

# HIGH PERFORMANCE ALLOY DOMESTIC VALUE CHAIN

Opportunities for Impact within the Fossil Energy Sector

## PROCESS

## PRODUCT

## INDUSTRY STRENGTHS

1

### Alloy Production

Processing into desirable composition

*PRODUCT: ingots, billets, rods, and powders*



2

### Shaping

Casting, stamping forging – controlling microstructure and stresses

*PRODUCT: semifinished/unfinished valves, airfoils, turbine components*



3

### Finishing

Machining for tolerances, heat treatments, coatings

*PRODUCT: Finished component*



4

### Component

Welding, brazing and joining of parts

*PRODUCT: Subassemblies and components*



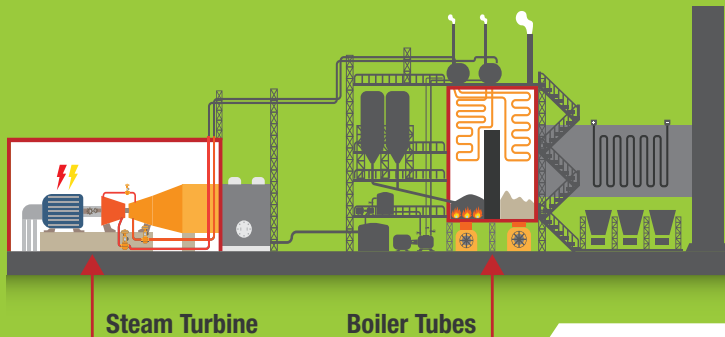
- **Diversity of Product**
- **Major Companies:**<sup>1</sup> Haynes International, Allegheny Technologies Inc, Special Metals Corp, Carpenter Technology Corp, Universal Stainless

- **High Growth**
- **Major Companies:**<sup>2</sup> Precision Castparts, ATI, Arconic, US Steel

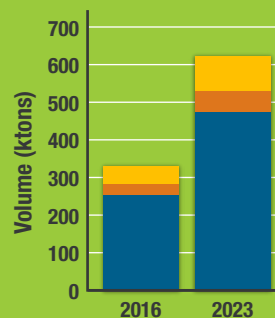
- **Low Imports Competition**
- **Major Companies:**<sup>2</sup> MIC Group, Norman Noble, Pacific Contours

- **High Profit**
- **Major Companies:**<sup>3</sup> GE, Siemens, Babcock and Wilcox, Black and Veatch

## Fossil Energy Applications



## Superalloy Market Segmented By Base Metal



**Fe** IRON - heat and corrosion resistant to 550 °C  
Comparatively low cost

**Co** COBALT - Hot corrosion, oxidation, wear resistance to 1100 °C  
Comparatively low strength, but maintains properties at higher temperatures

