



# Rare Earth Minerals: The Indispensable Resource for Clean Energy Technologies

**MINERALS FOR A GREEN SOCIETY**  
Rare Earth (Lanthanide) Elements  
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# What are "Rare Earth" Elements?

Rare earths are a group of 15 metals whose unique properties make them **indispensable for a wide variety of emerging and critical technologies:**

## The Rare Earth Elements

**Rare Earth Elements**

														Y 39			
La 57	Ce 58	Pr 59	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67	Er 68	Tm 69	Yb 70	Lu 71			
Lanthanides																	
H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Mn	Uu	Uu	Uu

### Clean Energy Technologies

Hybrid electric vehicles, wind power turbines, compact fluorescent lighting, and more.

### Advanced Water Filtration

Military, homeland security, domestic, and foreign aid applications.

### Defense Applications

Enable a wide variety of critical defense technologies, including electric power generation platforms

# Applications For Rare Earth Elements

- Petroleum refining
- Chemical processing
- Catalytic converter
- Diesel additives
- Industrial pollution scrubber

## Catalysts



## Electronics

- Display phosphors (CRT, PDP, LCD)
- Medical imaging phosphors
- Lasers
- Fiber Optics
- Optical temperature sensors



- Polishing compounds
- Optical glass
- UV resistant glass
- Thermal control mirrors
- Colorizers/Decolorizers



## Glass

## Rare Earths



## Other

- Water Treatment
- Fluorescent lighting
- Pigments
- Fertilizer
- Medical Tracers
- Coatings



- Capacitors
- Sensors
- Colorants
- Scintillators

## Ceramics



## Magnets

- Motors
- Disc drives & disk drive motors
- Power generation
- Actuators
- Microphones & speakers
- MRI

- Anti-lock brake system
- Automotive parts
- Communication systems
- Electric drive & propulsion
- Frictionless bearings
- Magnetic storage disk
- Microwave power tubes
- Magnetic refrigeration
- Magnetostrictive alloys

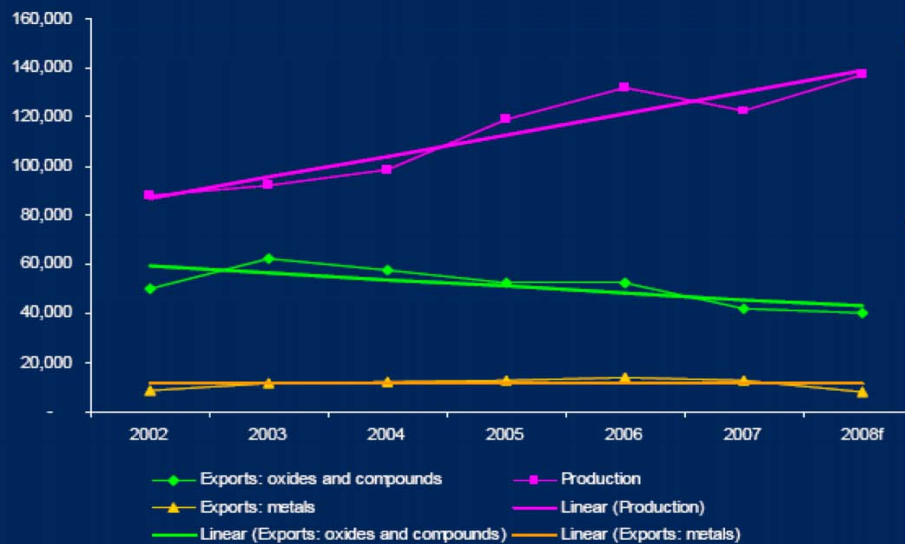


## Metal Alloys

- Hydrogen storage (NiMH batteries, Fuel cells)
- Steel
- Lighter flints
- Aluminum/ Magnesium
- Cast iron
- Superalloys

## Rare Earth Production: Growing Rare Earth Supply Issues

### China: A widening gap between production and exports, 2002-2008



- Decreasing availability of REOs and rare earth metals to processors outside China
- Decline in exports of metals and alloys has not been as steep as exports of oxides and compounds but forecasts for 2008 show a significant decline.

