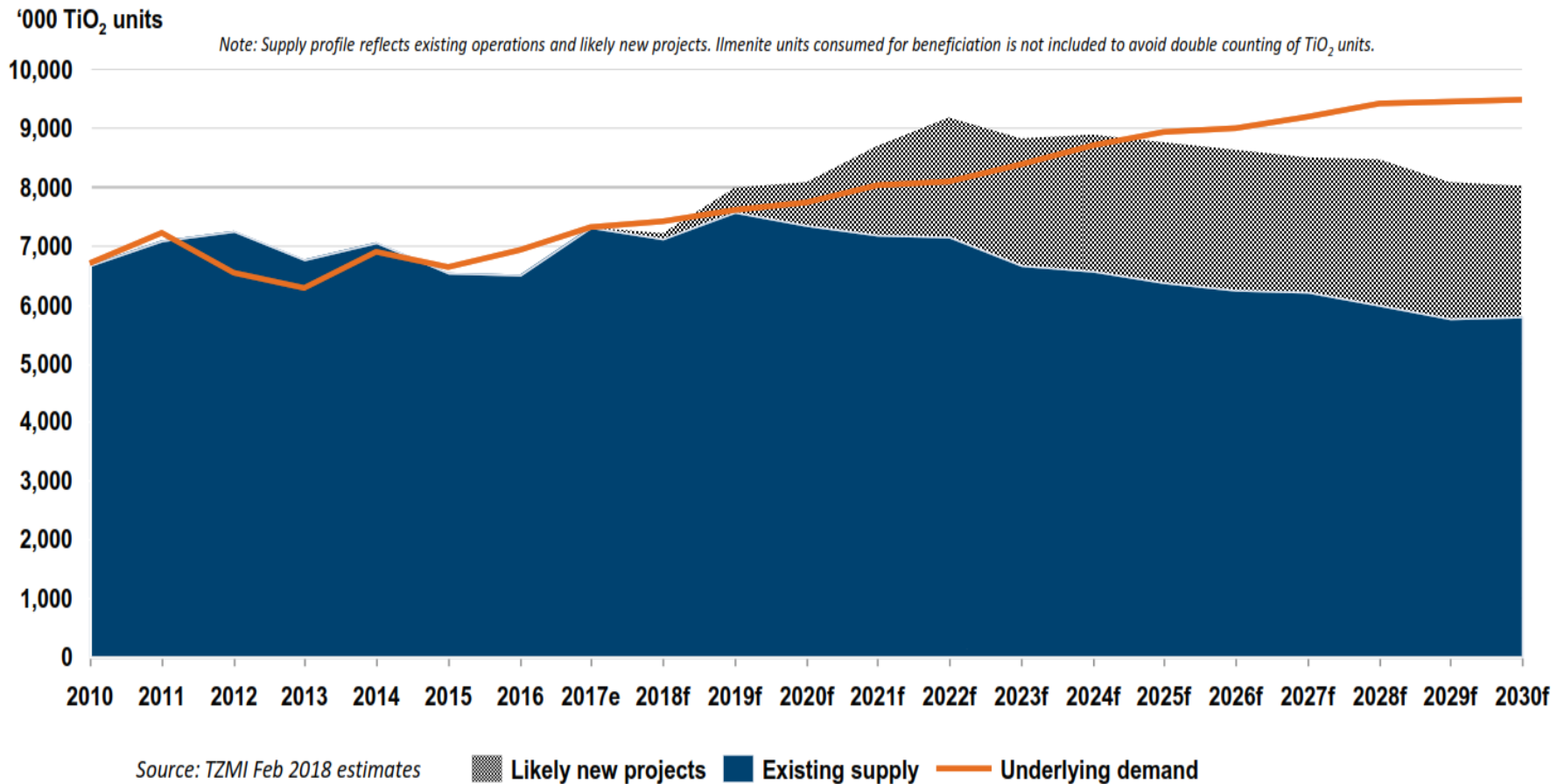
- Zircon Sand ( $\text{ZrO}_2 \cdot \text{SiO}_2$ ) @ 66%  $\text{ZrO}_2$
  - Ilmenite ( $\text{FeO} \cdot \text{TiO}_2$ ) @ 60 – 65%  $\text{TiO}_2$
  - Leucoxene ( $\text{FeO} \cdot \text{TiO}_2$ ) @ 65% - 80%  $\text{TiO}_2$
  - Rutile ( $\text{TiO}_2$ ) @ 95%  $\text{TiO}_2$
- } HiTi @ 88%  $\text{TiO}_2$



