

LITHIUM &

BATTERY METALS

Perth, Western Australia

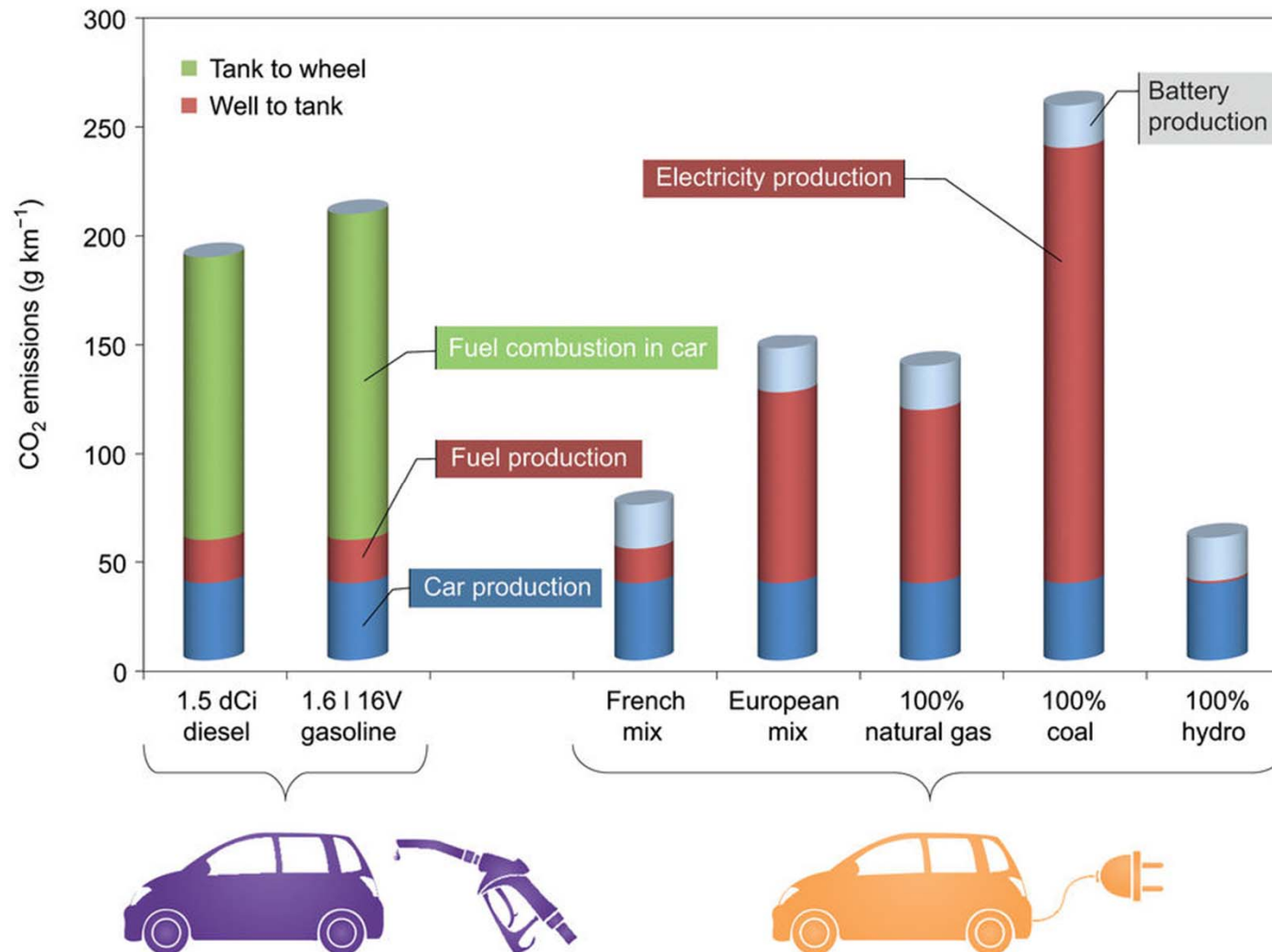
21-22 March 2018

KORAB RESOURCES LIMITED

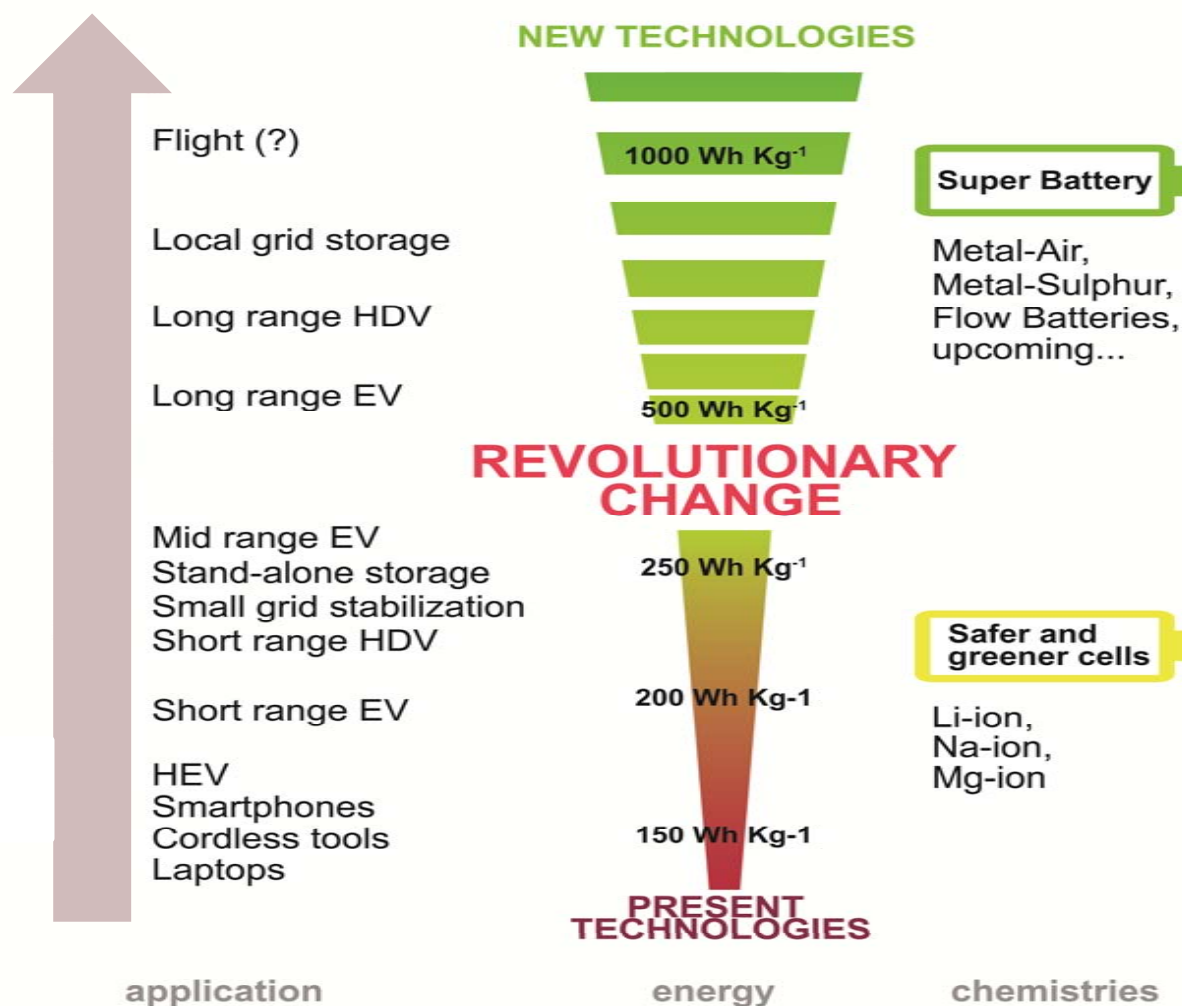
Andrej K. Karpinski
Executive Chairman
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How Green is Green?