Source: Global Trade Atlas, Roskill estimates

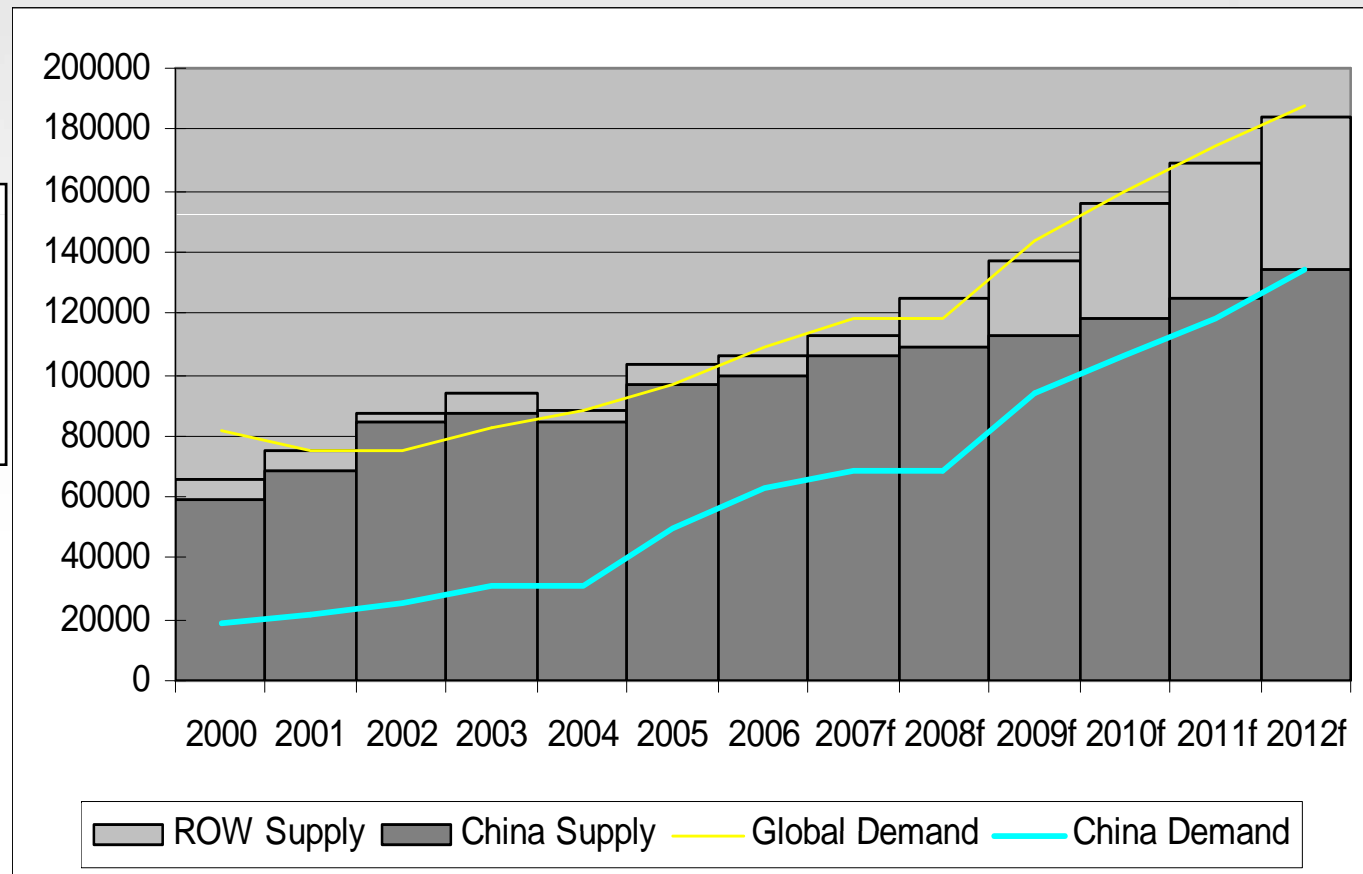
**Roskill**

EXPANDING THE WORLD'S KNOWLEDGE OF METALS AND MINERALS MARKETS

