



2024 Excellence in Reclamation Award

Melanie Kenderdine

August 29, 2024

New Mexico Mining Association Annual Meeting

Albuquerque, New Mexico

2024 Excellence in Reclamation Award

There were three incredibly strong nominees this year:

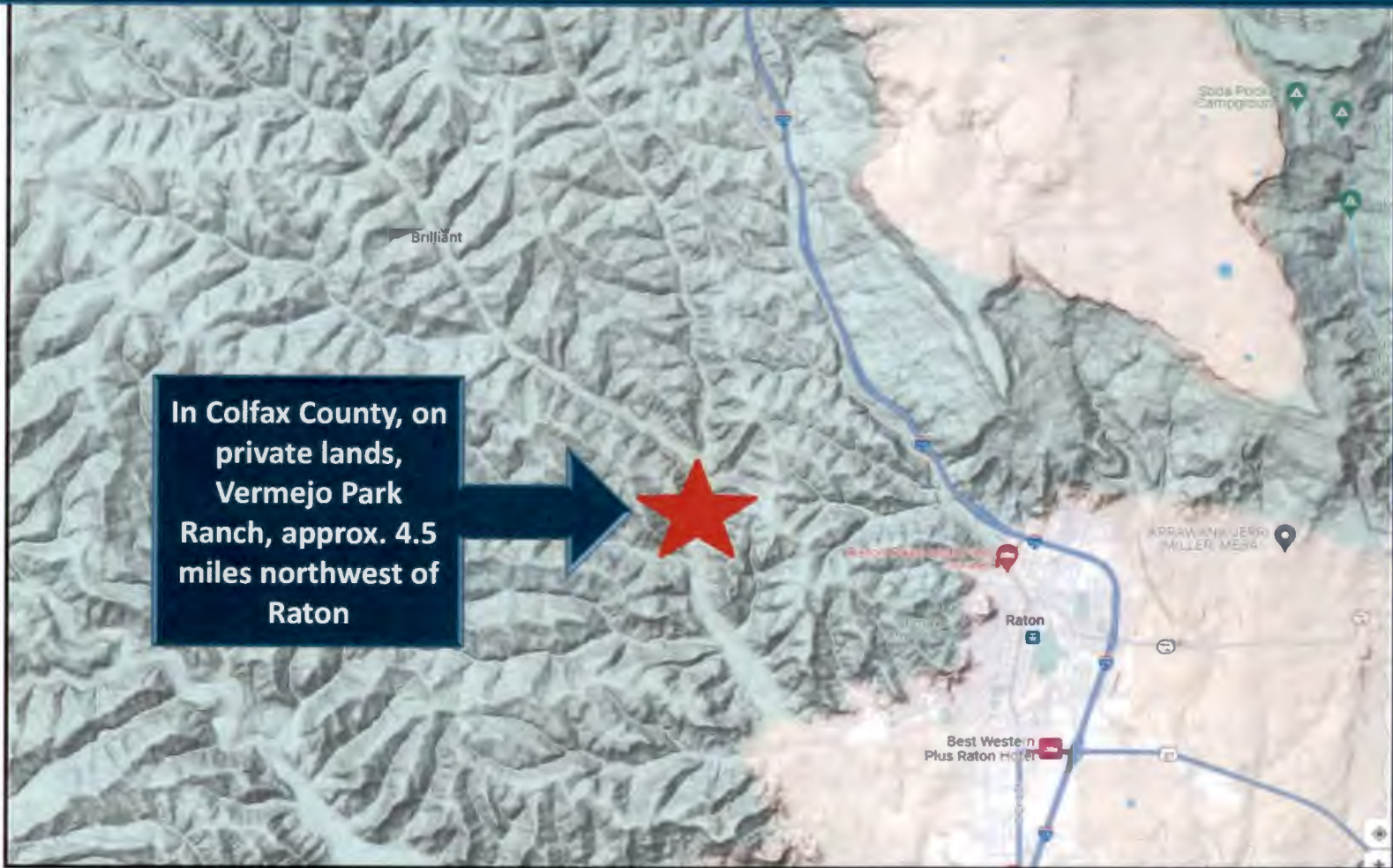
- Pit 5 Reclamation at the El Segundo Mine by Peabody Natural Resource Company
- Dutchman Canyon Abandoned Mine Stream Restoration Project by Oxbow Engineering and Sweatt Construction
- Hosteen / Yazzie Reclamation at Navajo Mine by the Navajo Transitional Energy Company