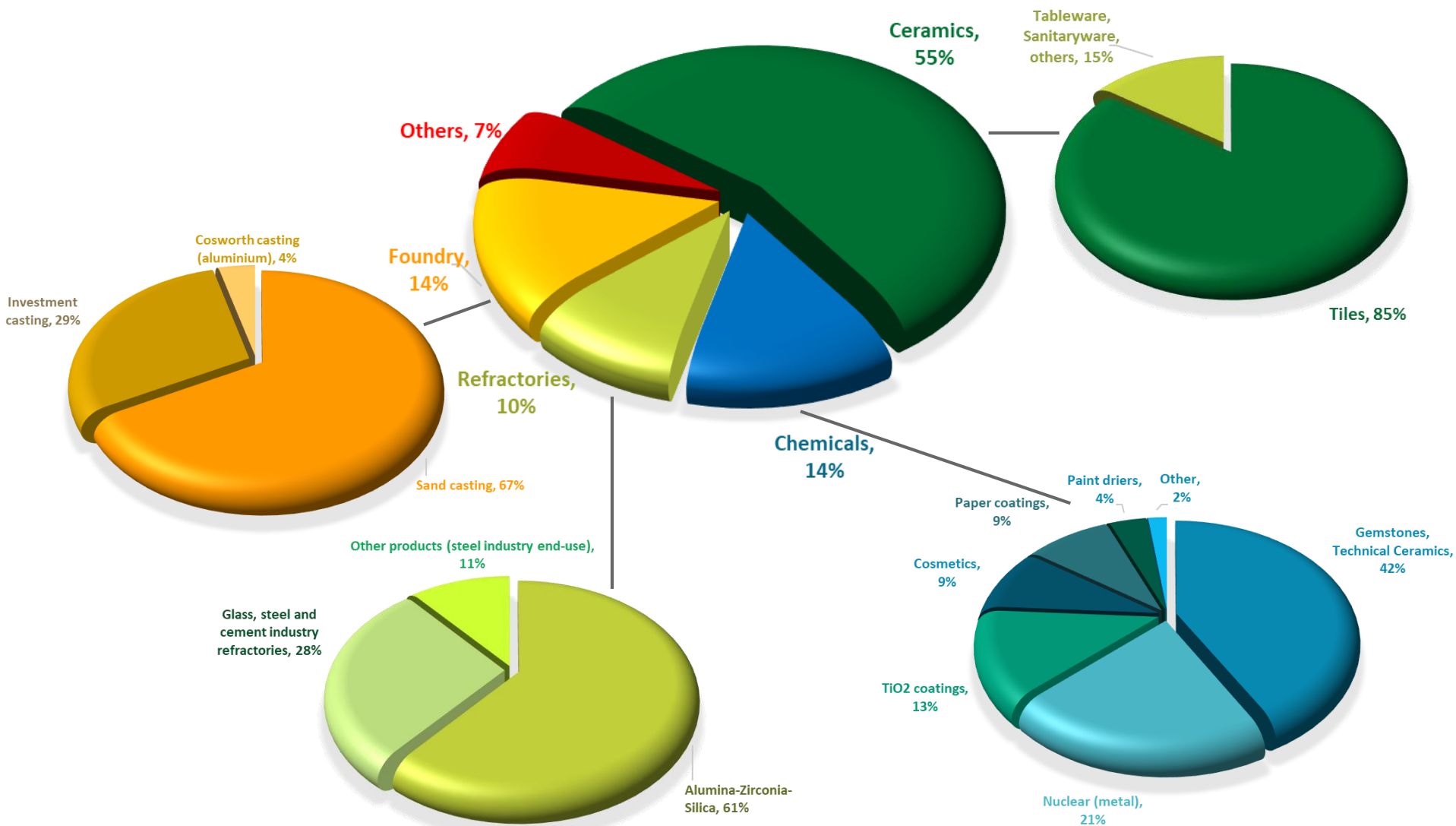
# Global Titanium Feedstock Use



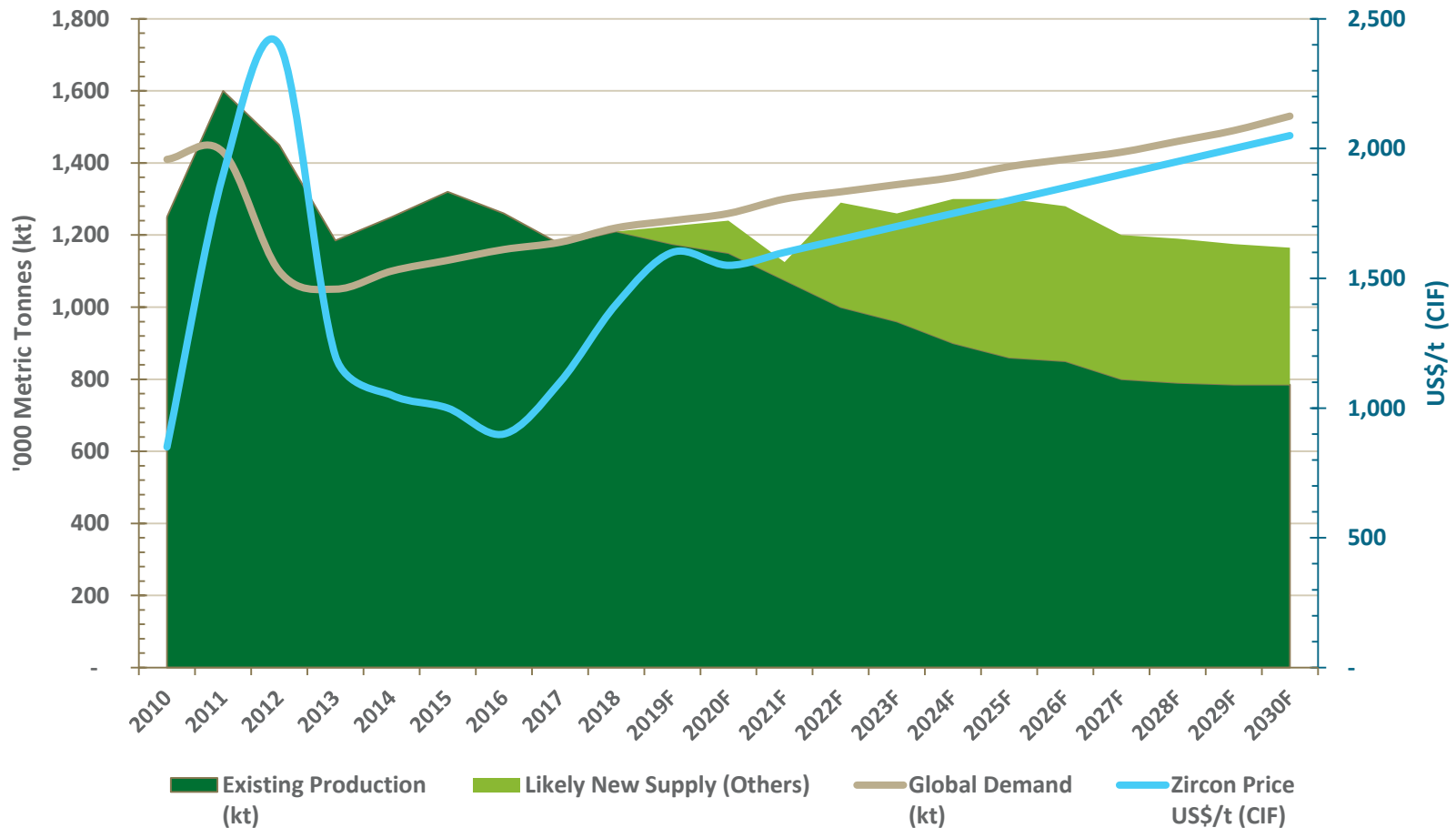
# Global titanium feedstock supply/demand balance



# Global Zircon End Market Use



# Forecast of zircon demand/supply & prices



- Global supply and demand currently in balance
- Current pricing for final zircon product stable at US\$1,580/tonne
- Severe supply shortages forecast beyond 2023, due to decline of current resources, even including anticipated new projects





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[www.titaniumcorporation.com](http://www.titaniumcorporation.com) TSX Venture Exchange symbol “TIC”

*Titanium Corporation is an Associate Member of the Resource Diversification Council; Canada's Oil Sands Innovation Alliance (“COSIA”), a Member of the Alberta Chamber of Resources, the Canadian Chamber of Commerce, and the Zircon Industry Association (“ZIA”). The Company's shares are listed on the TSX Venture Exchange (“TSXV”) under the symbol “TIC”.*



*Titanium Corporation wishes to gratefully acknowledge past funding from Emissions Reduction Alberta (“ERA”), Sustainable Development Technology Canada (“SDTC”), the Government of Alberta and the National Research Council Canada and the recent grant funding awards from Environment and Climate Change Canada’s Low Carbon Economy Fund, Natural Resources Canada’s Clean Growth Program and continuing funding by ERA.*



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Q & A