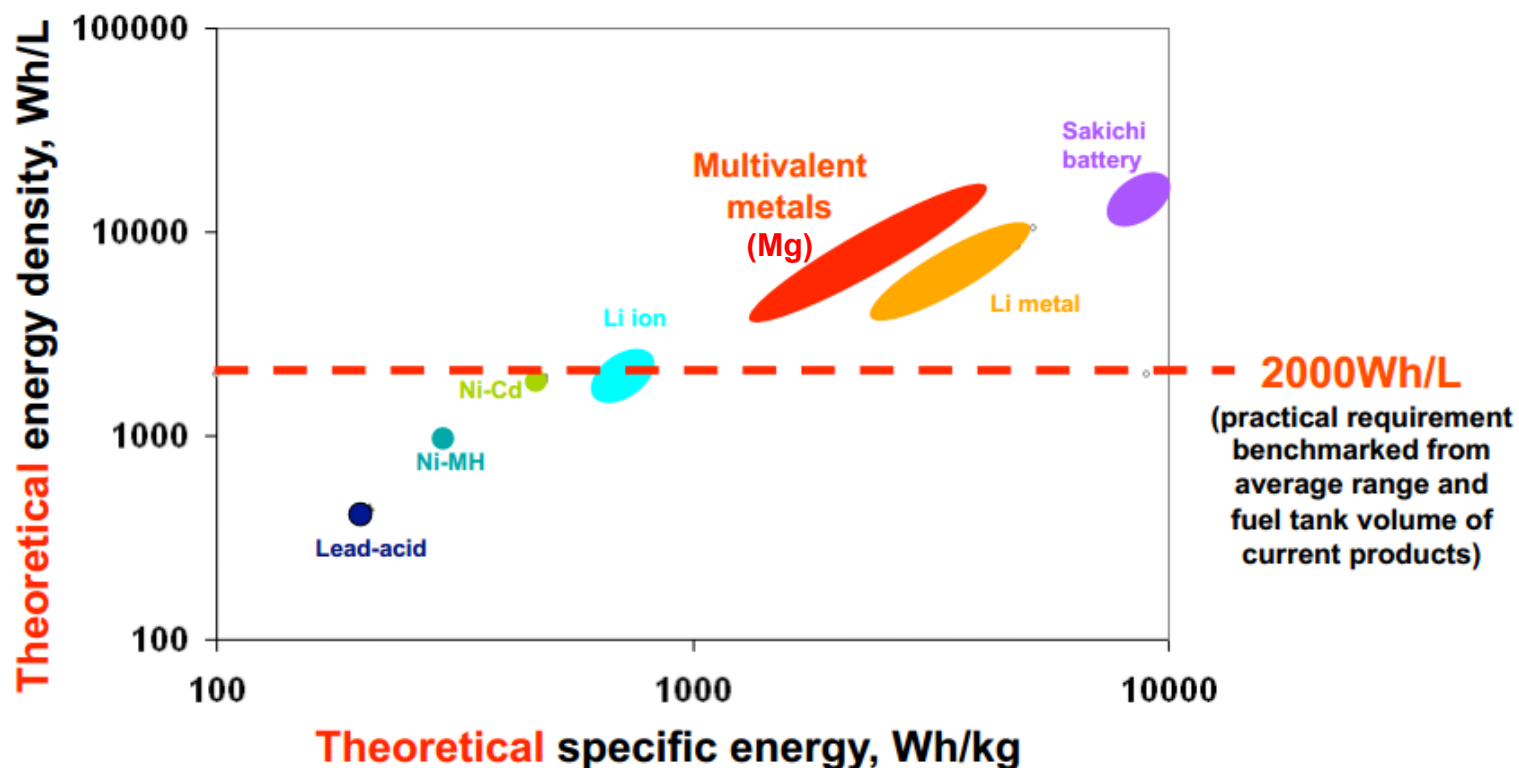


Why all the Fuss?