**Ni** NICKEL - Chemically and mechanically stable up to 800 °C  
High hardness, strength and corrosion resistance



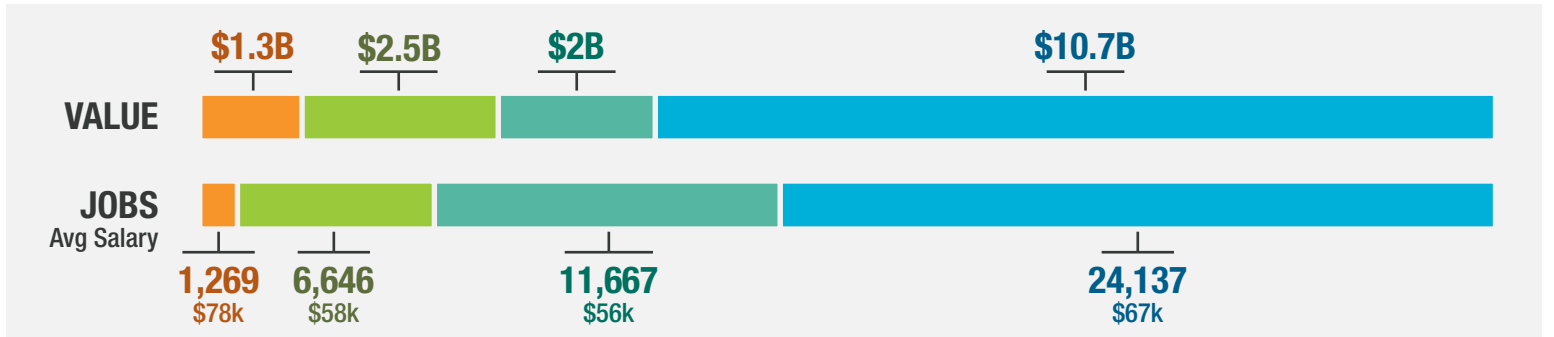
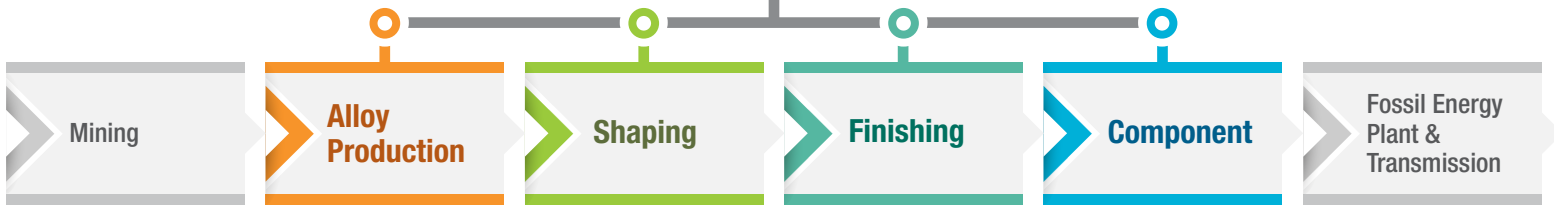
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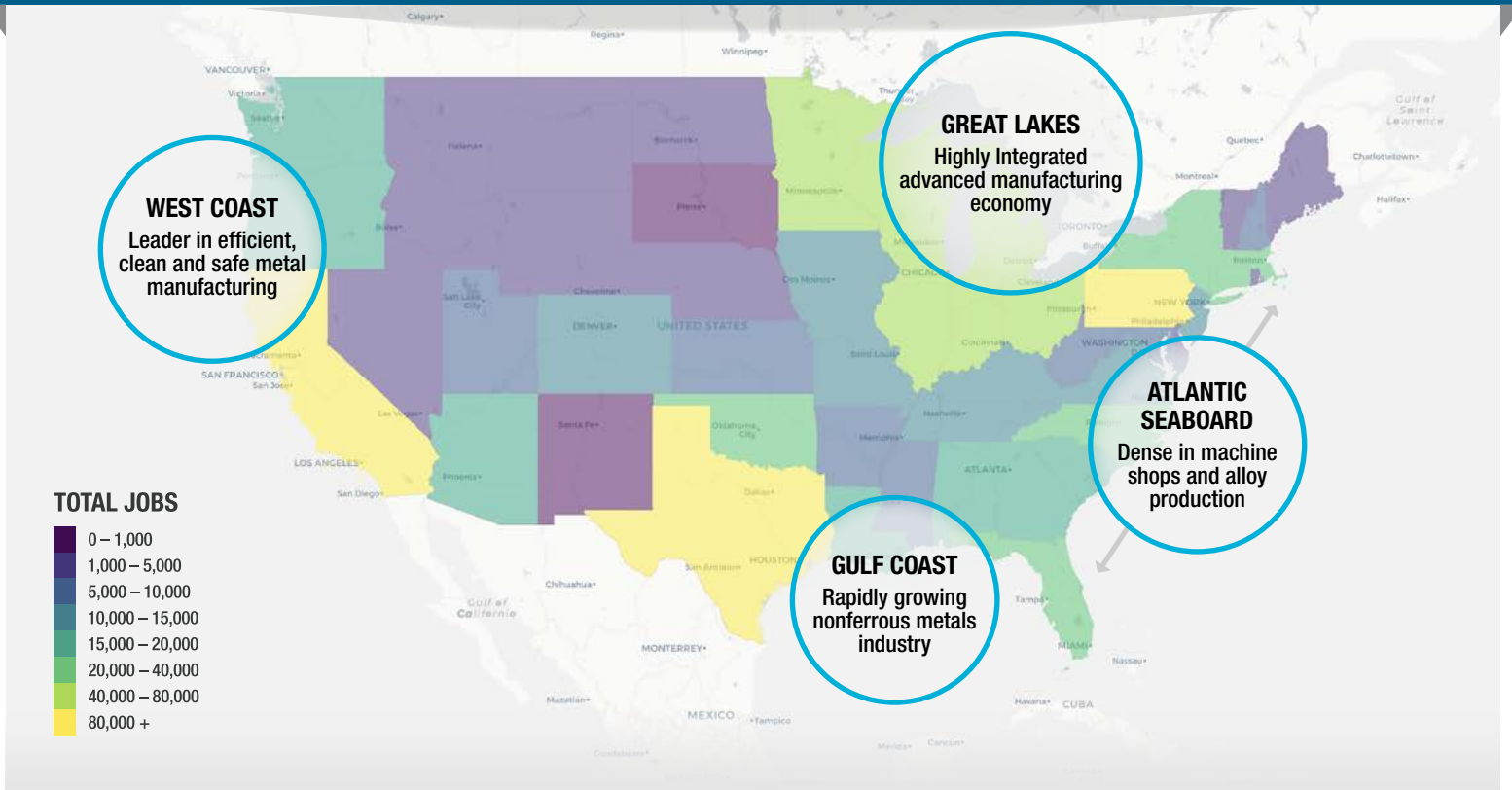
# HIGH PERFORMANCE ALLOY DOMESTIC VALUE CHAIN

## Regional Impacts



**TOTAL VALUE = \$16.5 Billion** | 
 **JOBS = 43,719** | 
 **AVERAGE SALARY = \$65k per year**

## HIGH PERFORMANCE ALLOY SUPPLY CHAIN: REGIONAL EMPLOYMENT



SOURCES: 1. Allied Market Research, Superalloys Market Global Opportunities Market 2017-2023  
 2. Source: IBISWorld  
 3. Source: Global Industry Analysts, Global Power Boilers Industry, 2020  
 \*\* Segment value and jobs supported estimates are derived using data from IBISWorld and EIA