





15-17 May 2023, Brussels, Belgium



"Greenland Molybdenum Project – Securing reliable high quality molybdenum supply for the EU Green Deal from a responsible EU associate source"



www.greenlandresources.ca



We know responsible mining can significantly improve peoples' lives









COMPANY HIGHLIGHTS

- U World Class Climax-type pure molybdenum deposit in East Greenland
- Cross cutting critical Mineral World Bank; IEA; Natural Resources Canada
- Supported by EIT Raw Materials / ERMA EU Body supports strategic mining projects for EU Green Deal
- □ NI 43-101 Feasibility Study Tetra Tech 2022
- Environmentally friendly mine design and low deleterious elements in ore body
- Current independent EIA / SIA strong sustainability and local support WSP Denmark
- Signing offtakes directly with largest EU chemical and metallurgical steel companies
- Strategic EU Project Supply ¼ of EU need, EU 2nd world Mo user and has no Mo production
- Re-permitting project was fully permitted in 2009
- U Working on Capex ERMA, financial advisor, supranational, crown corporations and others



ATTRACTIVE MINING JURISDICTION



ND RFSOURCFS

- ✓ Autonomous country within the Kingdom of Denmark (AAA S&P credit rating)
- Ranked Greenland as Global #1 in "Current Mineral Potential Index"
- ✓ Member of the European Raw Material Alliance
- State-of-the-art University and School of Mining with over 100 years of geological data
- Malmbjerg project located nearest point to the EU
- Among the world's largest molybdenum producers (China, USA, Chile, Peru, Mexico), Greenland ranks:
 - #1: Education & health \$ as % GDP
 - #1 Best GINI social inequality Index
 - #1 Lowest poverty rates
 - #1 Hospital beds per capita
 - #2 GDP per capita (>US\$50,000)

MOLYBDENUM: MARKET STATISTICS

MOLYBDENUM USES



REGIONAL PRODUCTION

Million pounds of Molybdenum Content					
Region	2022				
	Production	Use			
North America	112	90			
South America	167	15			
Europe *	-	124			
China	248	269			
Other	50	133			
Total	577	631			

Source: IMOA

✓ EU largest Mo users: Germany \simeq 20 million pounds per year, Italy 18, Finland 13, Sweden 12

✓ High performance steel (exceptional higher standard steel) is mainly produced in Scandinavia and Germany



WESTERN PRODUCTION HAS BEEN SYSTEMATICALLY FALLING

Annual	Production	Growth	of the	Key	Western	Moly	Producers

Selected Western Mo Producers	2019	2020	2021	2022	2022	2022 Production
Producer	YoY %	YoY %	YoY %	YoY %	mlbs	Comments
Freeport McMoRan (USA, Peru)	-5.3	-15.5	11.8	0.0	85.0	11% below 2017 level
Grupo Mexico (Mexico, Peru)	22.3	12.5	0.0	-13.3	57.8	
Codelco (Chile)	-7.0	24.5	-24.6	-2.6	45.2	33% below 2014 level
Other Chilean Mines	n/a	-2.8	-1.8	16.5	28.1	
Antofagasta (Chile)	-14.7	8.6	-16.9	-7.8	21.4	
Rio Tinto (Bingham Canyon, USA)	93.0	82.2	-62.7	-56.5	7.3	34% below 2017 level
Sierra Gorda (Chile)	-25.2	-18.0	-9.7	-52.5	7.2	80% below 2017 level
Antamina (Peru)	7.8	1.3	-38.0	36.7	6.7	35% below 2016 level
Teck (Highland Valley, Canada)	-24.1	-50.0	-66.7	-9.1	1.0	89% below 2017 level

Source: CPM Group

- ✓ China's increased production (+6% in 6 years) doesn't offset the falling western production
- \checkmark Global output flatlining or falling in recent years
- \checkmark Very few new projects in the pipeline with long development times
- \checkmark Limited growth potential in China
- \checkmark The only major Chinese project (60 mlbs p.a.) may start production in ~2030



