

Atlantic Forum Workshop on: **Coastal and Deep Sea Natural Resources**

Faial (Azores) Portugal, 20 and 21
September 2012

David Heydon

Chairman & CEO

DeepGreen Resources Inc.

David Heydon

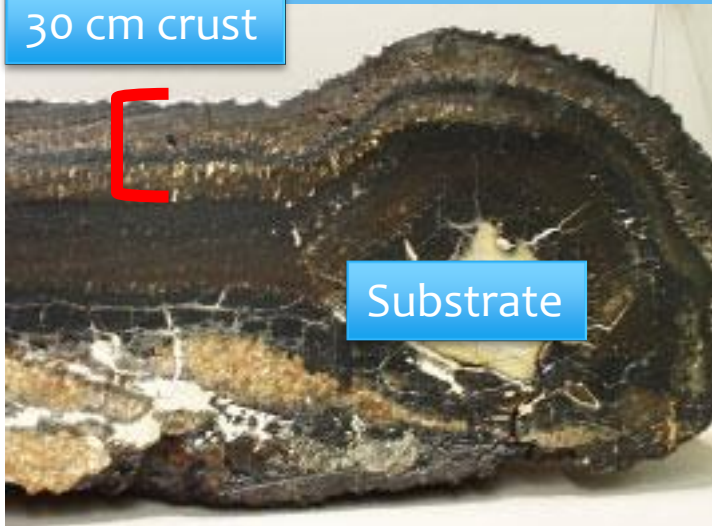
- ❖ **“Pioneer of Modern Deep Sea Mining”**, 10 years successfully leading this new industry
- ❖ Founder of Nautilus Minerals in 2002, developing the world’s first deepsea mine
- ❖ Founded DeepGreen Resources Inc.
- ❖ DeepGreen is first commercial company in over 30 years to focus on deepsea manganese nodule processing



Cobalt Crusts

- 30cm on uneven substrate, if remove extra 10cm you dilute 33%
- Cobalt + REE
- Lion Seamount & others in Portugal EEZ