2024 Excellence in Reclamation Awarded to:



**Oxbow Engineering & Sweatt Construction for
The Dutchman Canyon Restoration Project**

Location of Dutchman Canyon Restoration Project



History/Condition of Site

Coal mine, produced coal from 1860s-1950s



Abandoned coal mine, 2011



Reclamation of Site

2012, Original Reclamation



2012, Stream Contouring



Problems with Reclamation of Site

Storm damage to plant seedlings



Storm damage undercut geotextile fabric



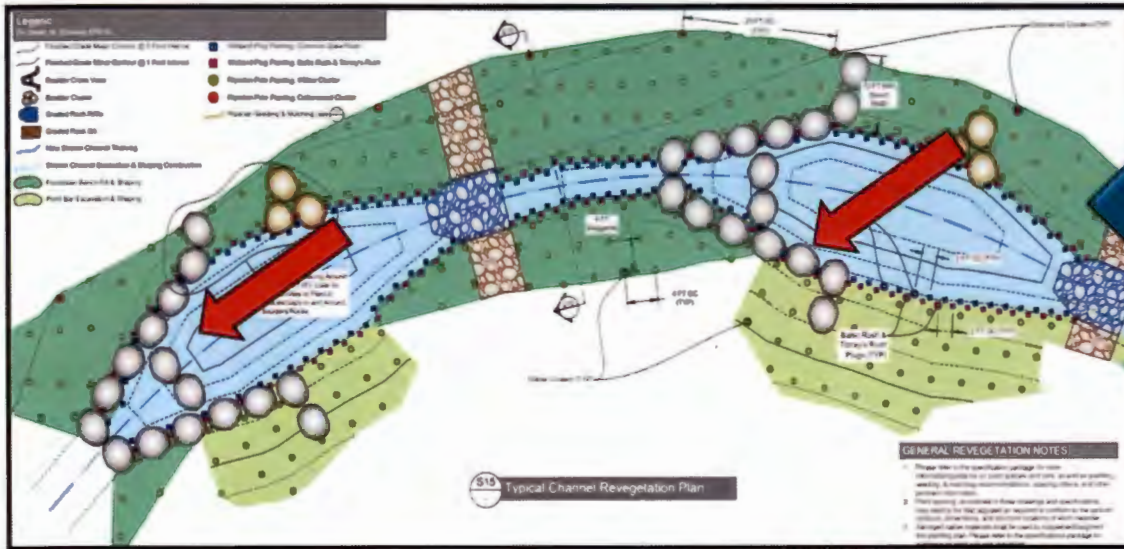
Design Solutions

The stream channel, however, continued to cut into the banks of the stream, exposing buried coal gob material.

In 2019, Oxbow Ecological Engineering joined the project and designed solutions for these erosion issues, and to provide ongoing stability for the stream channel

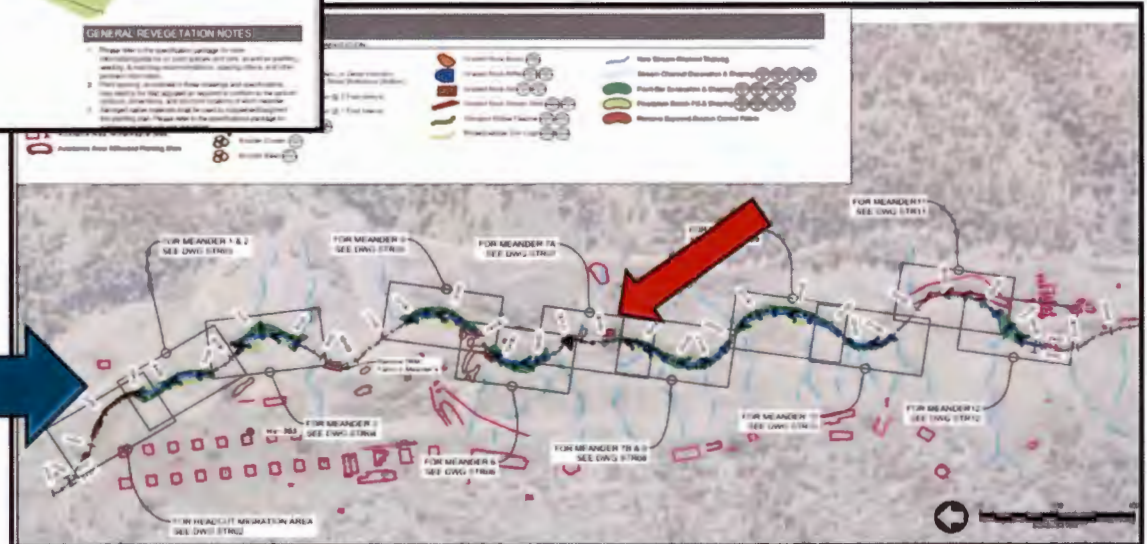


Design Solutions, contd.



