Grid Energy Storage	Industrial & Specialty Chemicals	Construction	Aerospace	Defense











US VANADIUM

US Vanadium is a Leading Global Producer of High-Purity Vanadium Oxides, Battery Electrolyte, and Industrial/Specialty Chemicals

Confidential & Proprietary

About U.S. Vanadium

US Vanadium is a privately owned, US-based producer of some of the world's highest-purity vanadium oxides, ultra-high-purity electrolyte for vanadium flow batteries, and vanadium industrial and specialty chemicals. We operate facilities in Hot Springs and Benton, Arkansas.

Unique Capabilities

We are the only integrated producer of high-purity vanadium oxide and specialty vanadium-based chemicals in the U.S.

Global Leadership

Our vanadium oxide and battery electrolyte products are among the highest-purity made anywhere in the world.

Growing Demand

Market demand for for vanadium continues to grow, particularly as vanadium flow batteries are increasingly deployed for renewable energy storage.

Low CO2 Profile

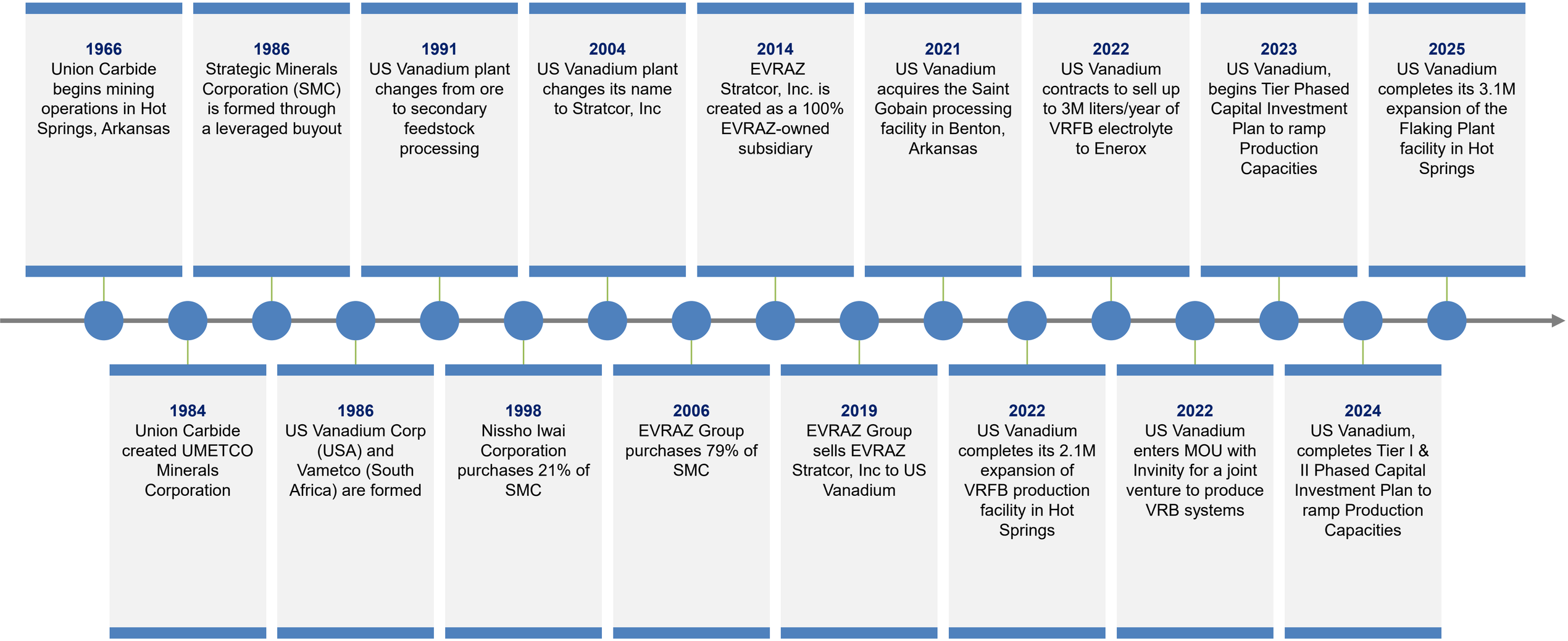
US Vanadium makes products entirely by recovering vanadium from post-industrial waste streams, which generates much less CO_2 emissions than primary vanadium mining.