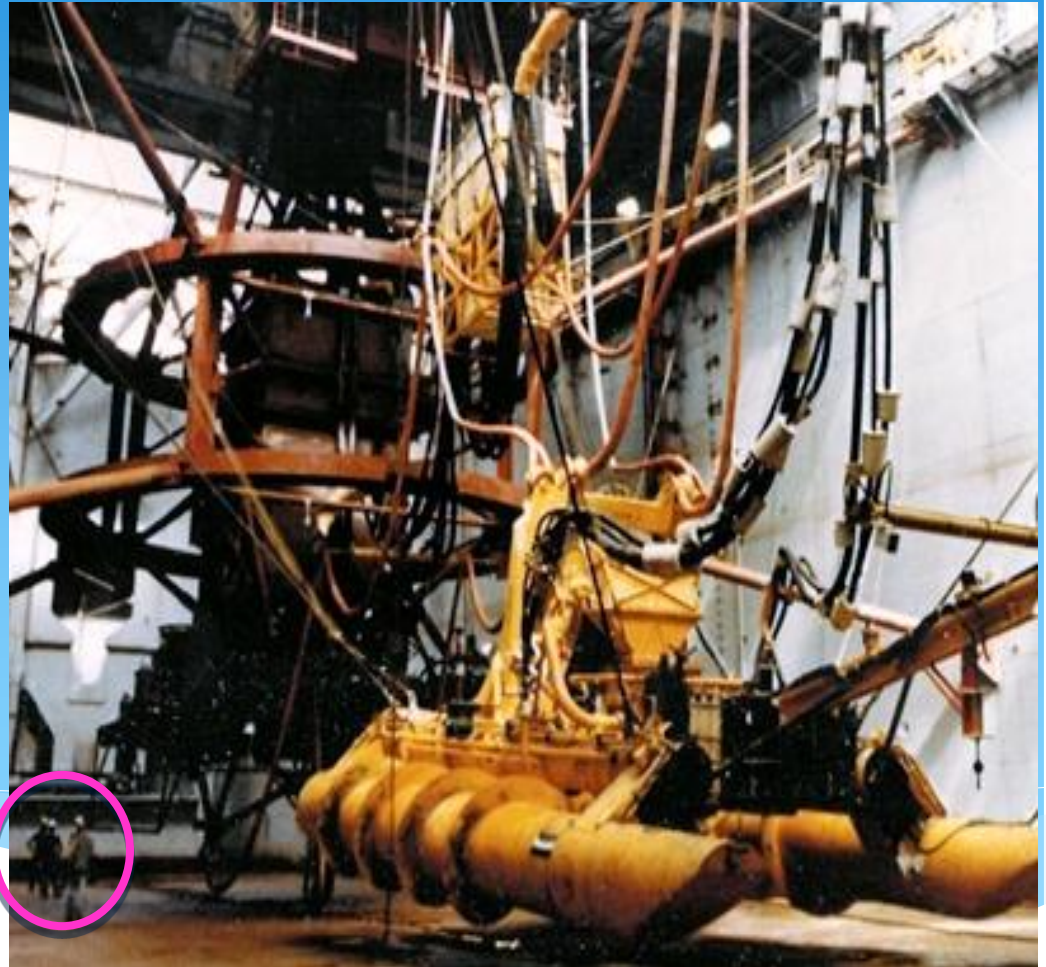
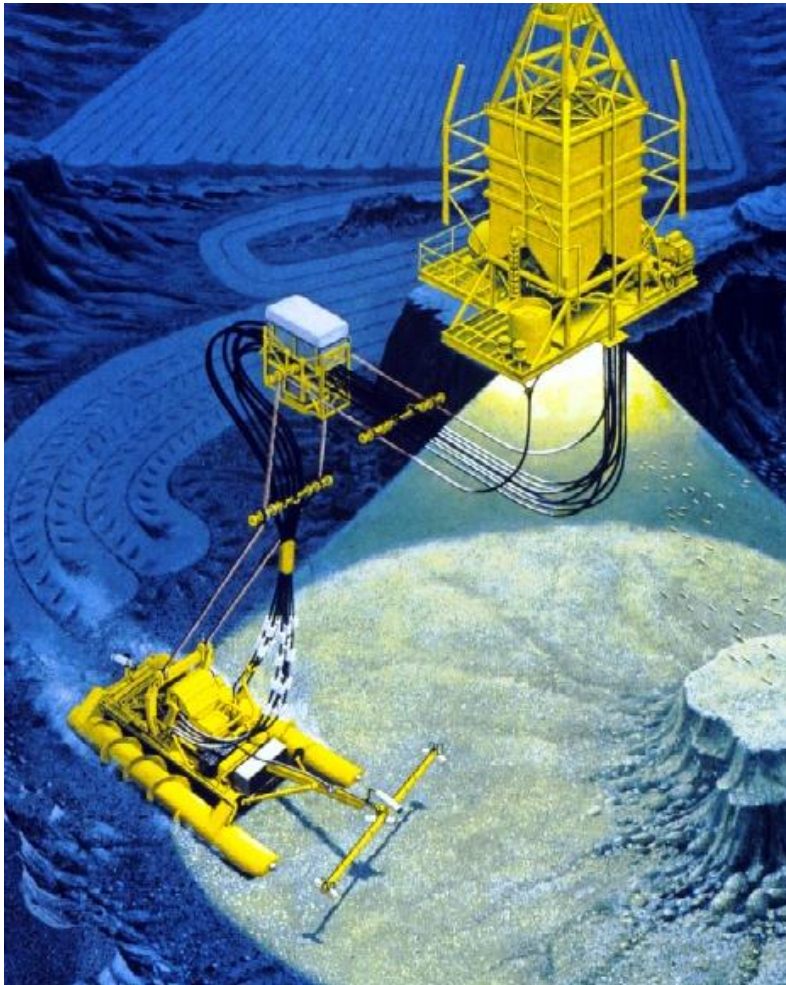
30 cm crust