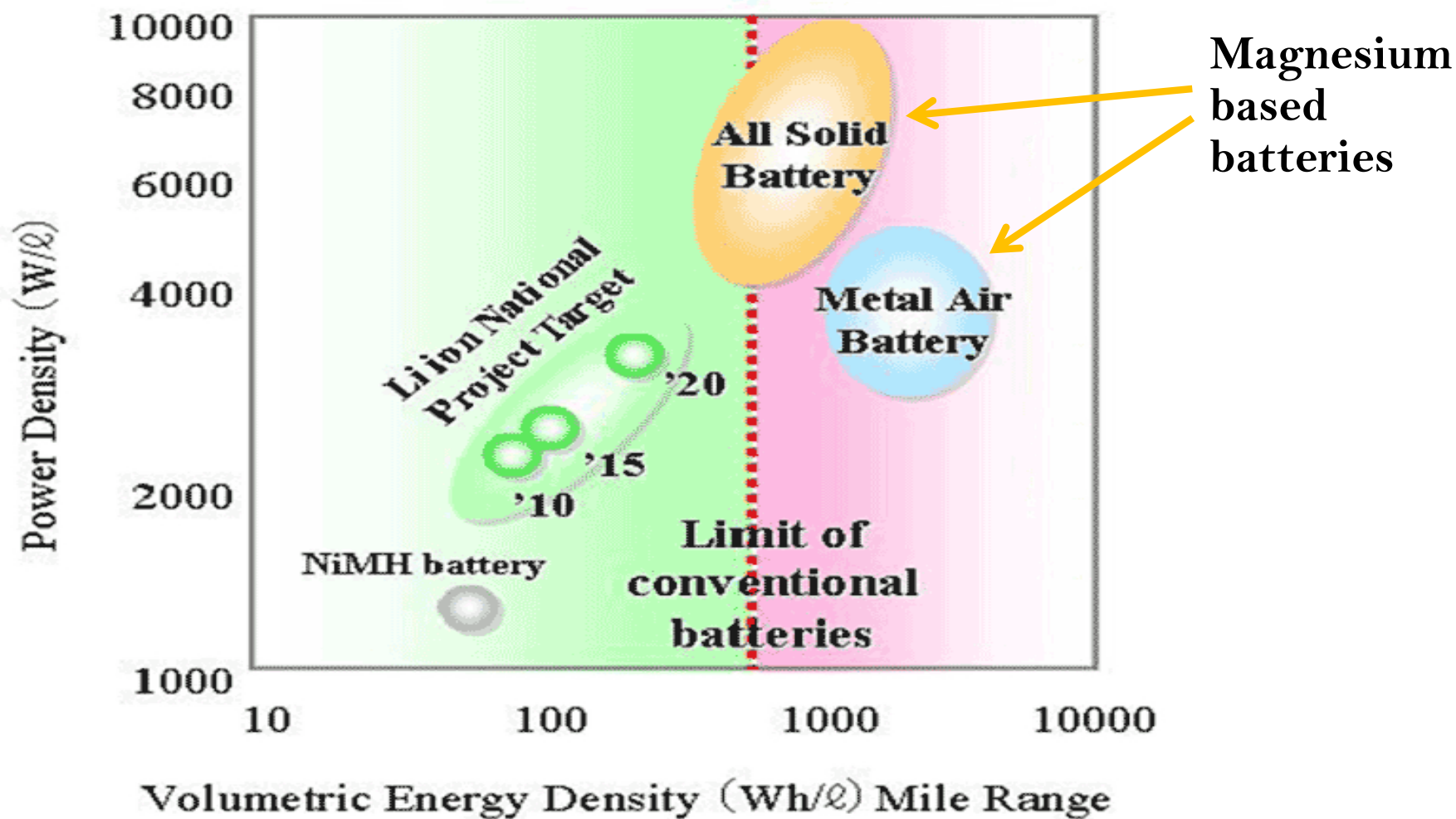


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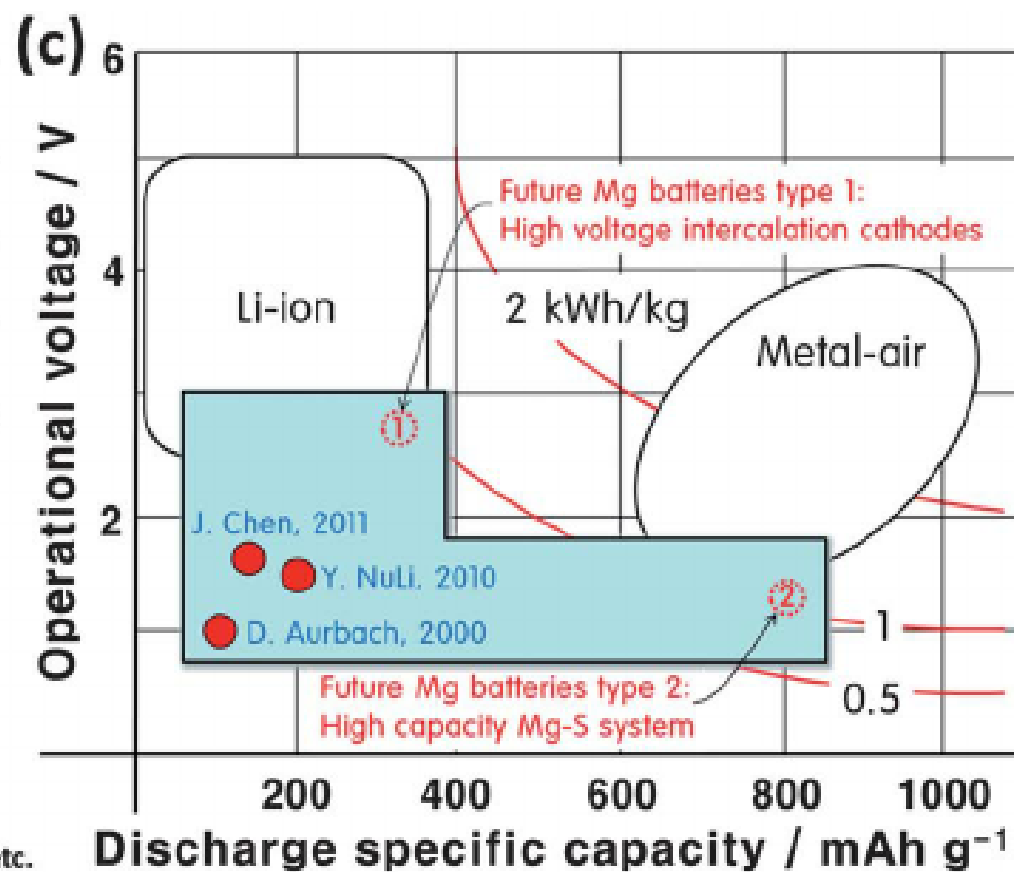
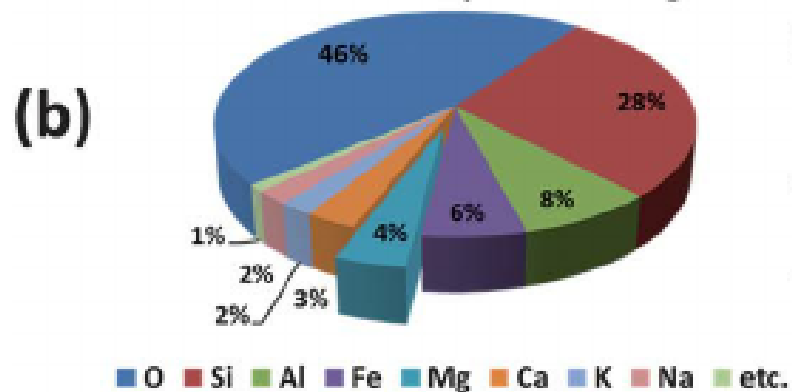
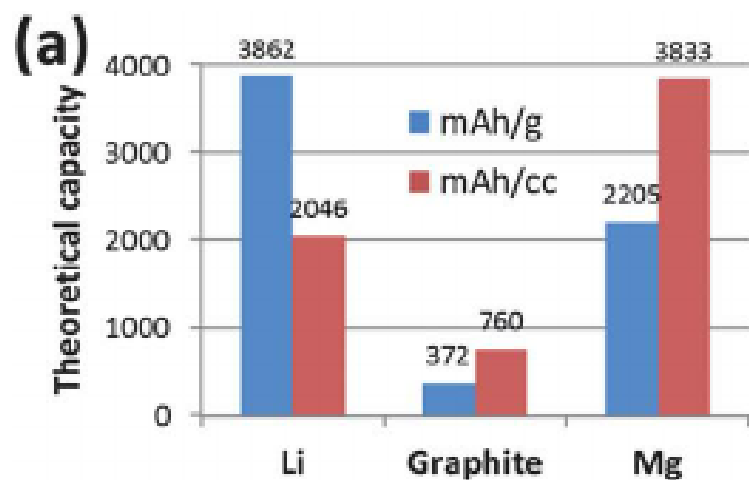
Comparison of estimated theoretical energy density of various battery systems



Why all the Fuss?