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Company History



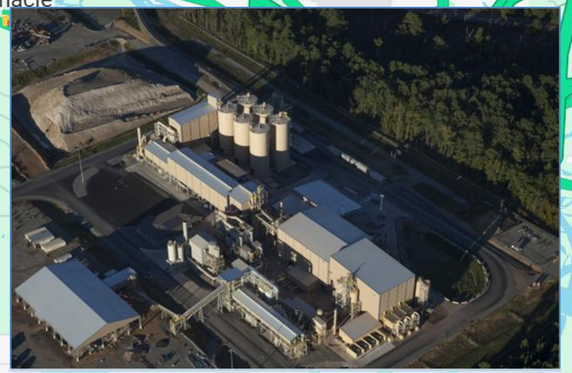
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Plants Overview



Hot Springs, Arkansas USA

- Total facility acreage: 912
- All environmental and operating permits in place
- 9-10 million pounds/year of vanadium in the form of vanadium pentoxide / trioxide and other specialty chemicals
- Onsite laboratory / technical center
- 65 employees



Benton, Arkansas USA

- Total facility acreage: 95
- All environmental and operating permits in place
- 150KMt/year feedstock processing capacity
- 35 employees

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Aerospace



Mega-Construction

Grid-Scale Energy Storage

Vanadium Market Context and USV Products

Product Summary & Markets

V2O5 Powder

Used in Sulfuric acid catalyst production, electrolyte valence balancing, some Vanadium chemical production (VOX) and precursor for Flaked V2O5

V2O3 Powder

Used as precursor for chlorinated Vanadium chemicals, electrolyte valence balancing, and Titanium Master Alloy production.

Flaked V2O5

Used for FeV, Titanium production in Master Alloys, and Nuclear pure Vanadium alloy.

Vanadium Chemicals

Uses V2O3 or V2O5 to produce solutions such as VOX, Stretvan, VOCl3, VCl4

- ❑ Markets; Automotive, refinery SO2 and CO2 scrubbing, EPDM rubber, and polyethylene production.



US High-Purity Vanadium represents a small but critical share of demand

Master Alloys/Titanium



±6.5 million lb/year

Titanium metal alloys. The largest volume titanium alloy is Ti 6%Al-4%V which represents roughly 85% of all titanium alloy production

End use applications are primarily aerospace, medical, and military, but also include industrial, consumer goods, and high performance automotive.

Electrolyte/Energy storage



±2-3 million lb/year

V_2O_5 and V_2O_3 are blended with sulphuric acid to produce electrolyte for Vanadium redox flow batteries (VRFBs)

These batteries are known for their long life, ability to store grid-scale amounts of energy, ability to operate in extreme temperatures. Ideal for military purposes and data centres.

Chemicals and Catalysts



±2 million lb/year

Catalyst for the production of:

- Sulphuric Acid (V_2O_5)
- Maleic-acid (V_2O_5)
- Polyethylene (VTi)
- EPDM rubber ($VOCl_3$)

Catalyst to reduce:

- Nitric oxide
- Hydrogen sulphide

Steel (Fev & Nitrovan)