MOLYBDENUM PRICE EVOLUTION (2006-2023)





- Green Energy transition to increase global demand of molybdenum (i.e., technology, mining equipment)
- ✓ Government infrastructure-projects aiming to promote economic growth will use molybdenum
- World Bank (2020) estimates 119% demand increase for molybdenum through 2050 under IRENA REmap scenario from energy technologies only
- International Energy Agency (2021) estimate 290% demand increase for molybdenum through 2040 under SDS scenario for renewables
- Molybdenum named one of the six cross cutting critical minerals by the World Bank in 2020 that will be used in all technologies in the green energy transition

TOTAL MOLYBDENUM DEMAND BY ENERGY TECHNOLOGY THROUGH 2050 UNDER 2DS⁽¹⁾



Note: 2DS = 2-degree scenario, CCS = carbon capture and storage, <math>CSP = concentrated solar power.PV = photovoltaic.

Source: (1) Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition, 2020 World Bank Group, Figure ES.2 Total Molybdenum Demand by Energy Technology Through 2050 Under 2DS



COMPARABLES MINERAL RESERVES GRADE (% Mo)





- Malmbjerg has the potential to become the most environmentally friendly source of molybdenum ir the world
 - ✓ Processing produces nearly no deleterious elements into the water environment and tailings
- ✓ Hauling our ore with an EU built rope conveyor that produces no CO₂, its own electricity and excess 1.3 Mw of electrical energy
- Designed process plant operation to use recycled salt water as process water, with very low reagent concentrations to mitigate any potential environmental contamination
- ✓ Limited molybdenum and mine-site consumables shipping season; 8-10 months no aquatic wildlife environmental disturbance in Kong Oscar Fjord
- ✓ Low disturbance footprint mine design and minimum mine closure footprint after reclamation because most of the infrastructure is modularized

PROCESSING FLOWSHEET





EIA / SIA IMPACT ASSESSMENTS (WSP Copenhagen, 2023)

- □ 16 out of 19 environmental impacts analyzed are assessed to be low or very low and 3 medium
- □ All 3 environmental risks due to accidents and natural disasters including TMF disposal to sea are assessed to be low
- □ High positive social impact on direct jobs, education, and public economy
- □ All negative social impacts analyzed including the local use of the Project area are assessed low negative
- Around 500 local direct high quality jobs during construction and 200 during the twenty-year mine life
- Dependent of the state of the s
- Lower energy consumption and low emissions due to higher ore grade
- □ Significant energy reduction and decarbonization achieved with the Aerial Rope Conveyor
- □ Working towards full decarbonization







GREENLAND RESOURCES

FEASIBILITY STUDY HIGHLIGHTS

- □ Initial Capex US\$820M
- □ Mineral Reserves 245 Mt ; 0.176% MoS₂ av. grade containing 571Mlb of Mo metal
- Production years 1-10 of 32.8 Mlb per year of Mo metal av grade 0.23% MoS₂
- Production 20 year LOM of 24.1 Mlb per year, throughput of 35,000 t/d, strip ratio 0.8 to 1
- Base case cash @ US\$18/lb Mo: After-tax IRR 22.4%, NPV6 US\$1.17b
- Levered case 60/40% debt/equity @ US\$18/lb Mo: After tax IRR of 33.8% and payback of 2.4 years
- Sensitivity: Levered @ US\$36/lb Mo: After tax IRR of 75.2%, NPV6 of US\$4.3 b payback of 1 years



MINE PLAN (NI 43-101 Feasibility Study Malmbjerg, February 2022)

Open pit mine with the primary crusher onsite; ore transport by 26km aerial rope conveyor with no CO₂ generation; processing on landed barges (no greenfield development) at Mestersvig Inlet, a natural deep draft harbor where process facility and modularized infrastructure is located; world standard design natural tailings management facility