Nodules - Successful Trial Mining 1970's

Most advanced of all deepsea resources

Graphic of actual 1970's trial mining system -
used with permission of Prof. Jin Chung



1970's Trial Mining Remote Harvester rated to 5,000 metre
water depth - *used with permission of Prof. Jin Chung*

Comparison to Manganese Deposits

➤ CCZ Nodule Deposits* 500 Mt @ 29% Mn

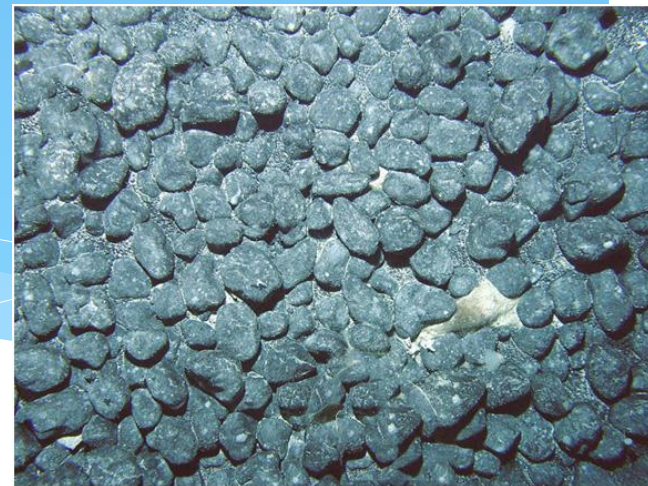
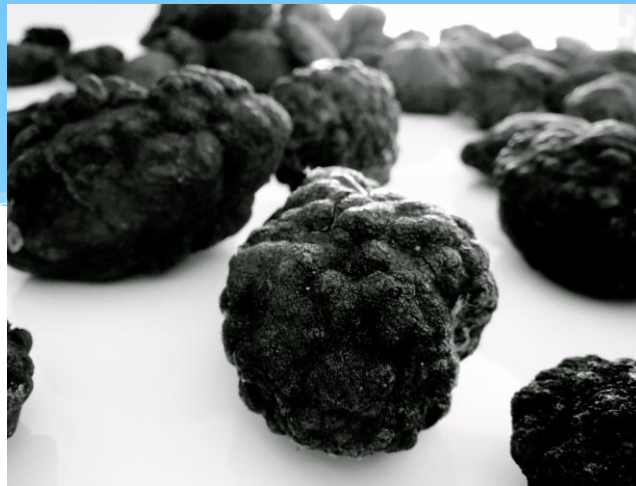
➤ BHPB & Anglo JV# 640 Mt @ 42% Mn

#Comprises 3 Mines: 2 in Sth Africa & 1 in Australia

➤ 4th most used metal in the world

➤ **66 tonne Met Coal shipped need 1 tonne Manganese**

➤ Rio Tinto & Xstrata have no exposure. Vale very limited low grade deposits



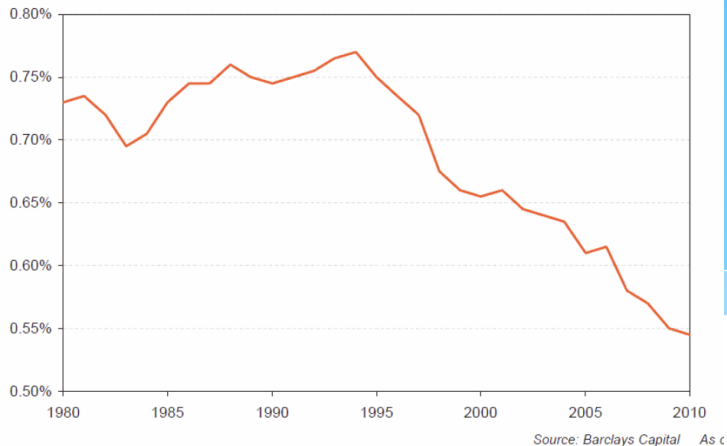
*Not NI 43-101 compliant

Comparison to Copper Deposits

- ❖ CCZ Nodule Deposits*
- ❖ Relincho
- ❖ Antamina (BHP %)
 - Pre-Strip 110 Mt
 - Strip Ratio 2.3:1

