



## Nachhaltige Beschaffung, Verarbeitung und Recycling von Wolfram Stakeholderdialog "Vom Rohstoff zum Werkstoff"

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Molybdenum & Tungsten: Strong metals for a high-tech world

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### Group portfolio and industrial logic



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<p>100%</p>  <p>High Performance Materials</p>	<p>100%</p>  <p>Tungsten &amp; Powders</p>	<p>50%</p>  <p>Hardmetals &amp; Tools</p>	<p>20%</p>  <p>Molybdenum Powders</p>
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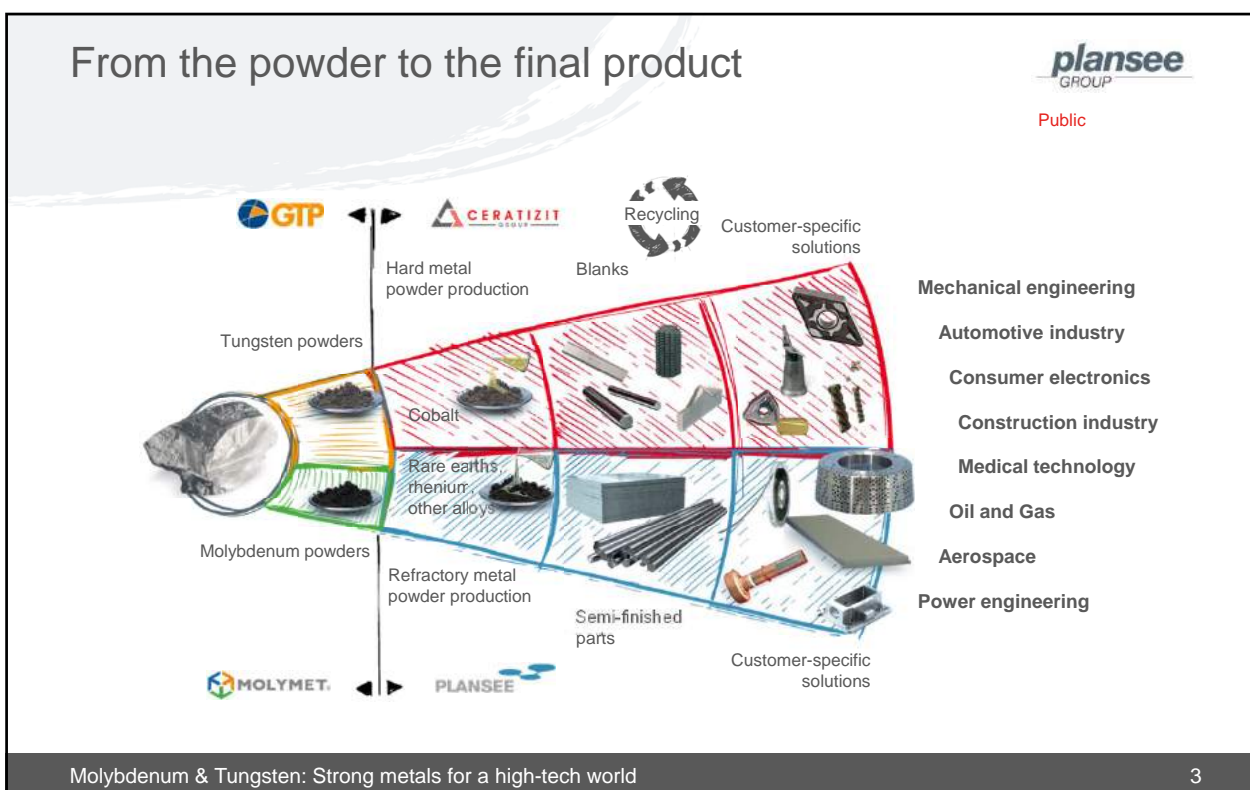
**Key facts:** >1,2 Bn € sales, >6.000 employees, 36 manufacturing sites worldwide