Aerial Rope Conveyor



OPEX and CAPEX (NI 43-101 Feasibility Study Malmbjerg, February 2022)



AVERAGE LOM OPEX US\$6.38/Ib Mo





NPV & IRR SENSITIVITY (NI 43-101 Feasibility Study Malmbjerg, February 2022)



After Tax Sensitivity NPV6% and IRR to changes in US\$ Mo Prices for Base Case

After Tax Sensitivity NPV6% and IRR to changes in US\$ Mo Prices for Levered Case





CASHFLOW (NI 43-101 Feasibility Study Malmbjerg, February 2022 @ US\$18/lb Mo)

After Tax Cashflow and Cumulative Cashflow on Base Case



After Tax Cashflow and Cumulative Cashflow on Levered Case





THE MOLYBDENUM REFINEMENT CHAIN & GHG FOOTPRINT



Ref.: https://doi.org/10.1007/s40831-019-00260-8

Mining and beneficiation stages cause major variance of GHG emissions between 0.46 and

- Ferro-moly conversion adds ~2.5 t CO₂e/t
- Transport accounts for <6% of total GHG emissions

Cu)

EUROPE'S STEEL INDUSTRY NEEDS MOLYBDENUM

☐ High-performance & special steel grades:

- ✓ Rely on alloying with group IV-VI metals (\downarrow)
- ✓ Molybdenum has largest variety of metallurgical benefits
- ✓ It also boosts the effects of the neighboring elements by metallurgical synergies

Specific Molybdenum benefits in steel:

- ✓ Increases hardenability
- \checkmark Adds to strength
- Enhances toughness
- ✓ Lowers hydrogen-induced cracking sensitivity
- ✓ Imparts formability and weldability
- ✓ Improves corrosion (pitting) resistance
- \checkmark Raises hot-strength and heat resistance



- □ The European steel industry is most specialized in these products:
- ✓ Unique know-how and experience
- \checkmark Most advanced production facilities and processing chain
- \checkmark High value addition and strategically important to Green Deal



WIND POWER: MOLY'S HOME BASE IS THE NACELLE



Drive train

- ✓ Rotor (low-speed) shaft: weight 5 20 t, 42CrMo4 (0.2-0.3% Mo).
- Main gearbox: weight 30 60 t, 18CrNiMo7-6 (0.2-0.5% Mo).
- ✓ Intermediate & high-speed shafts: 5 20 t, QT steels (~0.2% Mo)
- Bearing rings: 42CrMo4 (0.2-0.3% Mo)

Pitch system

- ✓ Pitch drive: CrNiMo carburizing steel
- Yaw system
- ✓ Yaw drive: CrNiMo carburizing steel
- ✓ Slew bearing: average weight 21 t, 42CrMo4
- Bolts and nuts
- Couplings and brake system

100-120 kg Mo required per MW installed power capacity



MOLY METAL IN BACK ELECTRODES OF THIN FILM SOLAR CELLS



Today's market share of CdTe and CIGS is ~5%

Flexible copper, indium, gallium and selenium (CIGS) solar cells achieve efficiencies >22%

□ Moly metal is sputtered as back electrode having a layer thickness of 500–1000 nm in thin film solar panels

□ Verified advantages:

- Molybdenum withstands processing temperatures of up to 650 °C
- ✓ Molybdenum resists high-temperature corrosion by selenium
- Molybdenum improves panel conversion efficiency by about 2 percent points.
- CIGS and CdTe cells enhance installation flexibility boosting energy harvesting scenarios.
- □ Future Molybdenum consumption increasing.