Design of rock structures

Stream flow stabilized



Construction Phase

Fish removal

Sweatt
Construction
was hired in
2020 to
construct the
project



Construction Phase, contd.

Space limitations



Construction Phase, contd.

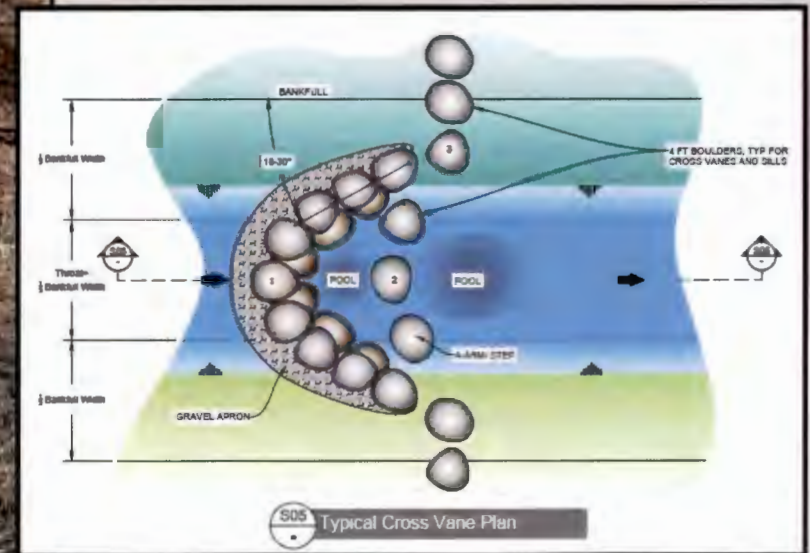
Use of boulders for water speed reduction



Construction Phase, contd.



Cross-vane rock structure



Construction Phase, contd.

Re-directing water flows



Construction Phase, contd.

Tree plantings



Construction Phase, contd.



← Protection of historical, cultural, and archeological sites and resources

Project Completion

Difficult conditions



Before and After

BEFORE



AFTER



More Before and After

BEFORE



AFTER



Again, Congratulations to Oxbow and Sweatt!!!



Metals/Minerals 2022 % US Import Dependence, Key Uses

100% Import Dependent

Arsenic	Lumber preservatives, pesticides, lead acid batteries, solar cells
Tantalum	Electronic components, gas turbine alloys
Strontium	Pyrotechnics, ceramic magnets, drilling fluids
Scandium	Alloys, fuel cells, electronics
Rubidium	Electronics, glass
Rare Earths	Catalysts, ceramics, glass, alloys, metallurgy
Niobium	Steel alloys
Manganese	Steel production
Indium	LCD screens, electrical components
Graphite	Lubricants, batteries, fuel cells
Gallium	steel making Integrated circuits, optical devices (LEDs)
Fluorspar	Aluminum manufacturing, gasoline, uranium fuel, refrigerants
Cesium	Oil/gas well drilling, fuel cells
Yttrium	Catalysts, ceramics, metallurgy, jet engines
Asbestos	Oil industry, rubber sheet, vehicle friction products
Mica (sheet)	Oil drilling, roofing, rubber products