Why all the Fuss?



Magnesium & Magnesium-Ion Batteries – Key Points

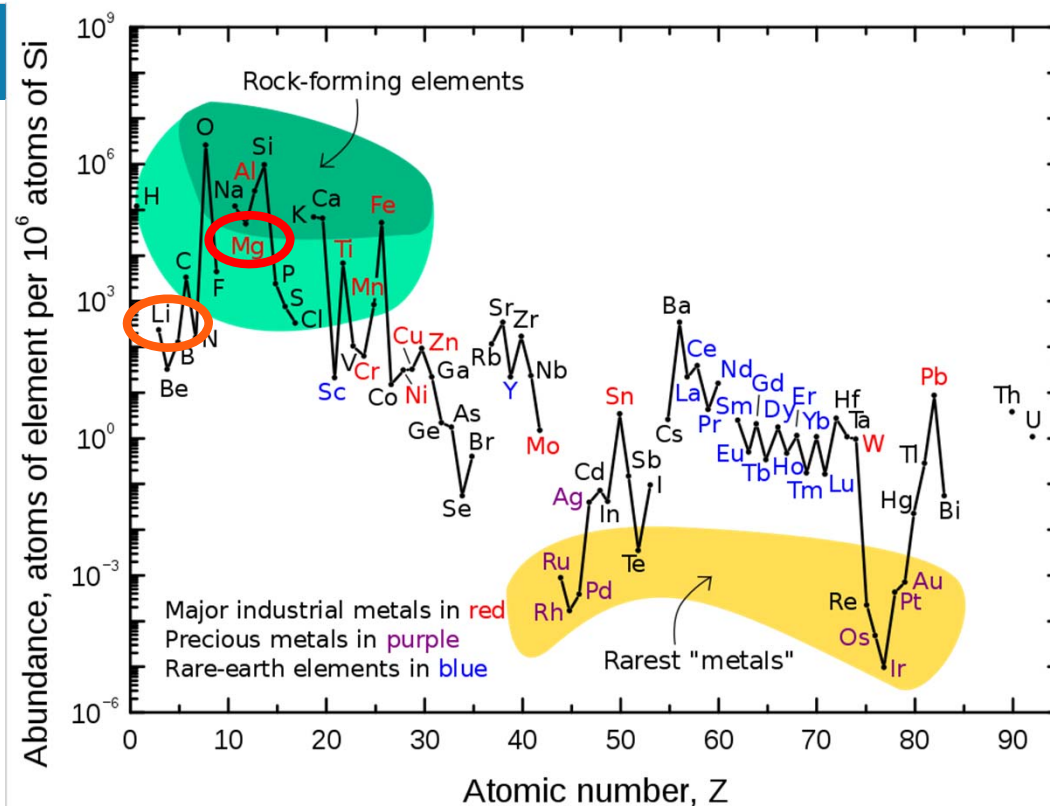
Magnesium-ion vs Lithium-ion

Magnesium is much cheaper and easier to find and produce than lithium

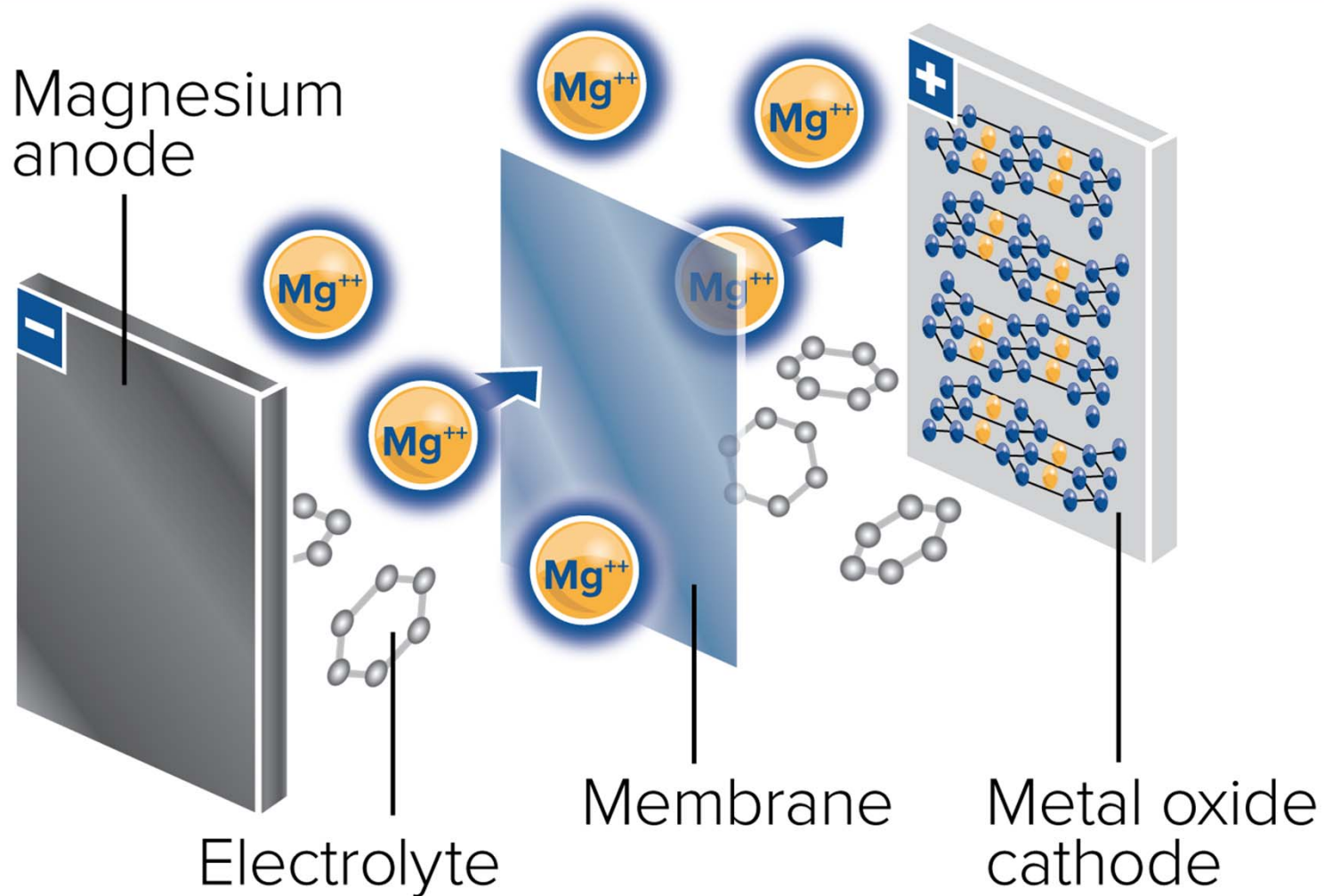
Magnesium is multivalent – its ions carry a double positive charge –vs- single positive charge carried by lithium ions

In theory, the energy density per unit volume of a magnesium ion battery is up to 170% of that of a lithium ion battery.