MOLY IN CORROSION-RESISTANT ALLOYS

Solar thermal parabolic trough

Solar thermal central tower





- □ Molten salt serves as heat transfer and storage medium in CSP plants
- □ Steels 316L and 347H (≤2 %Mo) are typically used for piping and storage tanks
- □ Alloy 625 (8-10 %Mo) and Alloy C-276 (15-17 %Mo) are most suitable for components involving high-temperature geothermal fluids
- □ Martensitic stainless steels (≤3 %Mo) are used for valve and pump components



RENAISSANCE OF NUCLEAR POWER? YES, WITH MOLY

Design evolution of nuclear reactor vessels



Part integration by large-size forgings (reducing number of weld seams)





Ingot weight of 670 t. Forging press force: 14,000 t

- Molybdenum content in typical reactor pressure vessel steels:
 - ✓ Min.: 0.30 %Mo
 - ✓ Max.: 0.80 %Mo
- Only few types of steels are certified for RPV components.
- Nuclear industry codes require very expensive testing programs to accept new structural material for RPV production.
- Molybdenum provides optimum balance between strength and toughness in all certified RPV steels.



THE RELEVANCE OF MOLY IN POWER GENERATION TECHNOLOGIES

Not so many people talk about it but...

Power generation technology	Mo kg/MW	Annual consumption (estimated next 5 years)
Hydropower	3	
Wind (design dependent)	99-119	11,000-13,000 tpy Mo
Solar thermal parabolic trough	~200	
Solar thermal central tower	~50	
Solar PV (Si wafer)	0	
Solar PV (CdTe)	5	~65 tpy Mo
Solar PV (CIGS)	50-100	250-500 tpy Mo
Geothermal	up to 7,000	
Nuclear	10	
Fossil fuel sub-critical (boiler/pipe/turbine)	5	
Fossil fuel USC 700 (boiler/pipe/turbine)	66	

 Moly is very relevant to renewable power generation! (>5% of the annual Mo production is directly used in REPG future trend: strongly increasing)



THE PYRAMID OF A HIDDEN CHAMPION

Direct Moly use in renewable power generation technology

Indirect Moly use for installation equipment & material fabrication -

Indirect Moly use in mining & mineral processing

- ✓ Moly's indirect uses represent the larger market
- Moly containing alloys are essential for the mining & production of other critical materials





MOLY ADDS MUSCLE TO HEAVY WEIGHTLIFTERS

- Mobile hoisting equipment for onshore
 - ✓ Ultra high strength Q&T steels (up to 0.8 %Mo)
- □ Lifting barges and jack-up platforms for offshore
 - ✓ Heavy gage TMCP or Q&T plate (up to 0.5 %Mo)









PUMP UP THE ENERGY





Pump-storage facilities: Height difference up to 1200 m = >100 barpressure in the lower penstock section Stacking and unstacking of 35-ton concrete blocks by cranes: Round-trip conversion efficiency of up to 85 percent. A 30 seconds decent generates about 1 MW of electricity

One way or the other: Only ultra-strong Molybdenum-alloyed steels make it possible!



FLAT GLASS PANELS FOR CONVENTIONAL PV MODULES



Glass melting electrodes (GME's) are typically made from Molybdenum metal (99.95 %Mo + ZrO_2)



Molybdenum provides strength, stability, high thermal and electrical conductivity, and a low coefficient of thermal expansion to GME's

GREENLAND RESOURCES

 \checkmark GME's are consumables and must be regularly replaced

THE HYDROGEN ECONOMY – NOT AT ALL WITHOUT MOLY



- ✓ Production of 1 kg H₂ consumes approx. 9 liters of fresh water
- ✓ Future green hydrogen plants in the sun & wind belts will require water desalination
- Desalination plant build on stainless steels containing up to 6% Mo

□ Moly-alloyed steels for tanks, pressure vessels, pumps, pipes, valves, compressors...

- Moly-based catalysts for chemical conversion processes
- Molybdenum carbide (Mo_xC) has similar properties as Platinum and can be an attractive alternative in PEM electrolysers



GREEN DEAL IS BOOSTING METAL CONSUMPTION

...and that requires a lot more mining and mineral processing activity.











Example:



Chilean copper miners process 430,000,000 tons of ore per year consuming 300,000 tons of Moly containing iron & steel alloys.
✓ ~600 tons of Molybdenum required – each year!

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