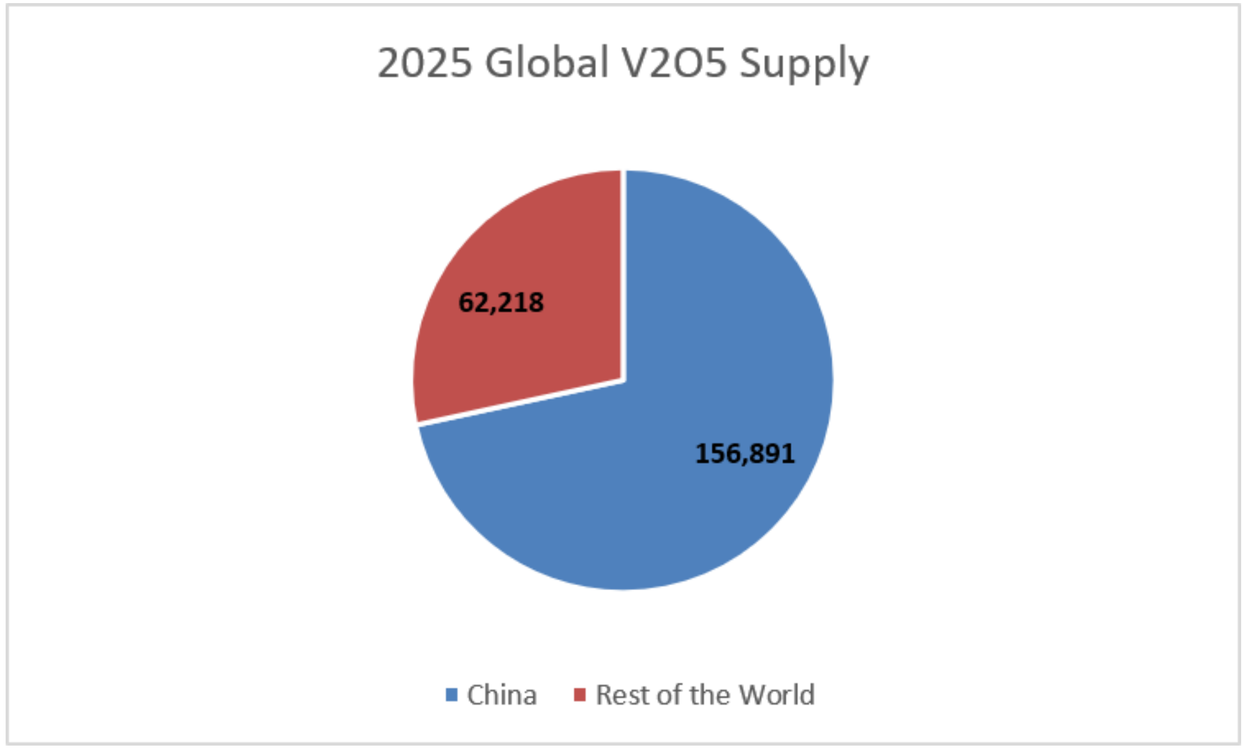
±38 million lb/year

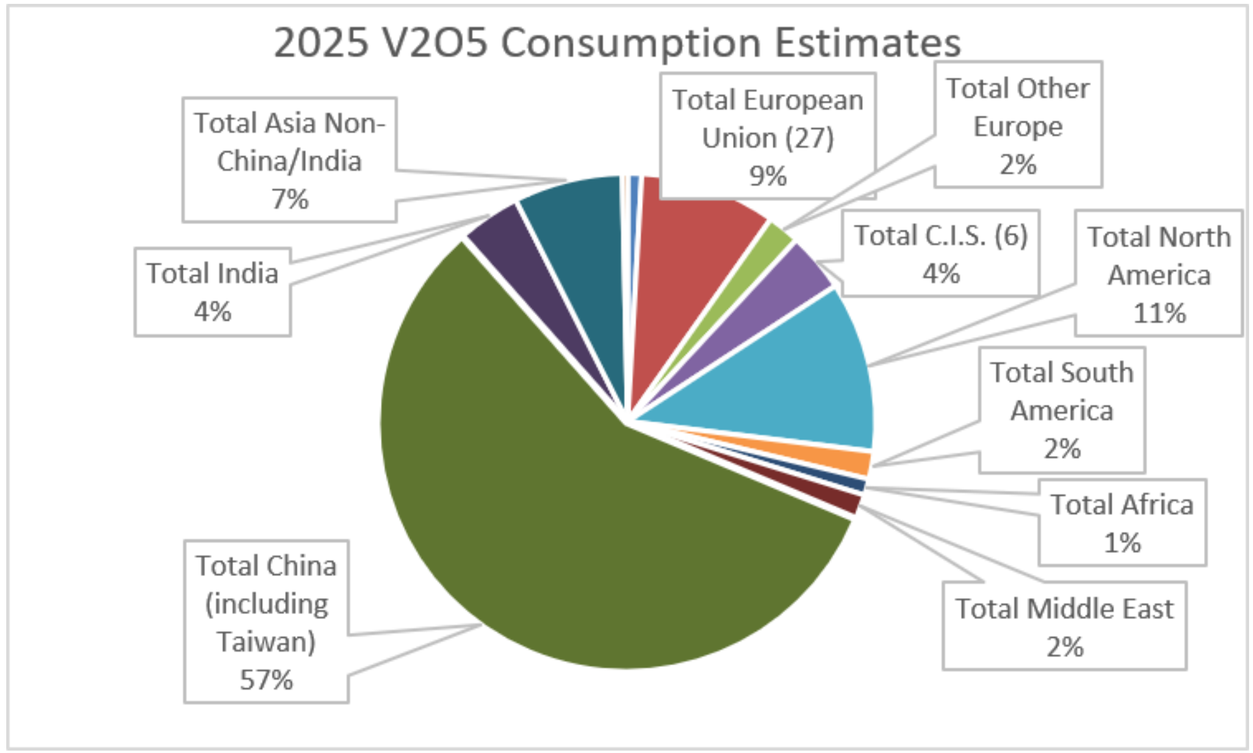
FeV and Nitrovan (VCN) are used to strengthen steel. About 15% - 20% of the supply is Nitrovan