500 Mt @ 1.1% Cu, 0.05% Mo
700 Mt @ 0.47% Cu, 0.026% Mo
635 Mt @ 0.85% Cu, 0.023% Mo

Recoverable Copper Ore Yield Grade



*Not NI 43-101 compliant



Comparison to Nickel Deposits

- CCZ Nodule Deposits* 500 Mt @ 1.3% Ni, 0.2% Co
- Goro 200 Mt @ 1.4% Ni, 0.11% Co
- Ambatovy 125 Mt @ 1.04% Ni, 0.1% Co
 - Strip Ratio 1:1, 110% waste, large remote construction camp



Nodule Project vs 3 Land Mines

Nickel Mine

mine camp/town, infrastructure, roads, power, plant

Copper Mine

mine camp/town, infrastructure, roads, power, plant

Manganese Mine

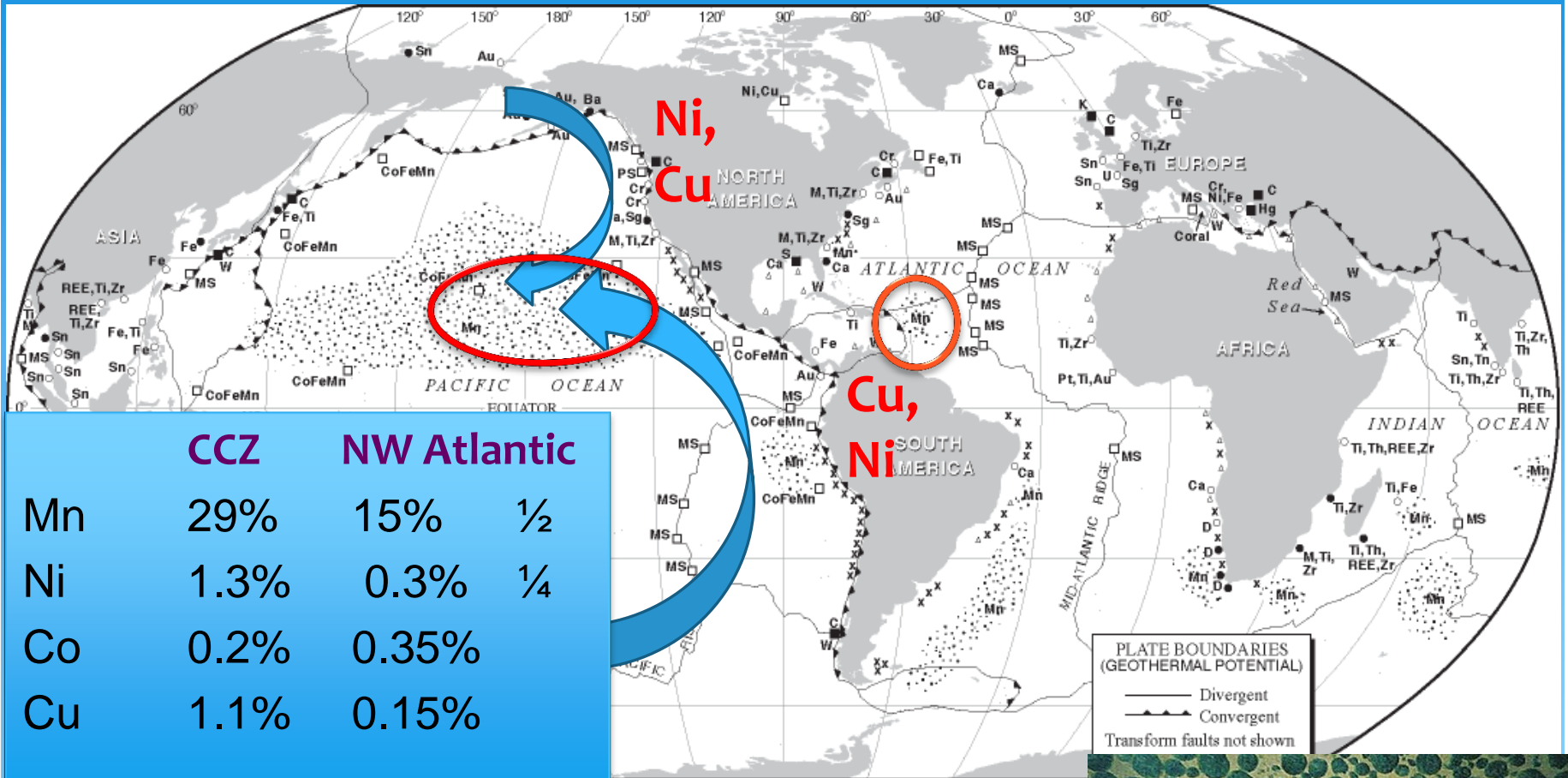
mine camp/town, infrastructure, roads, power, plant