**Mission:** Strong metals for High-Tech applications  
(Excellence in Powder Metallurgy)

**Objective:** worldwide market and technology leader for  
Molybdenum and Tungsten based materials and components

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## Properties of tungsten & tungsten carbide

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**Tungsten:**

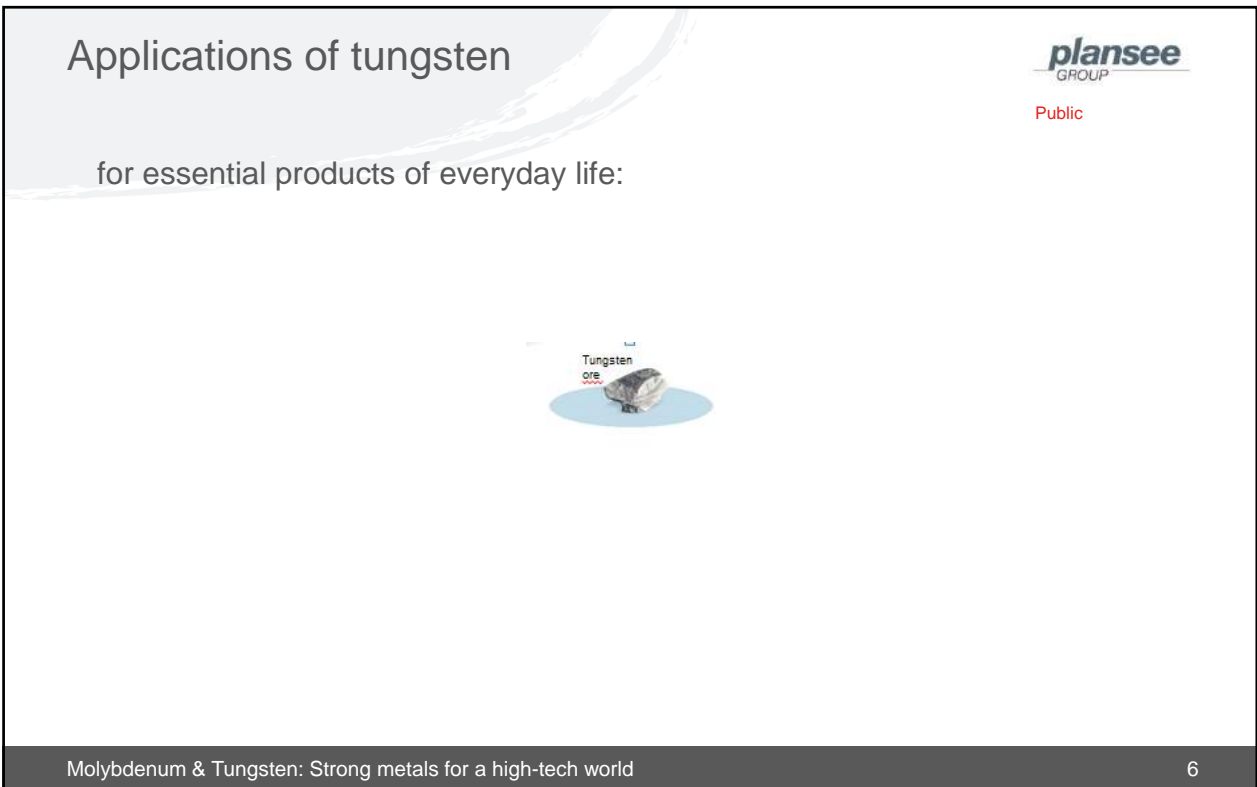
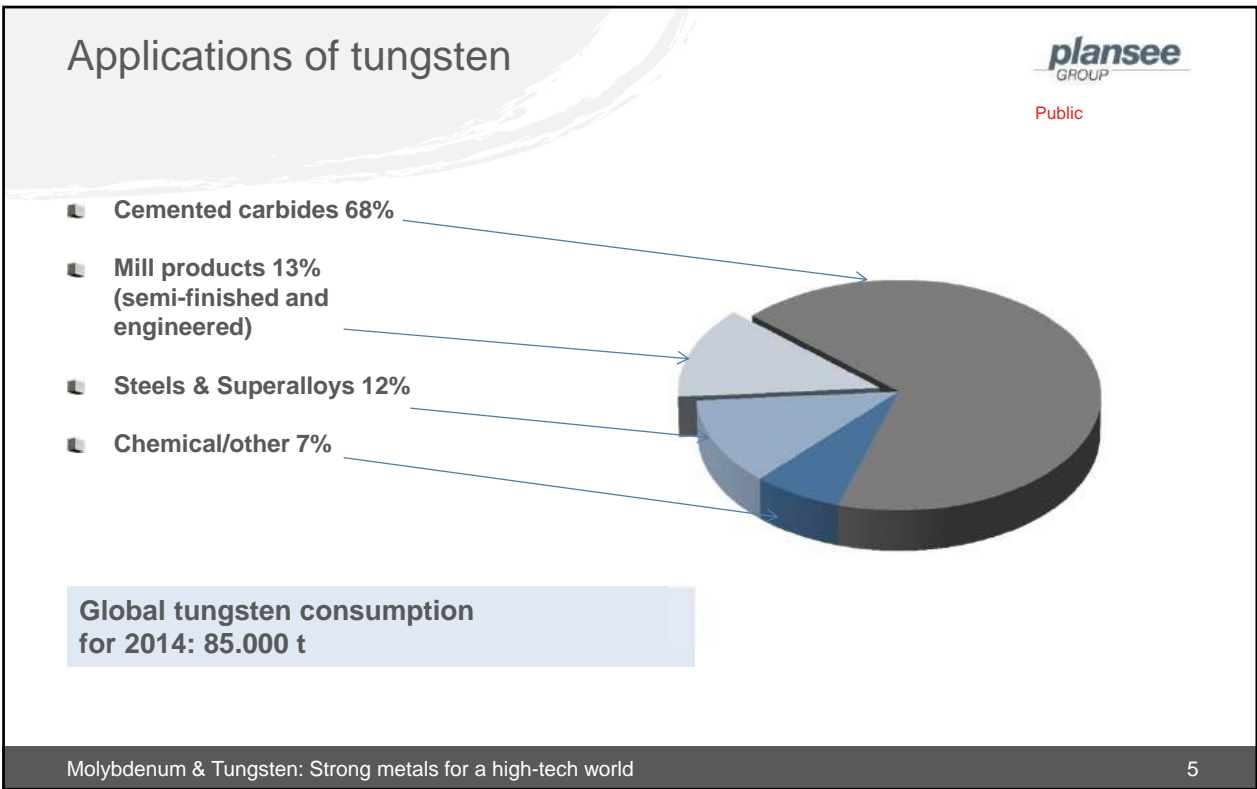
- High melting point (3420 ° C)
- High density (19,3 g/cm<sup>3</sup>)
- Low vapour pressure
- High temperature strength
- Low thermal expansion coefficient
- High thermal conductivity
- High absorption capacity for ionising radiation