Lithium-ion batteries usually do not function properly at temperatures below -15°C magnesium batteries still work at temperatures as low as -30°C and as high as $+55^{\circ}\text{C}$



Basic Diagram of Magnesium-ion Battery



Magnesium & Magnesium-Ion Batteries - Key Players

Magnesium based battery developers

Department of Defence (USA)

Department of Energy (USA)

Honda, Toyota, Samsung, Panasonic–Sanyo, LG Chem

Chinese Universities and Institutes

Russian Universities and Institutes

Mobile phone and computer battery makers

Various special-purpose-enterprises funded by hedge funds, sovereign funds, and family offices

Example of current use



Battery powered train



Batteries providing power for above train (Li-Mg-P)

Magnesium & Magnesium-Ion Batteries (Mg-Sc-Se)

State of Play

Mg-Sc-Se batteries (solid-state electrolyte)

Li-Mg-P batteries

Mg-Sn-V batteries

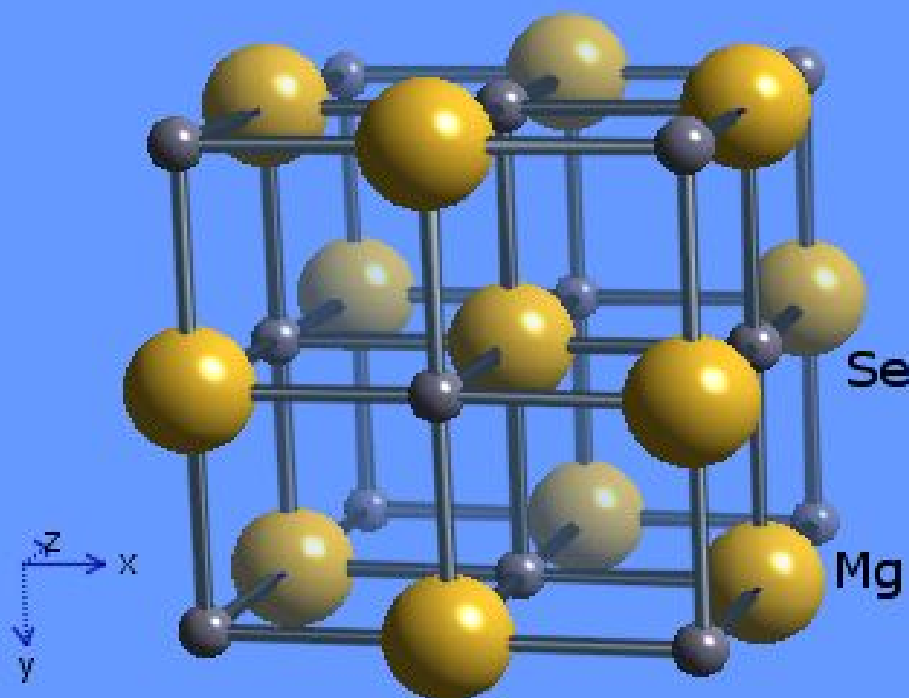
Mg-air batteries

Mg-Mo-S batteries

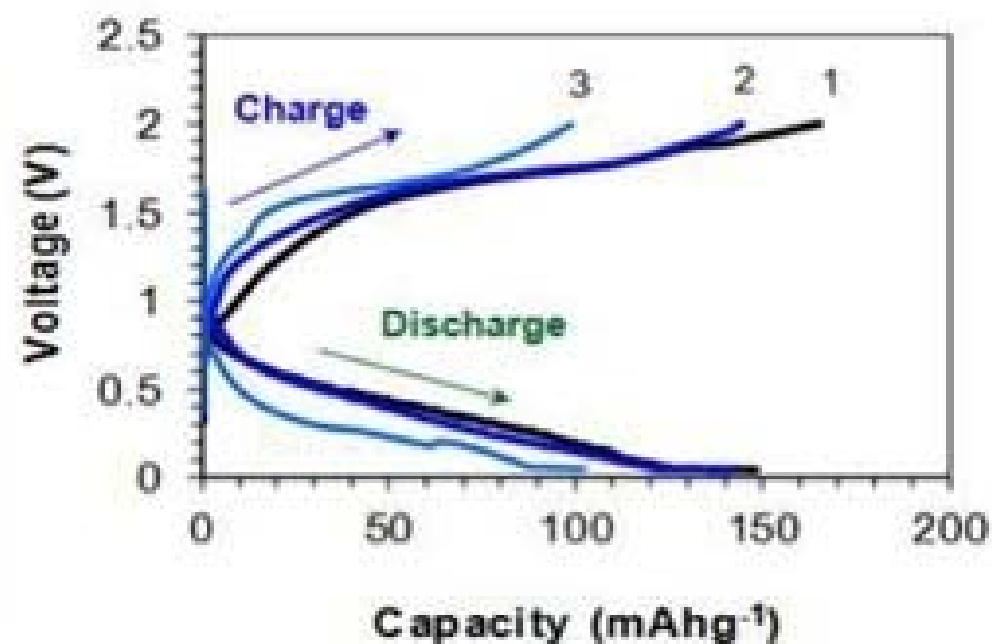
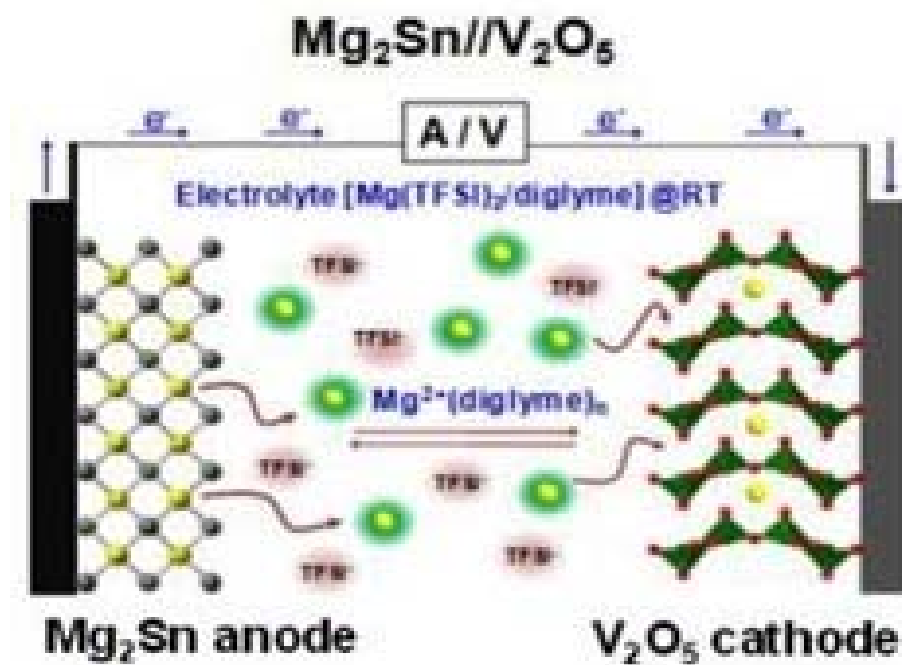
Mg-Fe-Si batteries

