

# VPRA – EPA IRIS Vanadium Compounds RfC

July 14, 2021

1:00 pm



# Introduction to VPRA

- Vanadium Producers & Reclaimers Association
- North American Trade Association
- Small industry: 2 full members representing producers of Ferrovandium, Vanadium Oxides and Vanadium Chemicals
- Roughly 300 total workers employed in the US
- No domestically-mined vanadium in the US
- Secondary recycling from petroleum waste streams
- "Spent catalyst" would otherwise be a EPA Listed Hazardous Waste



# What is **Vanadium** ?

A hard-silver-grey metallic element, used in:

1. Steel
2. Chemicals and Catalysts
3. Master Alloys
4. Energy Storage



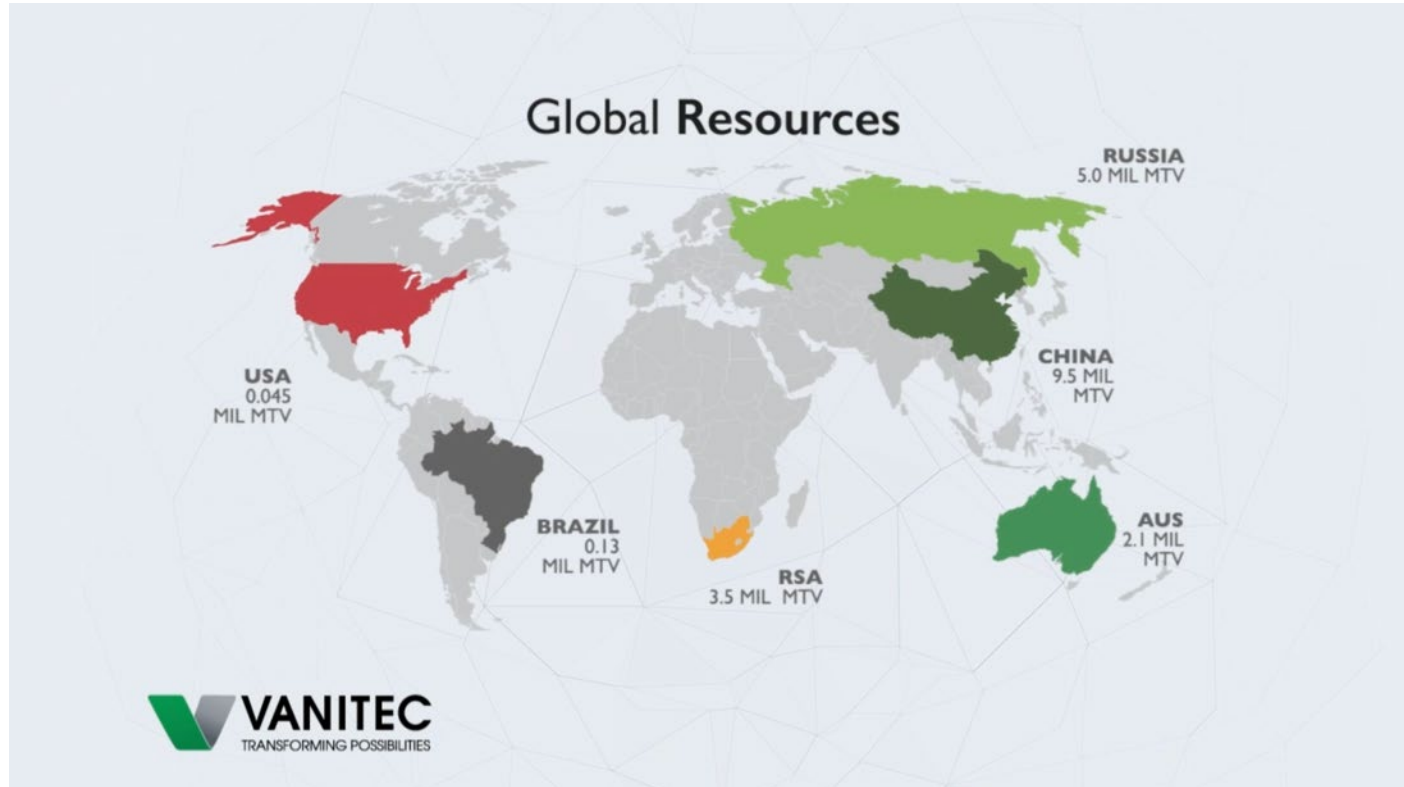
# What is **Vanadium** ?

**22<sup>nd</sup>**

MOST **ABUNDANT**  
ELEMENT IN THE  
EARTH'S CRUST

**VANITEC**  
TRANSFORMING POSSIBILITIES

# What is **Vanadium** ?



# What is **Vanadium** ?

## I. Steel

An alloying element for strengthening steels:

- **Construction**
- **Automotive**
- **Transportation**
- **Energy**

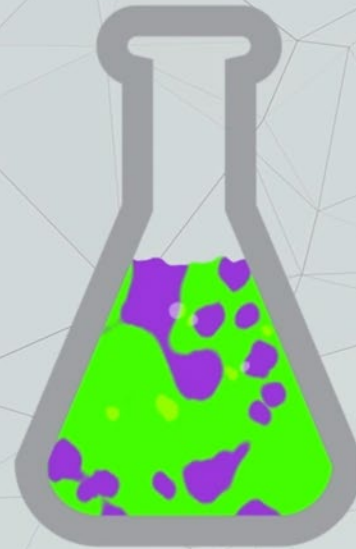


# What is **Vanadium** ?

## 2. Chemicals & Catalysts

Corrosion resistant and pigmentation chemicals:

- Sulfuric acid
- Colouring compounds
- Cathodes in (rechargeable) lithium batteries
- Vanadium electrolyte





# What is **Vanadium** ?

## 3. Master Alloys in Aerospace

Benefits of vanadium in titanium alloys are:

- Strength
- Heat treatability
- High strength to weight ratio
- Corrosion resistance
- Favourable welding

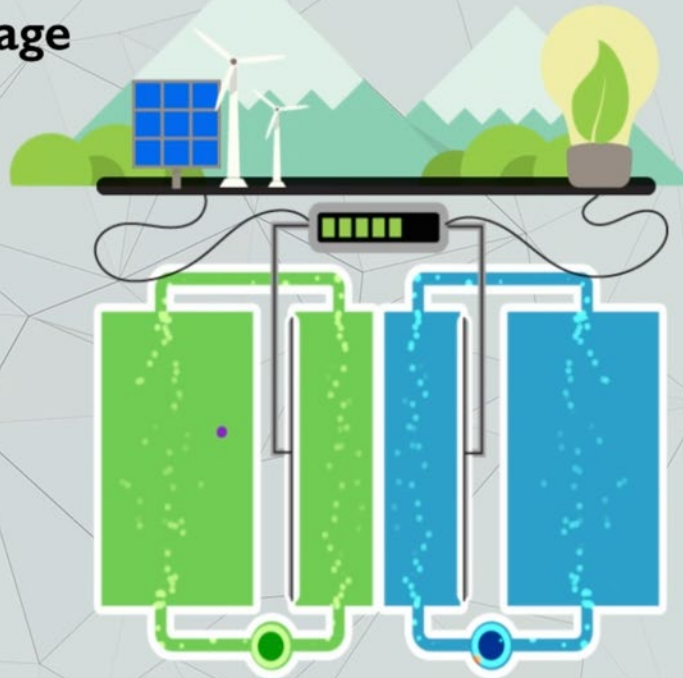




# What is **Vanadium** ?

## 4. Energy Storage

The **Vanadium Redox Flow Battery**,  
powered by  
vanadium  
electrolytes



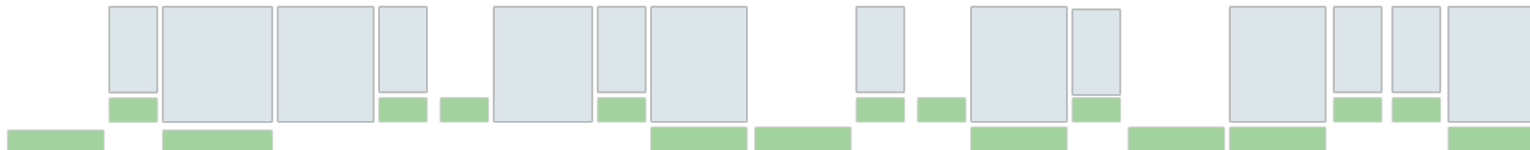
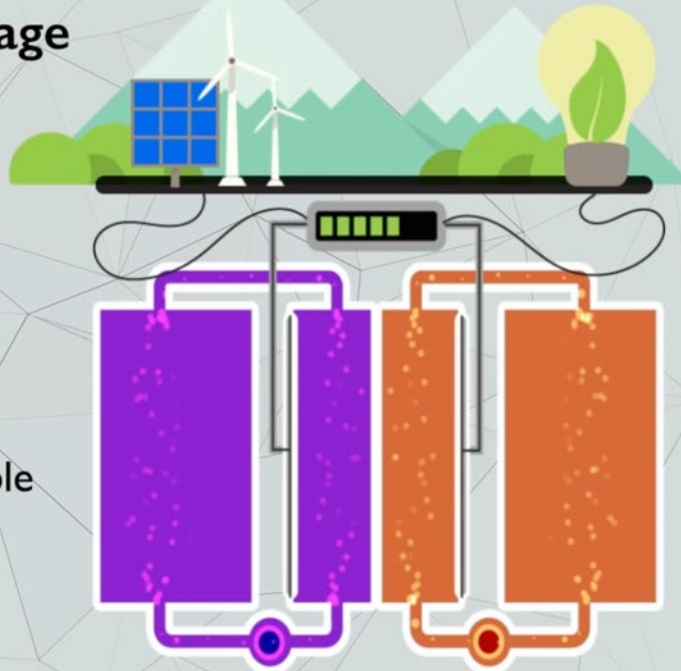
**VANITEC**  
TRANSFORMING POSSIBILITIES

# What is **Vanadium** ?

## 4. Energy Storage

### Benefits of the VRFB

- Long life-span
- Safe
- Scalable
- 100% of the vanadium is reusable



# Vanadium: Critical Mineral

- 2018 Vanadium officially included on US list of “Critical Minerals” by USGS
- 35 commodities essential for:
  - National Security
  - Economic Security
- Supply chain vulnerable to imports
- Absence would have significant consequences
- President Biden February 24, 2021 EO confirmed importance of these minerals



# VPRA IRIS Comments

- EPA should update and re-issue the IAP correcting errors and omissions
- Vanadium industry quite small so additional time to review steps of RfC and RfD helpful – thank you for additional 2 weeks
- Specific comments covered by scientists & chemists
- Endorse recommendation of Dr. Judith MacGregor that EPA conduct a workshop on environmental chemistry of vanadium compounds for RfC and RfD.



# Thank you!