**Tungsten carbide: WC**

- High hardness
- High compressive strength
- High modulus of elasticity
- High heat conductivity

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# Applications of tungsten



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for essential products of everyday life:



# Applications of tungsten



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for essential products of everyday life:



# Applications of tungsten



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for essential products of everyday life:



# Applications of tungsten



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for essential products of everyday life:



## Responsible sourcing and processing of tungsten

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### Strategic goals:

- Long-term and sustainable W supply of the Plansee Group
- Secured access to primary raw material sources
- Refrain from purchasing or using “conflict minerals”
- Socially and environmentally responsible sourcing in accordance with the Plansee Group’s Code of Conduct
- Resource and energy efficient processing

### Measures:

- Vertical integration
- Primary and secondary raw material sourcing
- Recycling and industrial Re-use of Tungsten
- Energy efficiency improvement
- Process & product optimization

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## Vertical integration

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Plansee Group Tungsten Road Map

From a tungsten processor to a vertically integrated group of companies

- End-to-end supplier covering the entire value added chain
- Handle all processing steps throughout the value chain

From ore/concentrate and powders to fabricated products



The Plansee Group developed into a strategic tungsten supplier of leading companies around the globe

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## Vertical integration – Global Tungsten & Powders

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GTP expands the vertical integration of the Plansee Group to become the leading Western producer of W- and WC-powders by:

- Plants in the US and Europe
- State of the art technology to guarantee competitive processing of various raw materials
- Recycling of secondary raw materials and processing of tungsten concentrates directly from mines
- Continuous investment in technology and capacity extension



News 2015: GTP acquires  TIKOMET

## Primary & secondary raw material sourcing

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The Plansee Group procures its tungsten from two sources

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Tungsten concentrates directly from the mine  
→ no conflict minerals



## Secondary raw material sourcing (scrap) and recycling



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- Collection systems for hard metal containing scrap
- Cooperation with waste disposal / recycling companies
- Take back agreements with Plansee Group customers

Hard scrap: end of life products (cutting inserts, wear parts, tools, punches and dies, etc.)

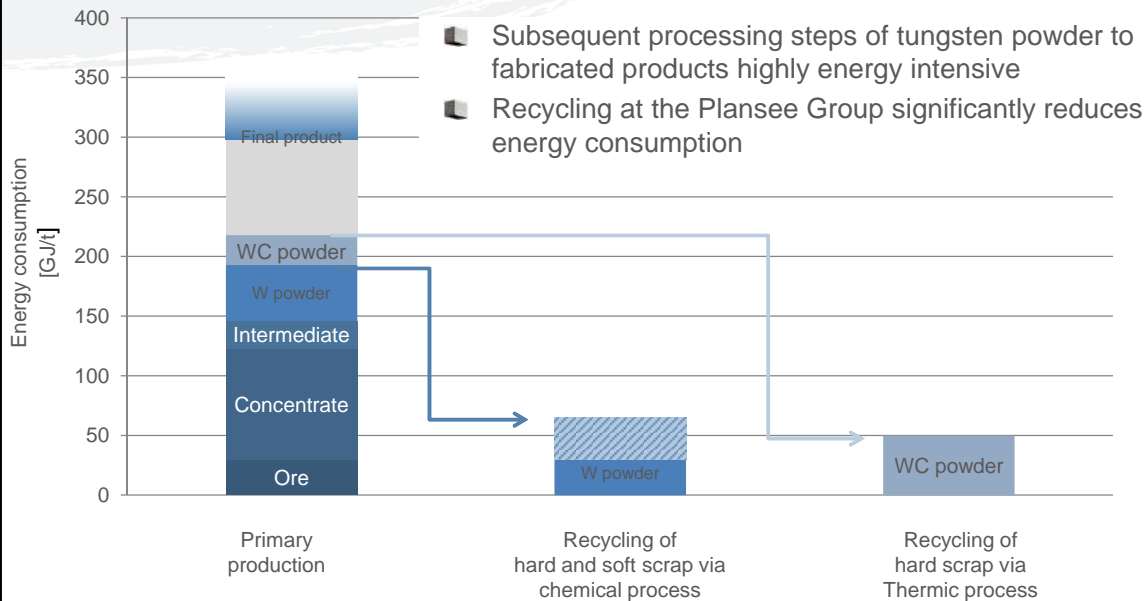
Soft scrap: by-product of tungsten processing (shavings, turnings, grinding sludge, sweepings and powders, etc.)