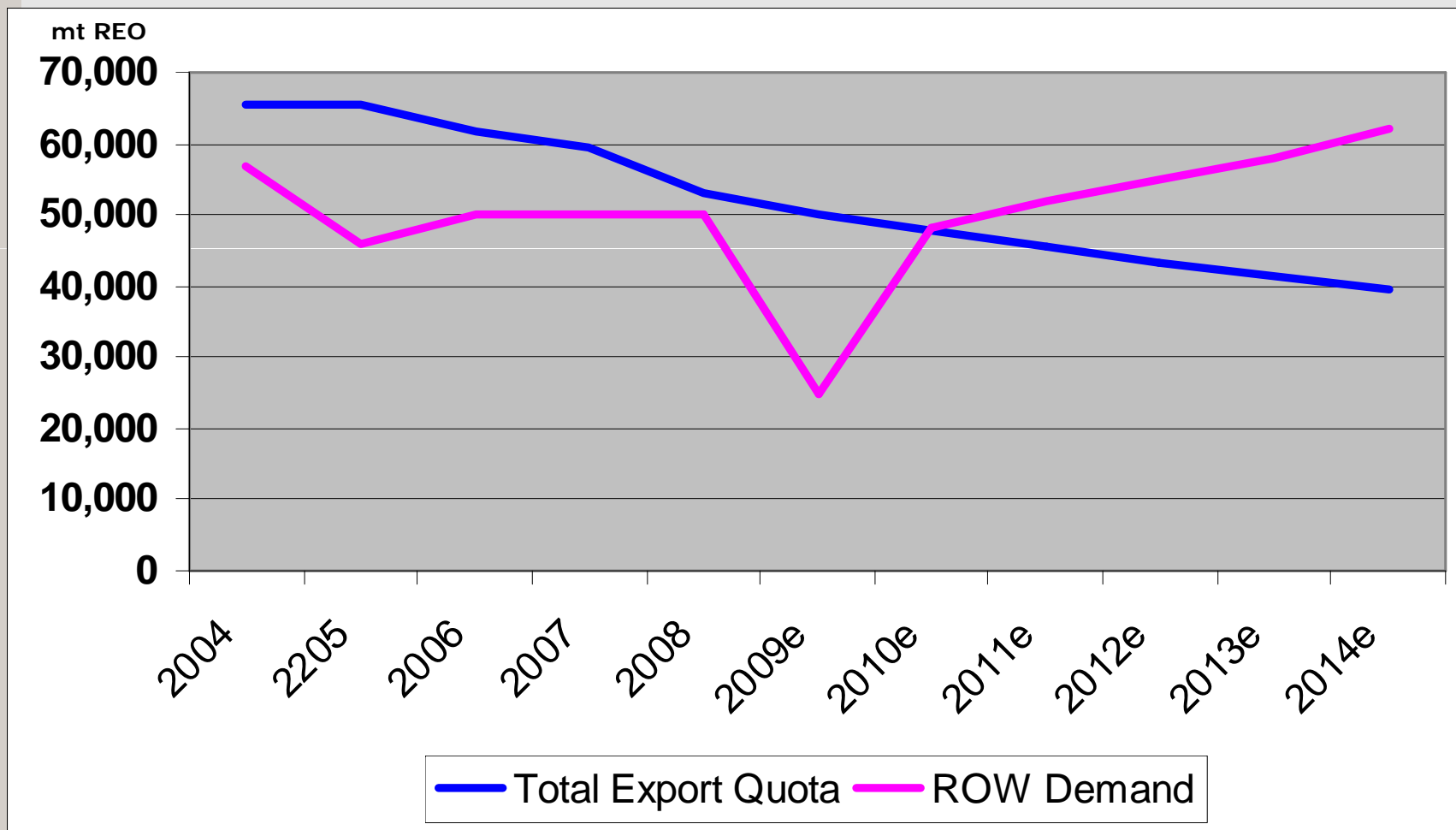


## Rare Earth Production: Projected Gap in RE Supply and Demand

RE Oxide  
 Demand (mt per  
 annum)