There is no Nitrovan produced in the US, and all Nitrovan is imported from South Africa and China

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Global Vanadium Supply/Demand





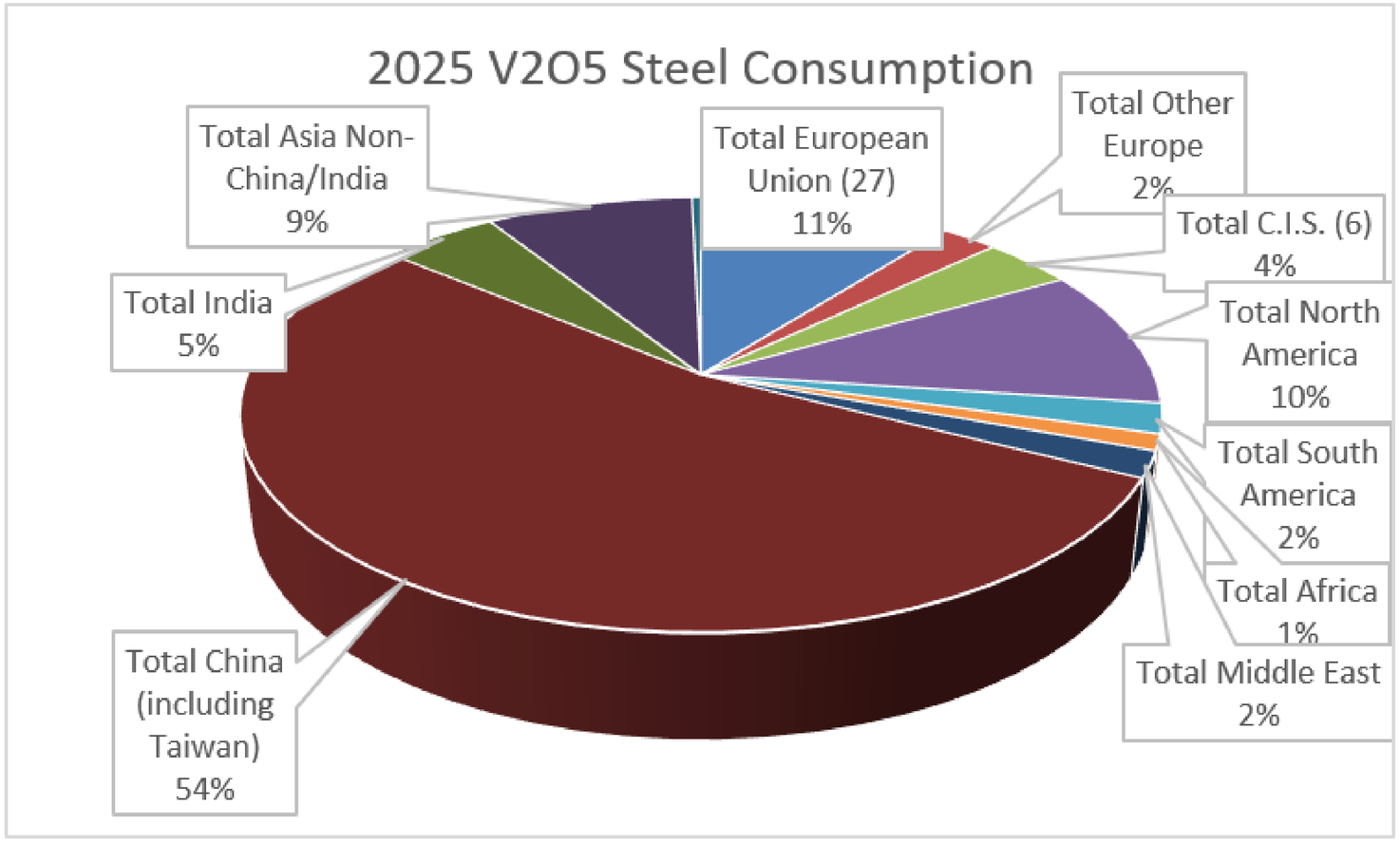
- China produces 73% of the worlds supply (tons V2O5)
- China is still exporting ~29,000tons V2O5 equivalent annually.