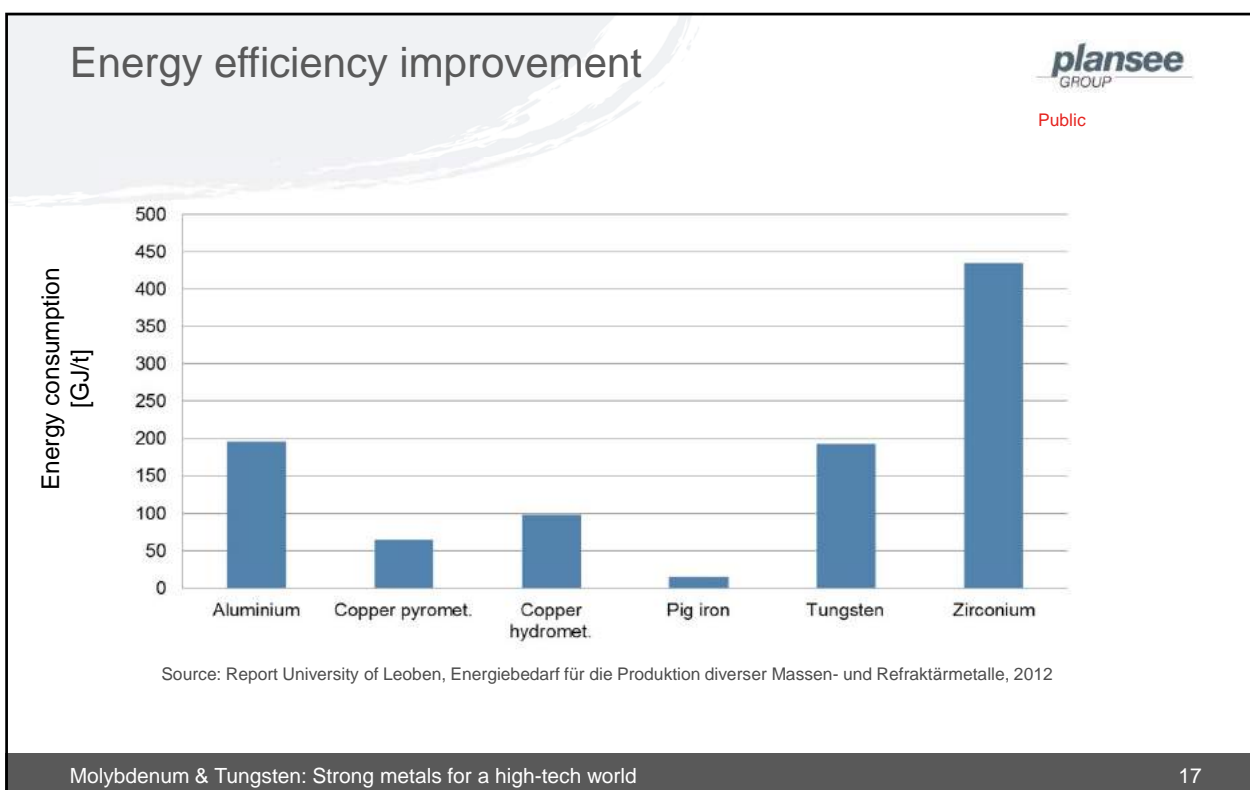
## Energy efficiency improvement – carbon footprint reduction



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## Process & product optimization

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- High product performance
- Optimized service life
- Process efficiency


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## Process & product optimization / Examples



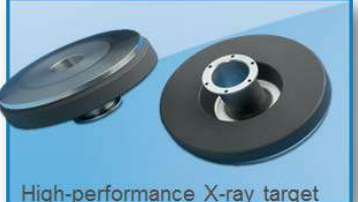
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### X-ray diagnosis



Tungsten X-ray anode

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High-performance X-ray target

- Better performance
- Higher temperature resistance
- Higher energy input

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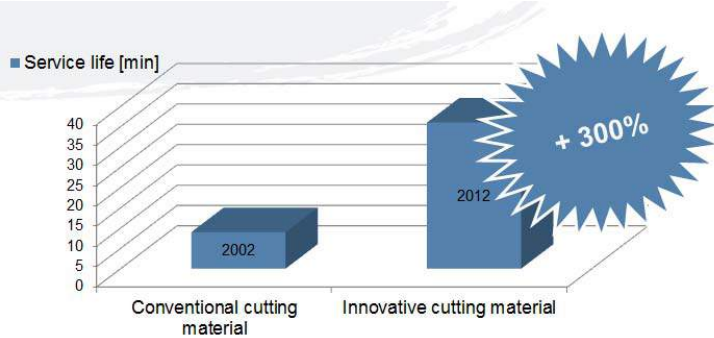
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## Process & product optimization / Examples