## ROW Rare Earth Supply Issues: declining China Export Quota

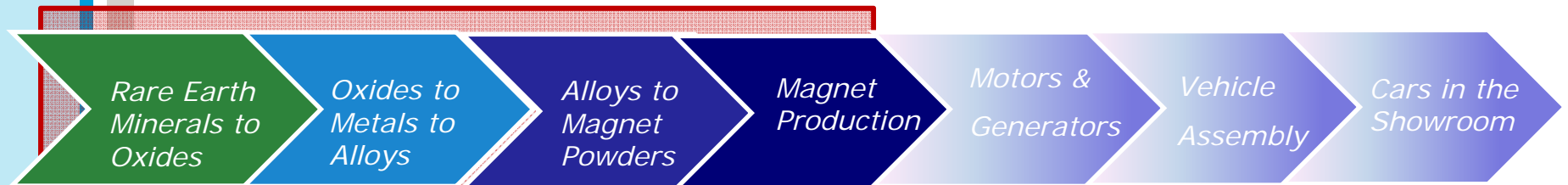


**Rare Earths or Petroleum:  
Trading One Dependence for Another**

**Petroleum Supply Chain**

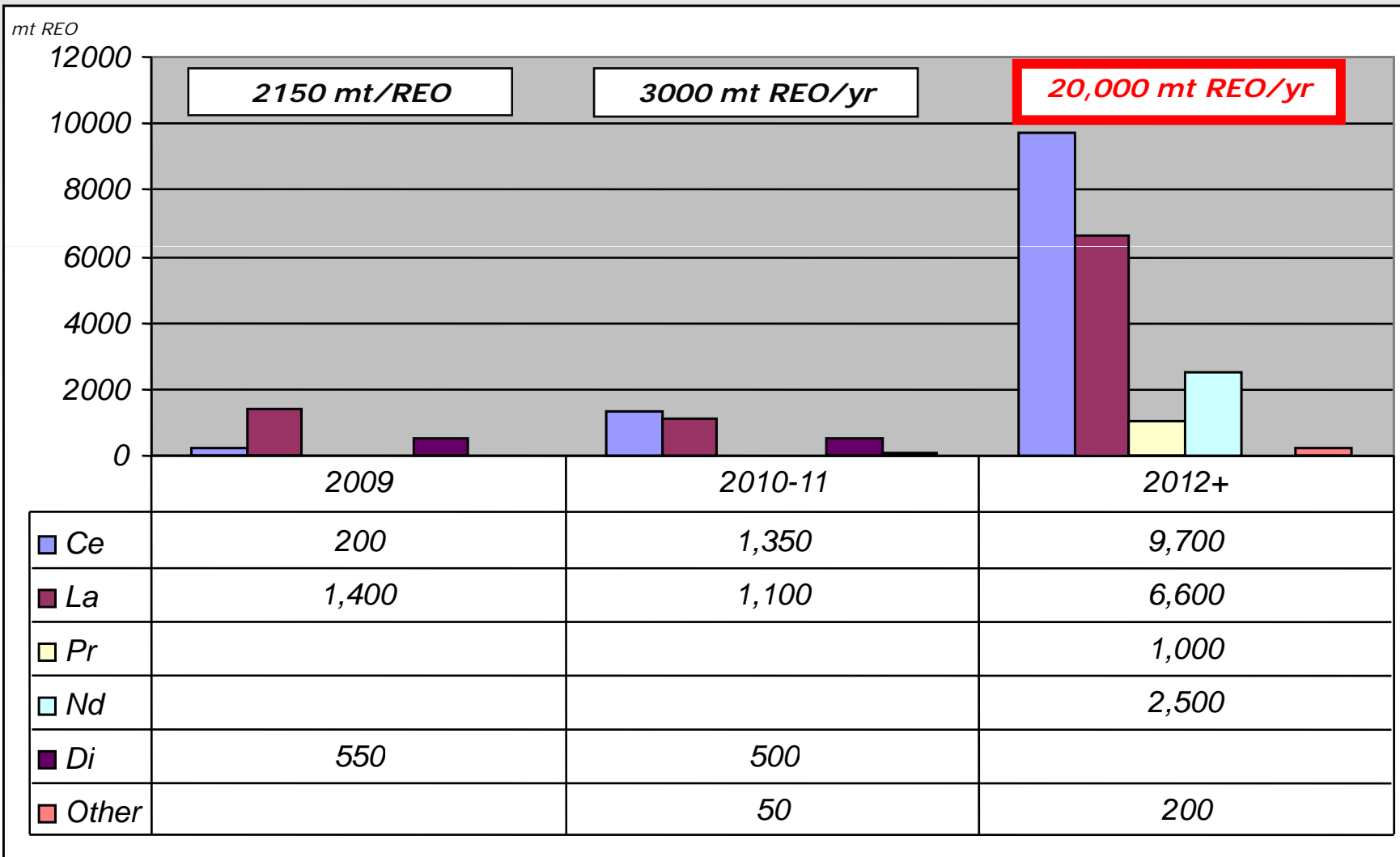


**Dependent on the Middle East**



**Dependent on China**

## Mt. Pass Production Through 2012





- Reestablish key Western Rare Earth Supply Chains
- Produce a full suite of high purity products
- Exceed all environmental requirements
- Be globally cost competitive



## Reestablish Supply Chains

**The name plate capacity of the plant will be 40MM lb/yr REO, expandable to about 80MM lb/yr REO**

Molycorp has LOI's in hand for >145% of planned production.

Molycorp will move as far down stream as is necessary to establish viable supply chains.

“Mining to Magnets”: Molycorp will produce Nd oxide, Nd metal, NdFeB alloy and partner with magnet producers to manufacture finished products.

**Attractive product offerings are crucial to meet our goals.**

Molycorp will produce a suite of high purity (>99%) products including:

- Neodymium
- Praseodymium
- Lanthanum
- Cerium
- Europium
- Dysprosium
- Samarium
- Gadolinium
- Others as markets dictate

- 30 year Mine Permit and EIR are approved.
- More than adequate fresh water available for full production.
- Through recycling and treatment, fresh feed water will be reduced from 850 gpm to <30 gpm
- Molycorp has several workable options to choose from for waste water disposal, including evaporation and recycling.