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Global Steel Consumption

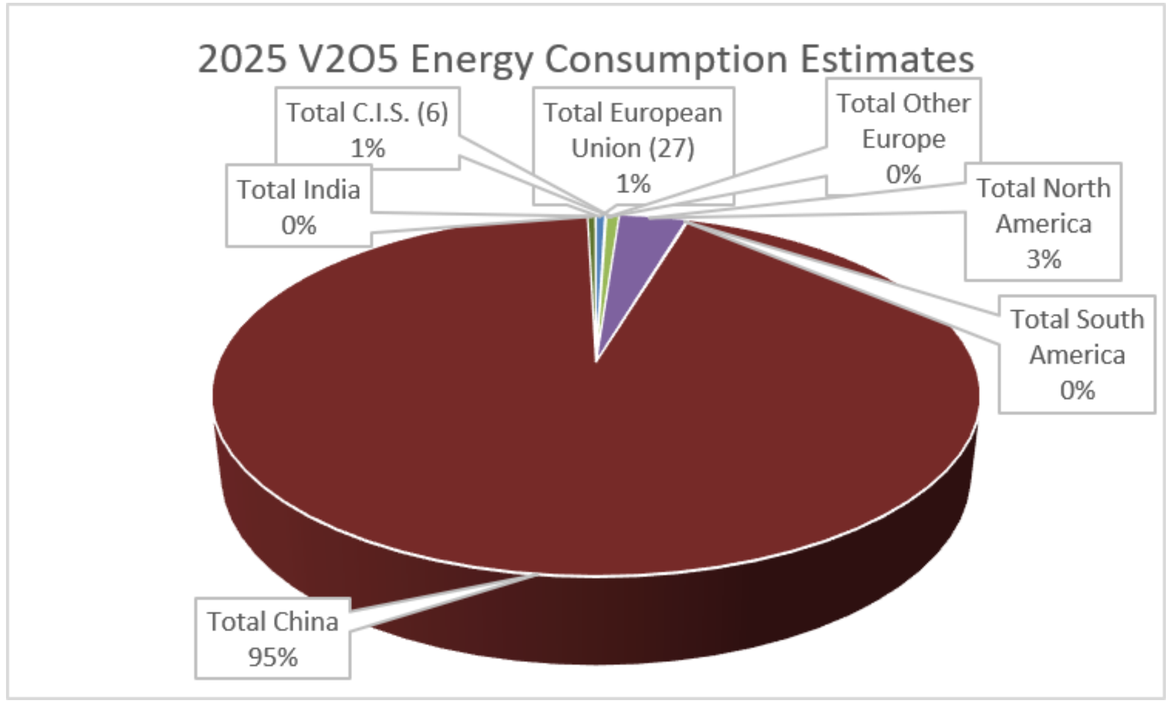
- 78% of the Global market is driven by Steel supply
  - 98% minimum specifications
  - Price driven market
  - 50%+ of the market is China demand