**Multiple angles of research –
all relying on magnesium as
main component**

Magnesium (II) selenide



Magnesium & Magnesium-Ion Batteries (Mg-Sn-V)



Magnesium & Magnesium-Ion Batteries (Mg-air)

State of Play

Mg-Sc-Se batteries (solid-state electrolyte)

Li-Mg-P batteries

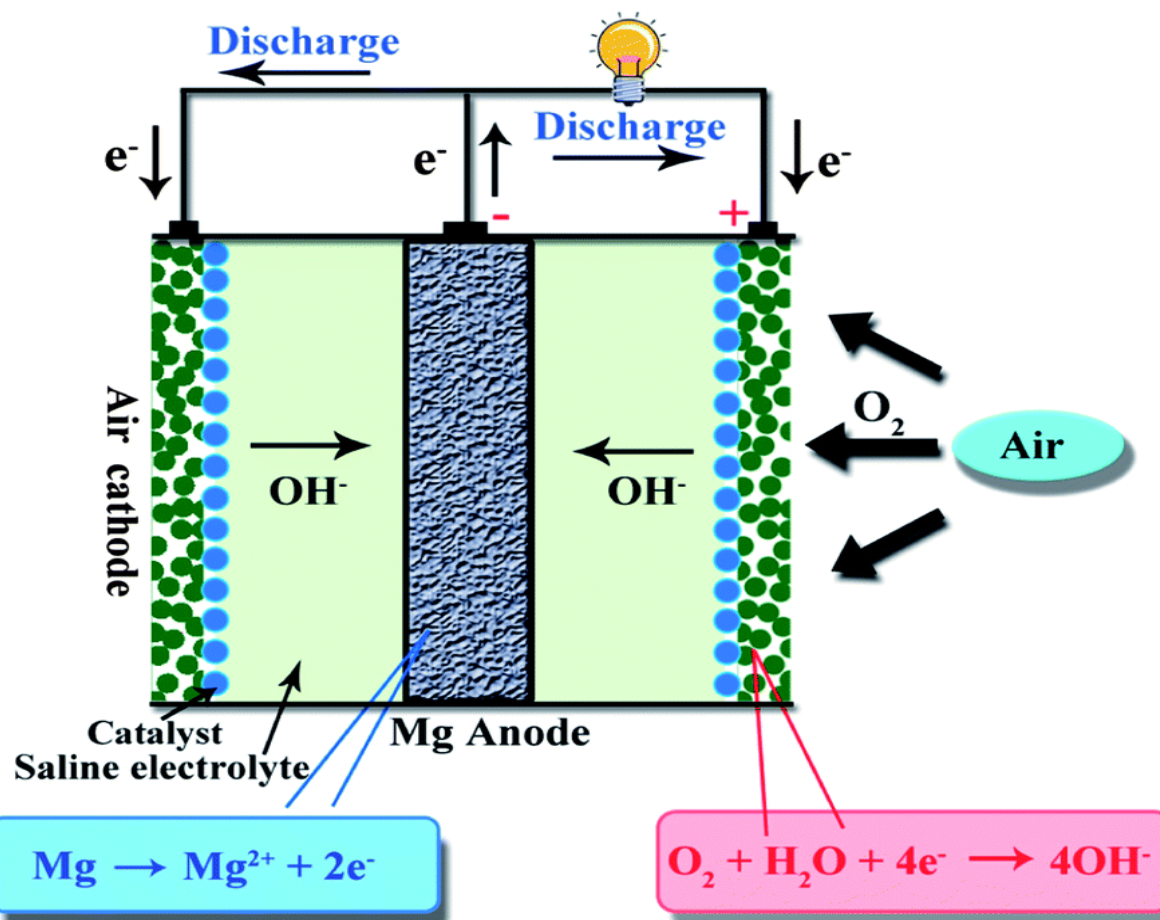
Mg-Sn-V batteries

Mg-air batteries

Mg-Mo-S batteries

Mg-Fe-Si batteries

Multiple angles of research – all relying on magnesium as main component



Magnesium & Magnesium-Ion Batteries (Mg-Mo-S)

State of Play

Mg-Sc-Se batteries (solid-state electrolyte)