- ◆ On land requires building 3 Mines and related infrastructure
- ◆ 3 lots of pre-stripping or mine development

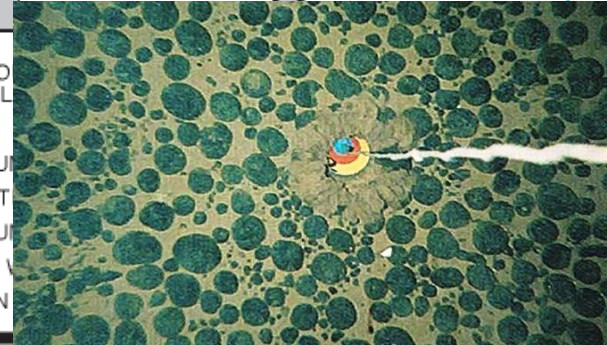
Nodule Project: All facilities on a self contained platform built in shipyard



Seafloor Resources - Nodules

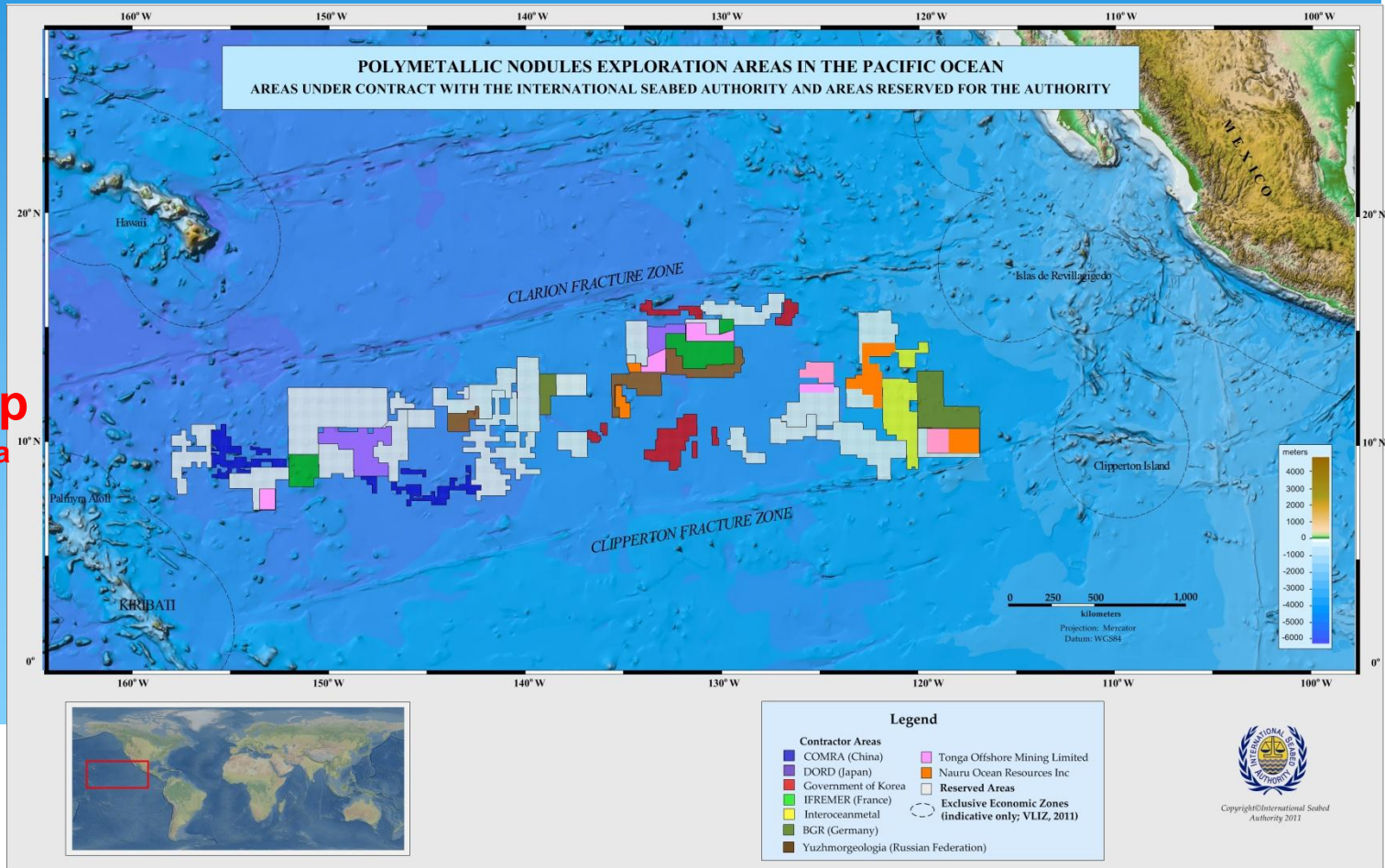


Ag SILVER	Ca LIME MUD, SAND, SHELLS	Hg MERCURY	Ni NICKEL	Sg SILICEOUS GRAVEL
Al BAUXITE	Cr CHROMITE	K POTASH	xxxxxxx PHOSPHORITE	Sn TIN
Au GOLD	cu COPPER	M MONAZITE	Pt PLATINUM	Th THORIUM
Ba BARITE	D DIAMONDS	MS MASSIVE SULFIDES	REE RARE EARTH ELEMENTS	Ti ILMENITE
c COAL	Fe IRON, MAGNETITE	Mg MAGNESIUM	Δ SALT	U URANIUM
co COBALT-RICH FERROMANGANESE CRUST	G GEMS	Mn MANGANESE NODULES	s SULFUR	W FRESH WATER
Fe				Zr ZIRCONIUM
Mn				



Countries Stake Claims to “High Seas”

- ❖ France
- ❖ Germany
- ❖ UK
- ❖ Belgium
- ❖ Poland
- ❖ Slovakia
- ❖ Bulgaria
- ❖ Czech Rep
- ❖ + Russia & Cuba
- ❖ Kiribati
- ❖ Nauru
- ❖ Japan
- ❖ Korea
- ❖ China
- ❖ Russia
- ❖ India (in Indian Ocean)



Portugal & Spain + EU lay claims

- Low chance of deposit & grade within EEZ
- Exploration in EEZ is 'high risk' exploration phase
- Establish a claim over substantial metal deposits in known area of high grade nodules with International Seabed Authority
- Secure metal resources for industry in Portugal, Spain and EU
- DeepGreen has commercial metallurgical process for nodules
- DeepGreen and EU collaboration to secure a clean and more affordable metal supply to EU