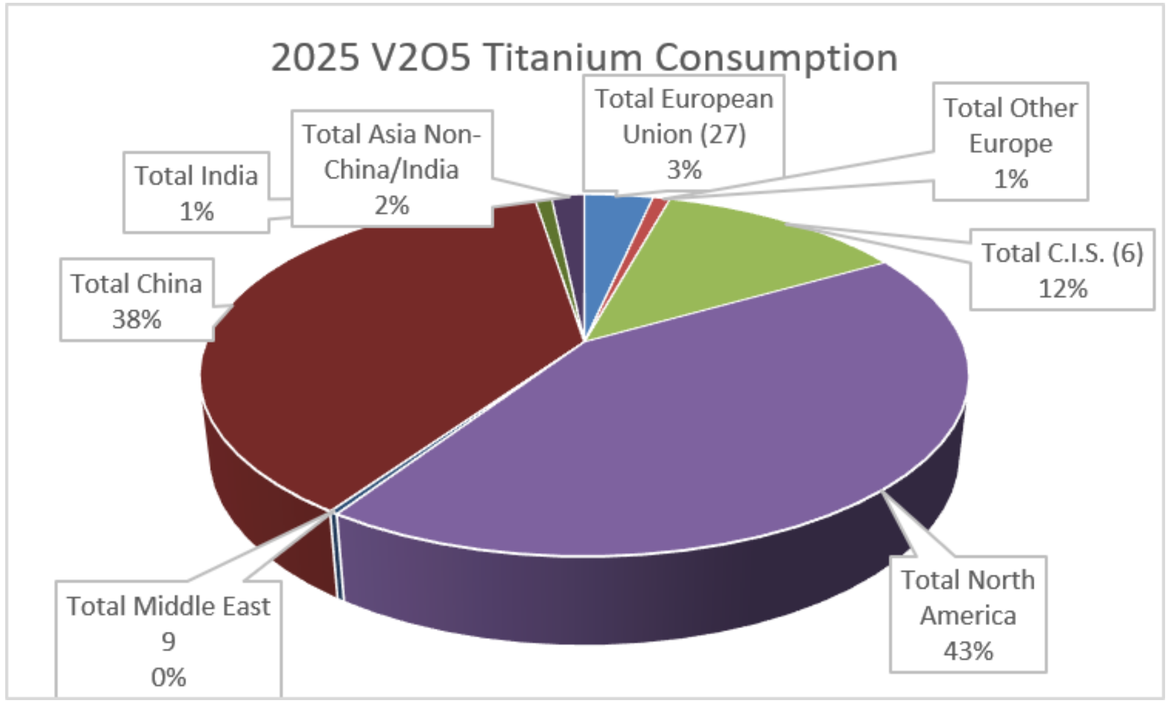
- Currently there is no domestic supply of Nitrovan/ Nitrided Vanadium for the US



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High Purity-Electrolyte and Titanium





- Specifications continue to tighten for each of these markets
- Accounts for ~17% of the global market demand
- China has grown by an average of 25% YOY in Titanium since 2023 and by an average of 38% in energy storage consumption since 2023.

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Market Review- Electrolyte

- Power/Energy redundancy drivers
  - AI Data Centers
  - Utilities back up
  - Privatized grid resilience