Li-Mg-P batteries

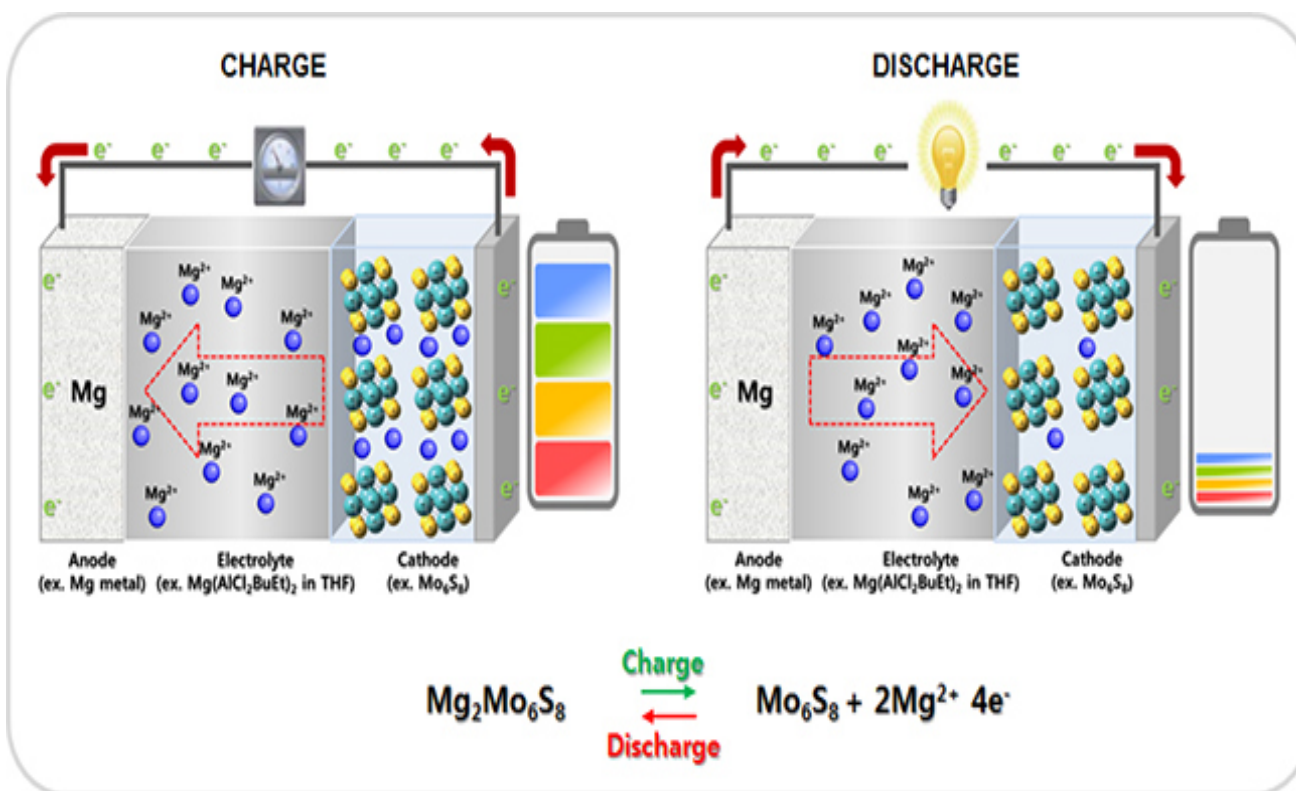
Mg-Sn-V batteries

Mg-air batteries

Mg-Mo-S batteries

Mg-Fe-Si batteries

**Multiple angles of research –
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Magnesium & Magnesium-Ion Batteries (Mg-Fe-Si)

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Mg-Sc-Se batteries (solid-state electrolyte)

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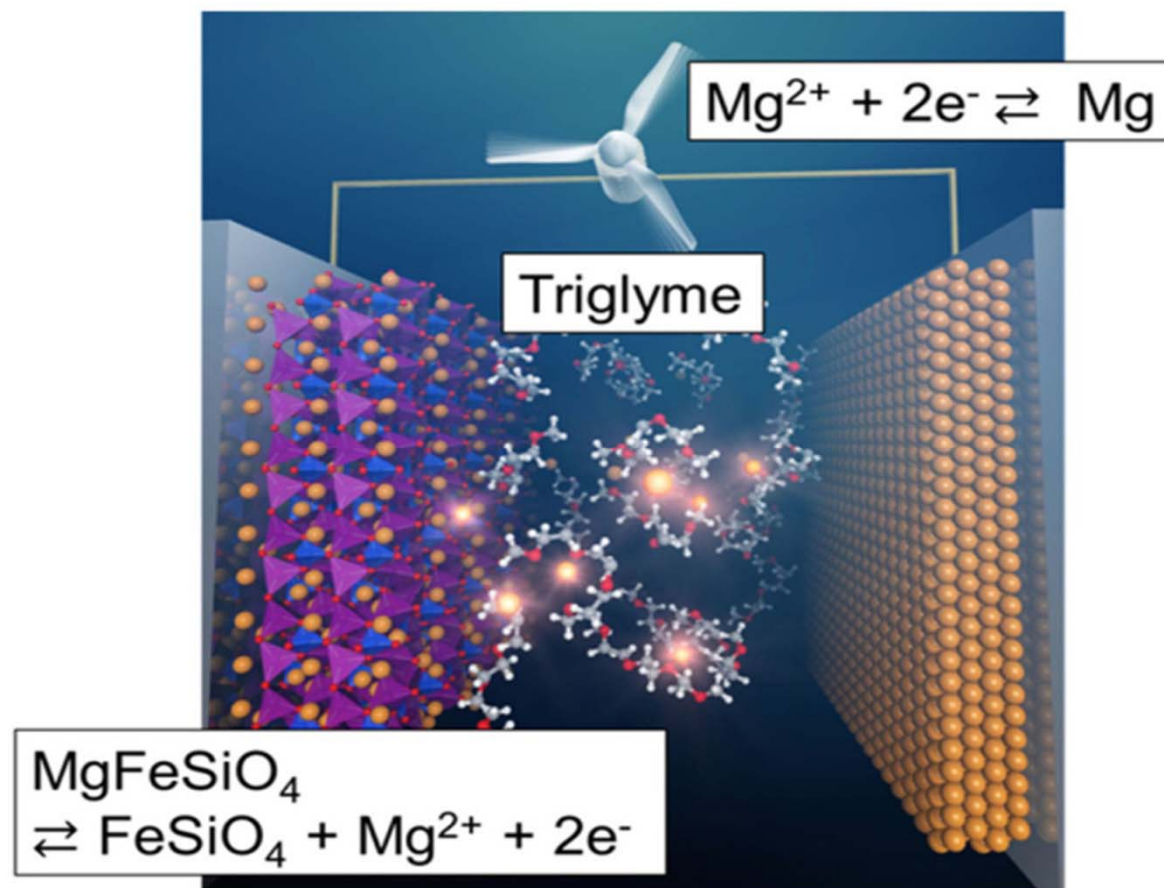
Mg-Sn-V batteries

Mg-air batteries

Mg-Mo-S batteries

Mg-Fe-Si batteries

**Multiple angles of research –
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Why Korab?

Korab is developing Winchester deposit - a large, high grade, magnesium carbonate deposit to supply key raw material for production of magnesium oxide and magnesium metal for magnesium batteries

Winchester deposit is located 85km by road from Darwin port and accessible by sealed road

It will be a simple quarry operation supplying crushed raw magnesium carbonate rock (MgCO_3) in bulk, no processing, just crush/screen/sort

Annual capacity can be easily adjusted to demand

Deposit is covered by just 5m of clay and is at least 130m thick

Contractor based operation using truck and shovel, drill and blasting

Very simple mine infrastructure consisting of graded road, ore and waste pads, dumps and dewatering

Exceptionally low CAPEX of ~AU\$2.5Mln (~US\$2Mln)



Winchester Magnesium Carbonate Project Financials

Project estimated EBITDA at US\$105/T magnesium carbonate price and US\$0.80 exchange rate

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEARS 5-8	YEARS 9-12	TOTAL
	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)
From	37,200	37,800	37,500	49,700	201,100	250,300	613,600
To	37,300	37,900	37,600	49,800	201,200	250,400	614,200

Project estimated Free Cash Flow (in \$ '000) after tax, interest, and debt repayments at US\$105/T magnesium carbonate price and US\$0.80 exchange rate