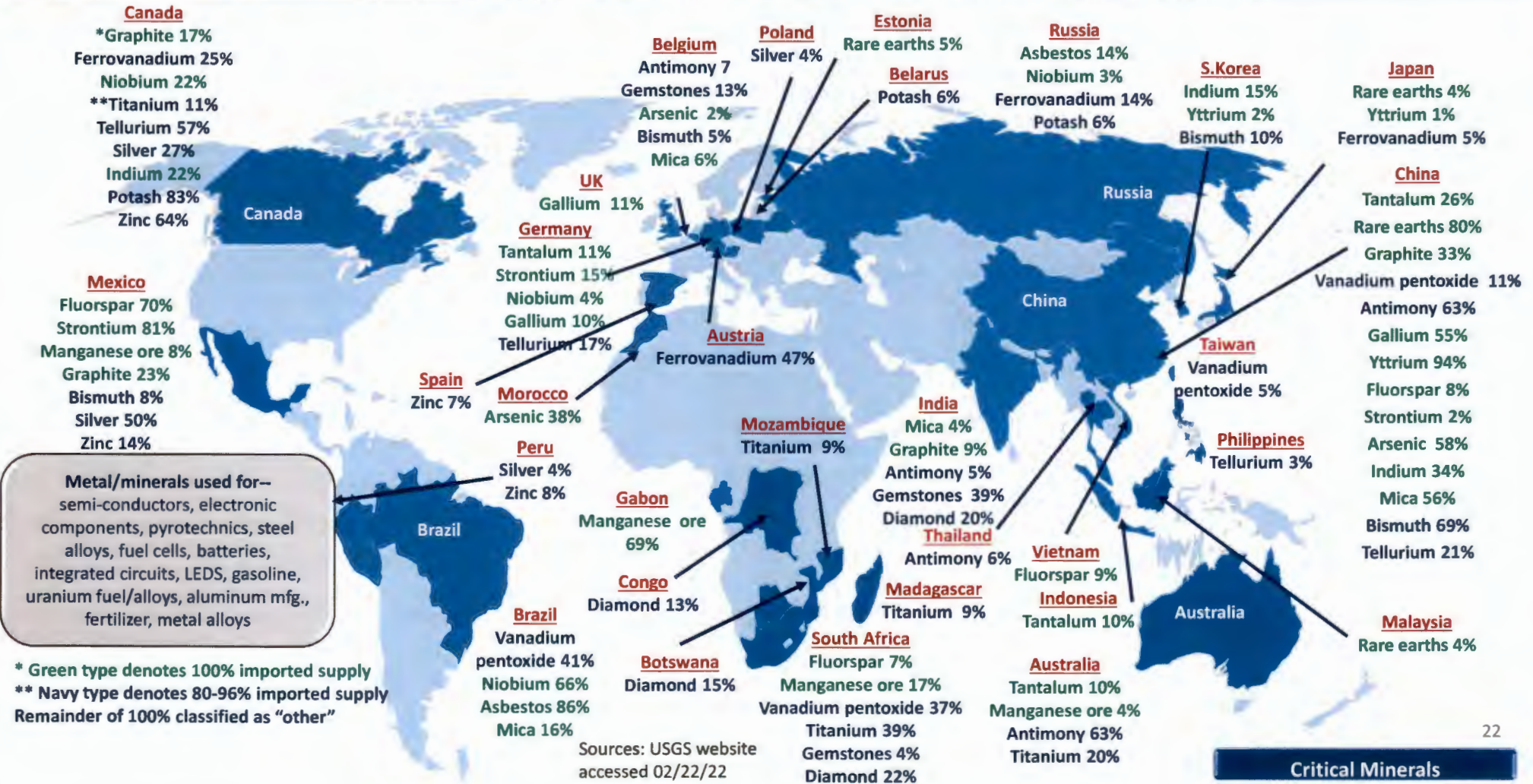
Note: Navy type indicates on USGS Critical List 2022
Red type highlights some key energy uses

96 - >50% Import Dependent

Vanadium	96% Metal, steel, uranium alloys
Tellurium	>95% Cooling, energy production, solar cells, cast iron production
Bismuth	94% Used in medical/ atomic research
Potash	90% Fertilizer, chemical, & industrial apps
Titanium*	>88% White pigment, metal alloys
Diamond	84% Computer chips, O&G drilling, transportation
Zinc	83% Metal galvanizing
Antimony	81% Flame retardants, metal products, ceramics, glass
Silver	80% Electricity, electricity conductivity, batteries, plastics
Platinum	79% Catalytic agents
Rhenium	76% Lead-free gasoline, super alloys
Cobalt	76% Rechargeable batteries, superalloys
Barite	>75% Oil/gas drilling
Bauxite	>75% Cement, petroleum industries
Iron Oxide	>75% Concrete, construction materials
Tin	75% Coatings & alloys for steel
Chromium	75% Stainless steel, other alloys
Gold	>52% Electrical/electronics
Tungsten	>50% Wear-resistant metals
Germanium	>50% Fiber optics, solar cells
Lithium	>50% Batteries, EVs
Nickel	>50% Steel alloys

Sources: USGS;
Methodological Note to the
Inventory of Export
Restrictions on Industrial
Raw Materials
*Titanium mineral
concentrates

US Metals, Minerals on Which the US 80 to 100% Import Dependent, Country Suppliers of US Market/% Total Imports from Country