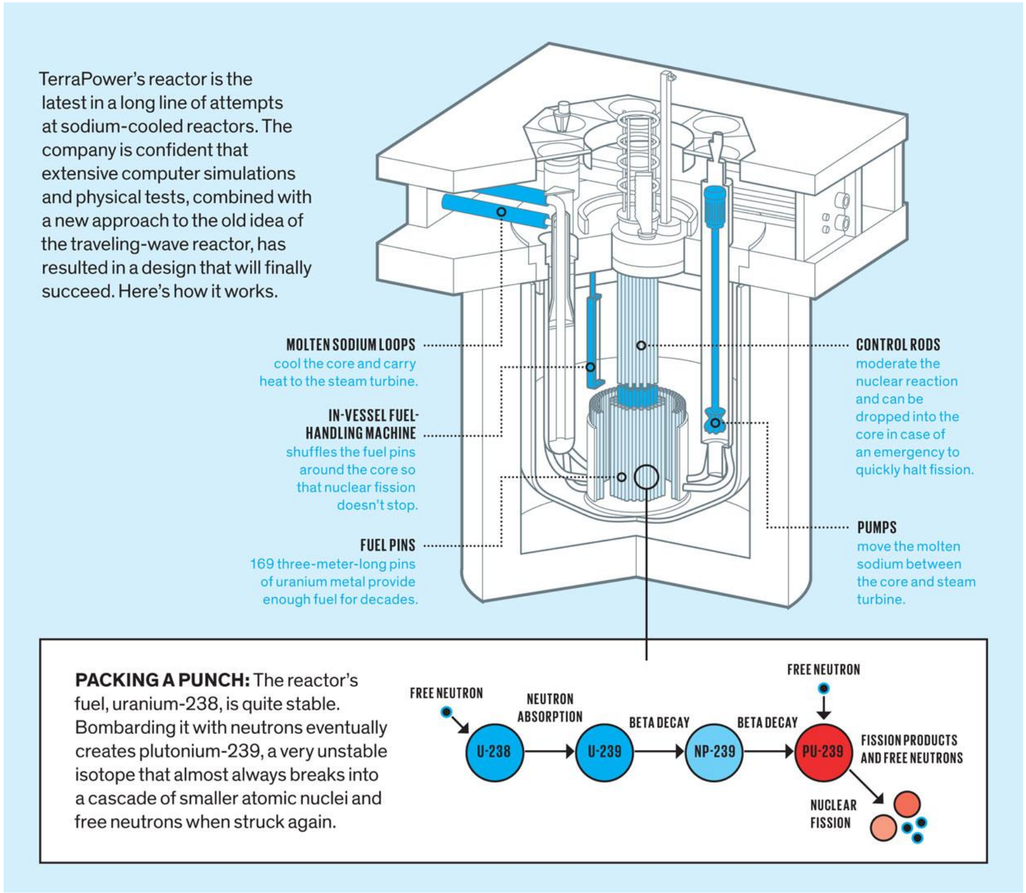
- State legislation for AI data centers is pushing the market
  - NY, VA, IL, TX, CA

- Requirement for minimum of 12+hr discharge makes it more cost efficient and safer than Li-ion
  - Requirement continues to increase.
  - 1MWh= ~18,500lbs V_2O_5 at 1.8M
    - 1GWh= ~18.5M lbs V_2O_5



Market Review- Nuclear

- Modular Nuclear Reactors are the target energy source for AI data centers
- Complete grid resilience with energy storage backup
- Requires a pure Vanadium alloy for neutron buffering
- Larger scale reactors for Fusion technology would be 10X Vanadium demand.
- 150 nuclear deployments in China alone with over 200 announced globally.
- 168 SMR projects announced across North America.
- 2029 timeline for demand
  - **Conservative estimate of ~900tons of V2O5 annually**



Market Review- Aerospace/Defense

- Vanadium is crucial for the Titanium going into aerospace and defense.
- Ti6Al4V is the main product mix
  - Engine turbine blades
  - Ballistic missiles
  - Graphite skins in Fuselage
- Titanium demand set to grow by 26% over next 5 years
- Airbus and Boeing moving to 1000 new planes annually. (10 years)
- Engine production to grow 35% over 10 years