### Variable Costs

The most fundamental driver for our variable cost is HCl and NaOH consumption

Power and fuel costs are the second most significant cost

Molycorp has developed and is implementing innovative approaches and proprietary technologies that will significantly reduce these key costs, including onsite power generation and chemical recycling.





## Cost Competitiveness – Cerium Products

**Cerium consumption is an issue for the entire rare earth industry.**

- Traditional markets have diminished and new applications have not replaced demand.

**Molycorp has developed non-traditional high volume, high value, patent protected uses for new, cerium enriched, rare earth based products.**

- Arsenic sequestration for Copper and Nickel manufacturers
- Advanced water treatment

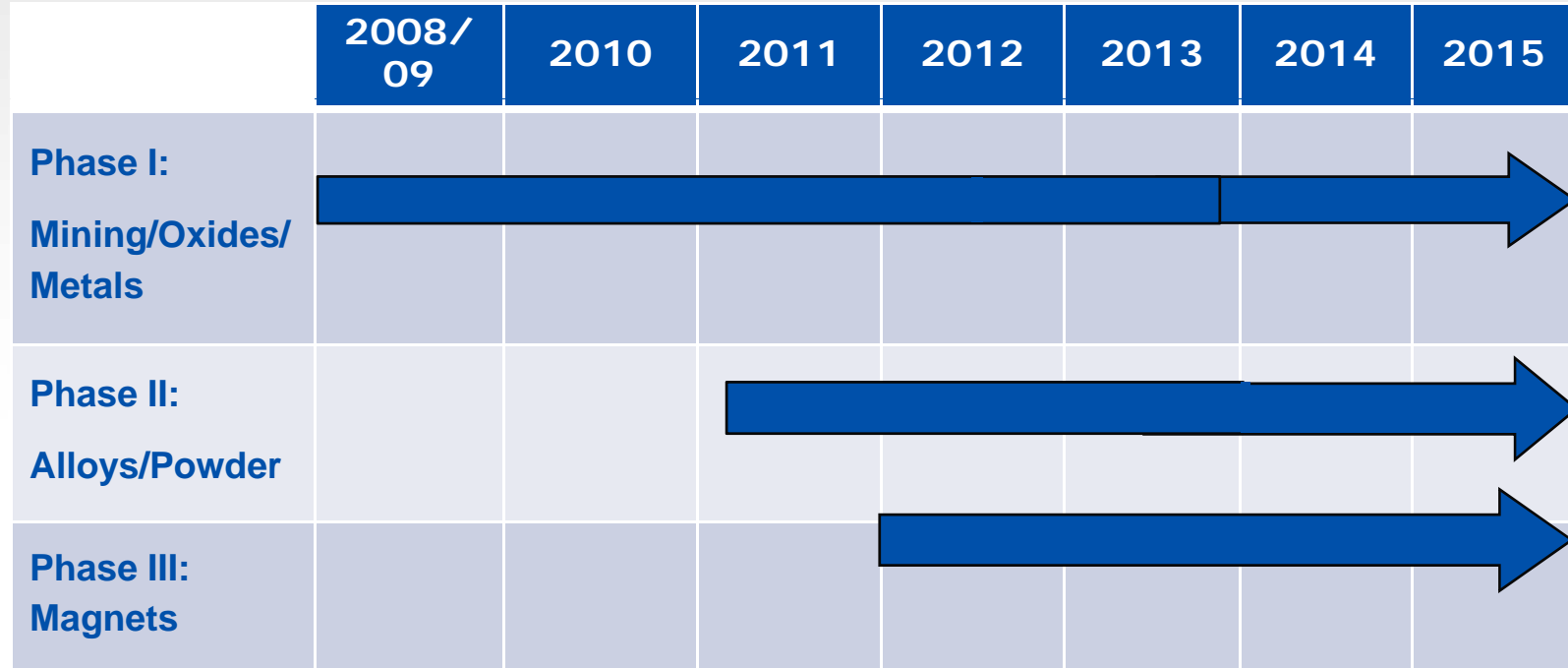


## Molycorp's Phased Approach: Cultivating Capacity of at least 20,000 tons/year REO

**Phase I:** Complete refurbishment of processing plant and produce metal.

**Phase II:** Build alloying and magnet powder facilities.

**Phase III:** Build magnet production and finishing facility.



**900 direct jobs created** with addition of metals and magnet manufacturing



Thank You for your time.  
Any Questions?