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### Milling of Ti-alloys for aerospace




Year	Material Type	Service Life [min]
2002	Conventional cutting material	~15
2012	Innovative cutting material	~45 (+300%)



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Cutting edge after 10 minutes

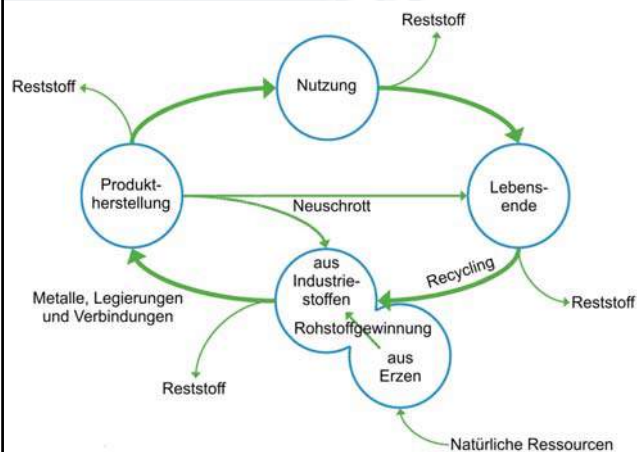
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## „Recycling and industrial Reuse“ as a key enabling technology in a resource constrained world

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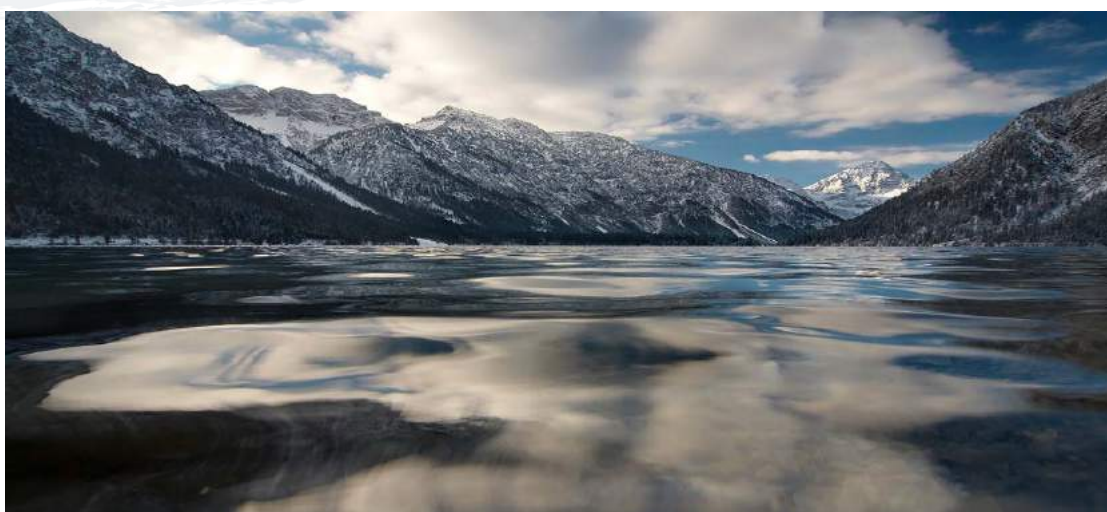
- We are one of the global leading companies in Molybdenum & Tungsten based products
- Strong Metals for a High Tech World  
→ Molybdenum and Tungsten as enabling technology made in Austria
- We close the loop and secure supply by recycling production scrap and end of life materials
- Continuous investment in R&D&D and deployment crucial
- Austrian centered Innovation Eco-System needed

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## The lake Plansee

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**Thank you for your attention**

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