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Aerospace



Mega-Construction

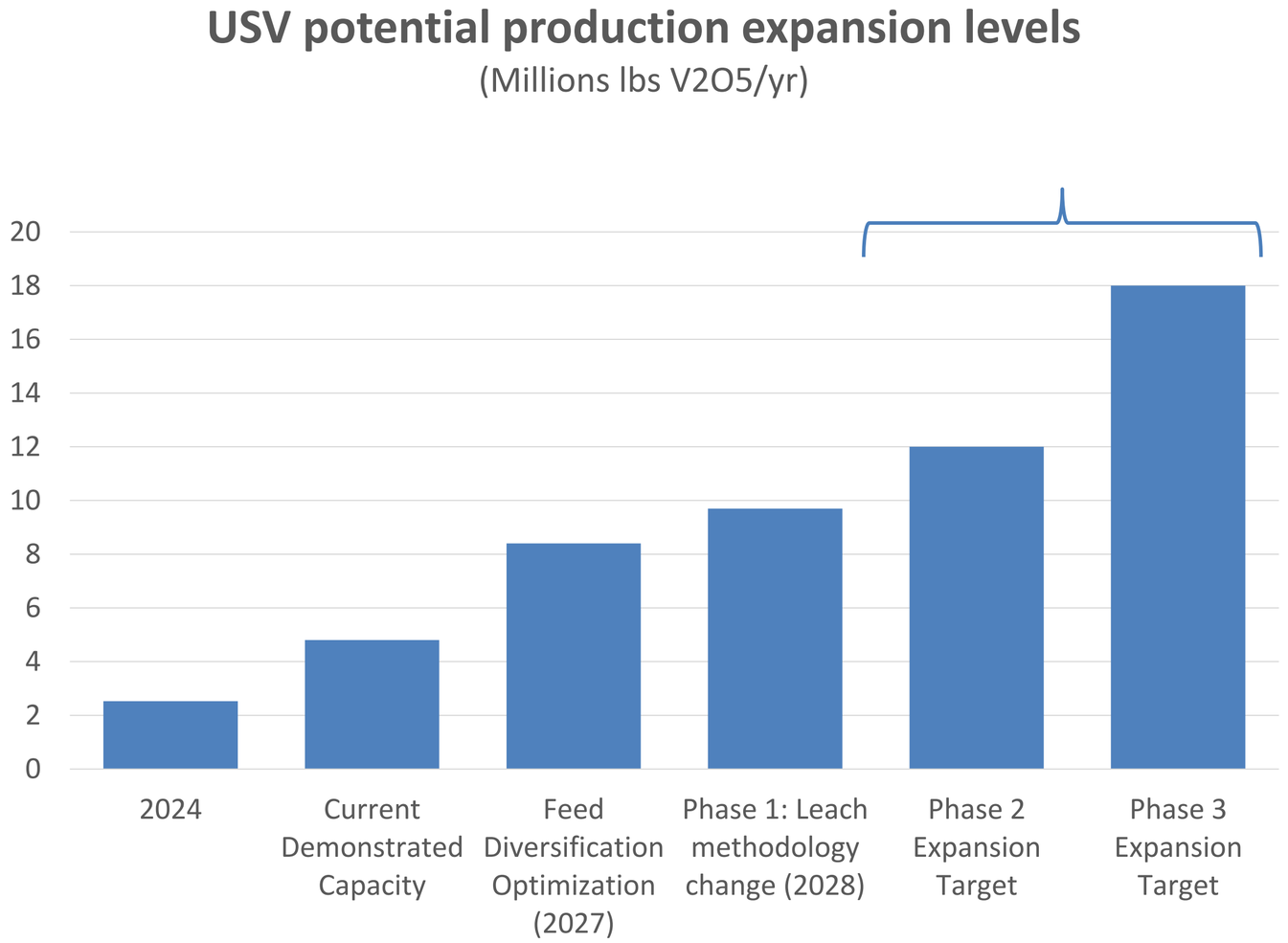
Grid-Scale Energy Storage

US Vanadium's Role in Supply

Our Growth Plan: Production Expansion Targets

- $120+ million investment from Techmet made to-date
- Near-term goal: 700,000 lbs/month of high-purity vanadium oxides (8.4M lbs/year).
- Phase 1: Leach modification: 9.6M lbs/yr
- Phase 2 expansion: 12M lbs/year
- Phase 3 expansion: 18M lbs/year

At US Vanadium's target production rate of 12 million lbs. / year, our estimated Scope 1 and 2 CO_2 footprint of **18.4 kg CO_2 eq / kg V** is approximately **25% of a primary vanadium mine.**



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The Power of Vanadium

US-Designated Critical Mineral

Vital to Defense Applications

Critical to Vanadium Flow Batteries

Few Practical Substitutes

Growing Global Demand

Constrained Global Supply

Multiple High-Value Markets

Premium Price for High-Purity Products

➢To what extent will US vanadium supply into FeV, and what are the capabilities?

- US Vanadium requires toll processing to produce FeV
- US Vanadium would potentially target FeV supply at Phase 3 expansion. This is dependent on on other high purity markets demand long-term.

➢If demand surpasses supply with the increase in three High Purity strategic markets, what does this do to index pricing and long-term feasibility of a global index?

-USV is looking at options outside the traditional index. Shifts possibly towards a cost+ model that allows for long-term stability.

➢ US Vanadium has been awarded DLA funding for the build of a Nitrovan furnace for domestic supply. Currently finalizing engineering.

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