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEARS 5-8	YEARS 9-12	TOTAL
	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)
From	30,000	26,500	26,300	34,900	141,000	175,300	434,000
To	30,100	26,600	26,400	35,000	141,100	175,400	434,600

Free Cash Flow Net Present Value using a discount factor of 12%pa (in \$ '000) after tax, interest, and debt repayments at various magnesium carbonate prices

MgCO3 price in US\$/tonne	US\$85	US\$90	US\$95	US\$100	US\$105	US\$110	US\$115	US\$120	US\$125
	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)	(in \$ '000)
From	129,000	143,000	157,000	170,000	184,000	198,000	212,000	226,000	240,000
To	130,000	144,000	158,000	171,000	185,000	199,000	213,000	227,000	241,000

NOTE: Tables shown above are taken from ASX Report released on 21 March 2018 titled "WINCHESTER MAGNESITE DIRECT SHIPPING ORE FEASIBILITY STUDY RESULTS (EARNINGS, NPV, EBITDA, CAPEX, AND OPEX)". The information shown above should not be relayed upon without referring to the full text of the ASX Report which contains assumptions and cautionary statements.

Other Winchester Project Details

Exceptionally low capex of ~AU\$2.5 million (~US\$2Mln)

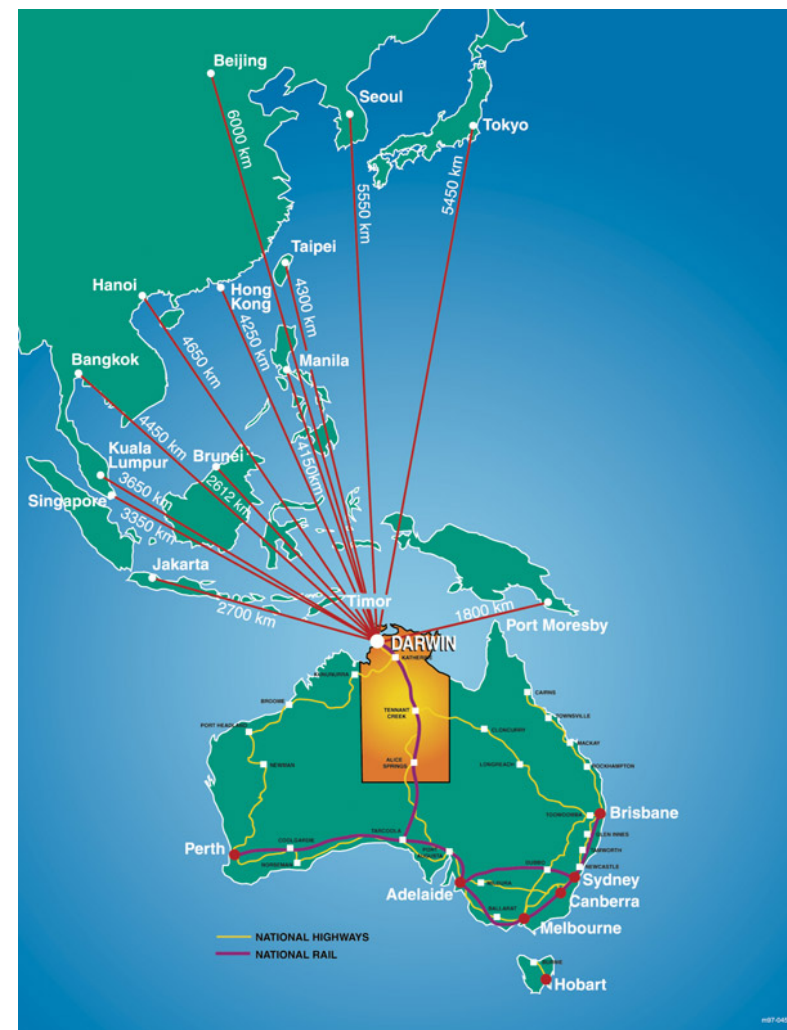
Mine can be developed in stages and easily expanded

No need for additional funding once mine is in operation, capacity expansion can be fully funded from cashflow

Mine can operate at a profit with magnesium carbonate prices as low as US\$50/t

Mine can produce various grades of magnesium carbonate rock depending on customer requirements from 42% MgO to 47% MgO (88% MgCO₃ to 99% MgCO₃)

Magnesite mineralisation continues for approximately 8 Km in length. Current JORC mineral resource covers approximately 7% of this mineralised trend.



Winchester Magnesium Carbonate Project Location



Test Mining (Drill & Blast)



Test Mining (Setting Charges)

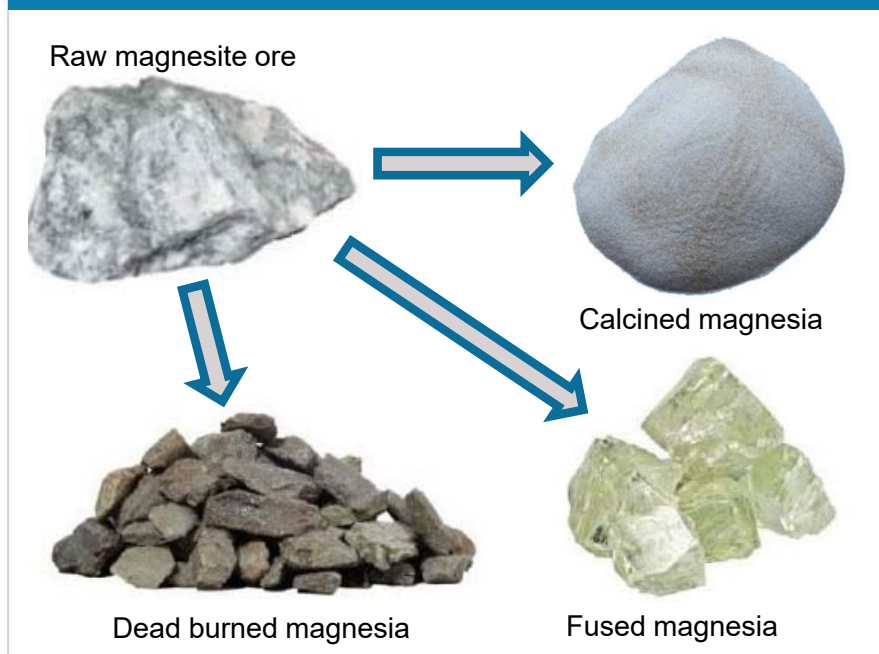


Magnesium Carbonate Has Many Uses

MANY CURRENT USES IN KEY INDUSTRIES - CURRENTLY A US\$60 BILLION MARKET

NEW APPLICATIONS IN RECHARGEABLE AND PRIMARY ENERGY STORAGE

Magnesium carbonate processing



Magnesium carbonate end users





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