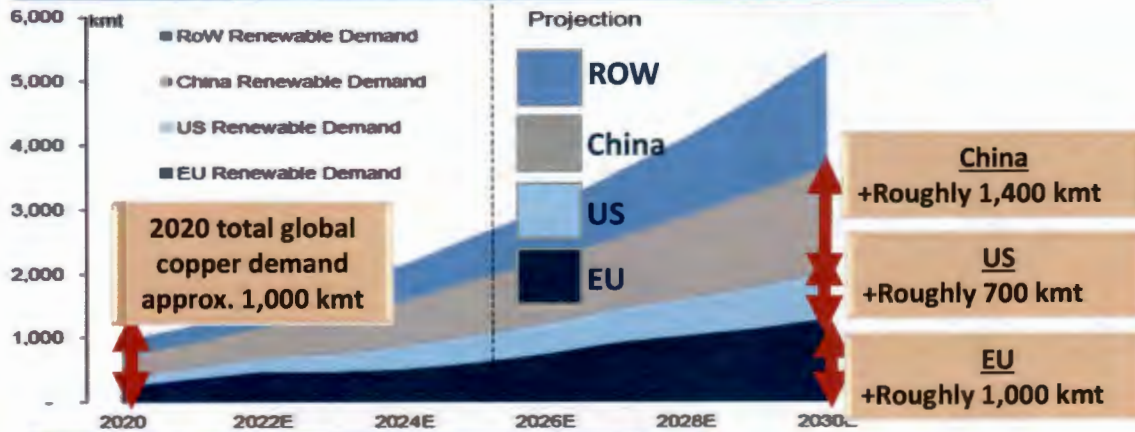
NM Metals, Minerals on Which the US is 75-100% Import Dependent, Country Suppliers of US Market/% Total Imports from Country



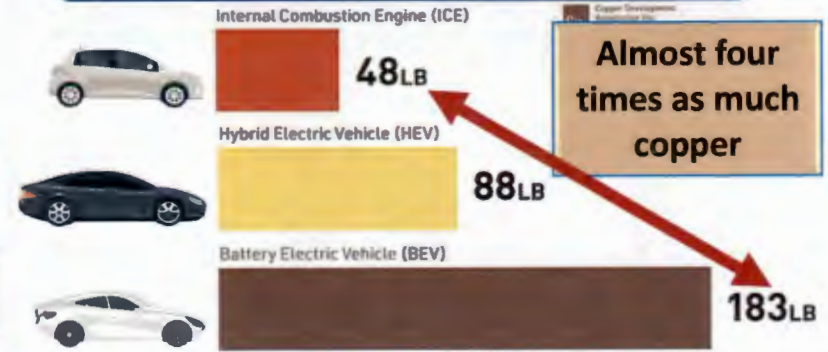
Found and/or Produced in NM			
Mineral	% Import Dependent	% Suppliers	Key Uses
Antimony	81	63% China	Ceramics, glass
Arsenic	100	58% China	Lumber preservatives
Bismuth	94	69% China	Medical, atomic research
Gallium	100	55% China	LEDs
Graphite	100	33% China 23% Mexico 7% Canada	Batteries, fuel cells
Indium	100	34% China 22% Canada 15% S. Korea	Electrical components
Manganese	100	69% Gabon	Steel production
Niobium	100	22% Canada	
Rare earths	100	80% China	Metallurgy, glass, wind turbines
Scandium	100	China, Japan Europe (% NA)	Aluminum, fuel cells electronics
Tellurium	95	57% Canada	Solar cells, cooling
Titanium	75	39% South Africa 20% Australia 11% Canada	Steel alloys
Vanadium	95	37% South Africa 14% Russia 11% China	Steel
Zinc	83	64% Canada 14% Mexico	Metal galvanizing

Demand for Electrification/Transportation = \$10,000 per ton Copper

Green electrification related copper demand by region



Copper Content by Vehicle Type



Copper, 5 Year Price Chart



Frnk Els | April 13, 2021 | 2:16 pm

“Within the United States, mining and production of copper are located in the West, specifically **Arizona, New Mexico, Utah, Nevada** and Montana. According to the USGS. Production in these states and Michigan account for more than 99% of domestic copper production”

Feb. 5, 2024

140 M EVs by 2030 in IEA's SDS X 183 lbs. of copper/EV = 11.6 million Mt of copper for EVs

Global production, 2020: approx. 20 million Mt

US uses (%): building construction, 43%; electrical and electronic products, 21%; transportation equipment, 19%; consumer and general products, 10%; and industrial machinery and equipment, 7%.