



Bolstering supplies of critical materials for decarbonization technologies

Japan Organization for Metals and Energy Security

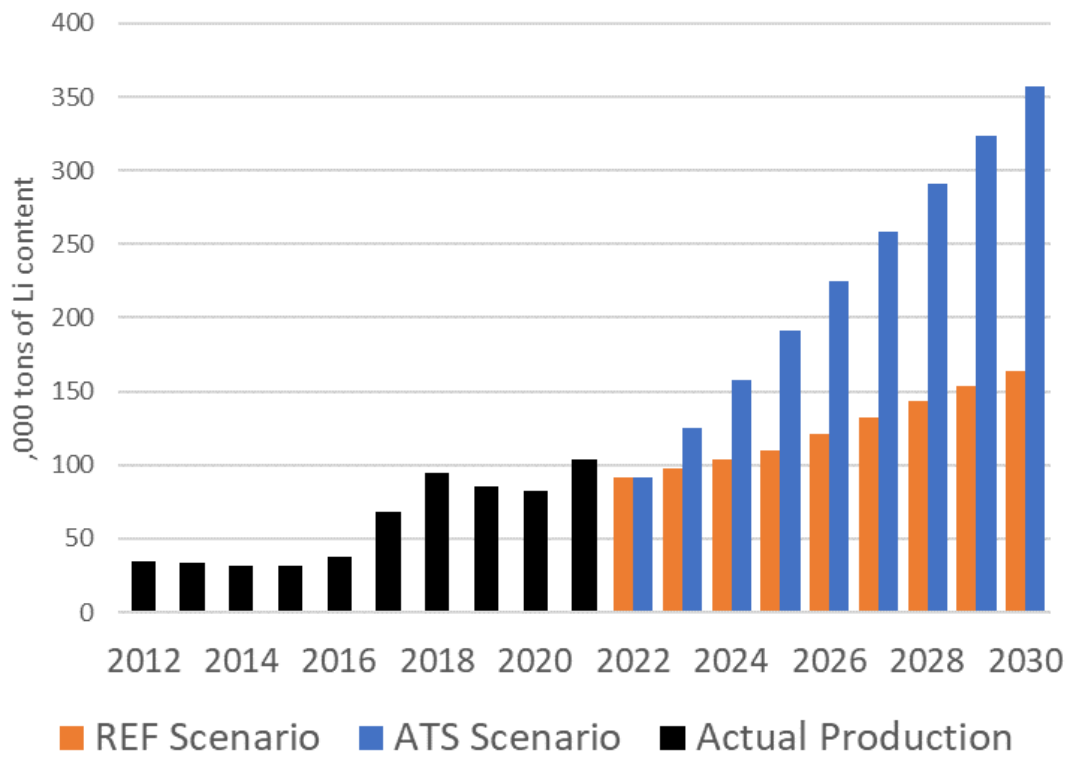
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Takeshi Harada

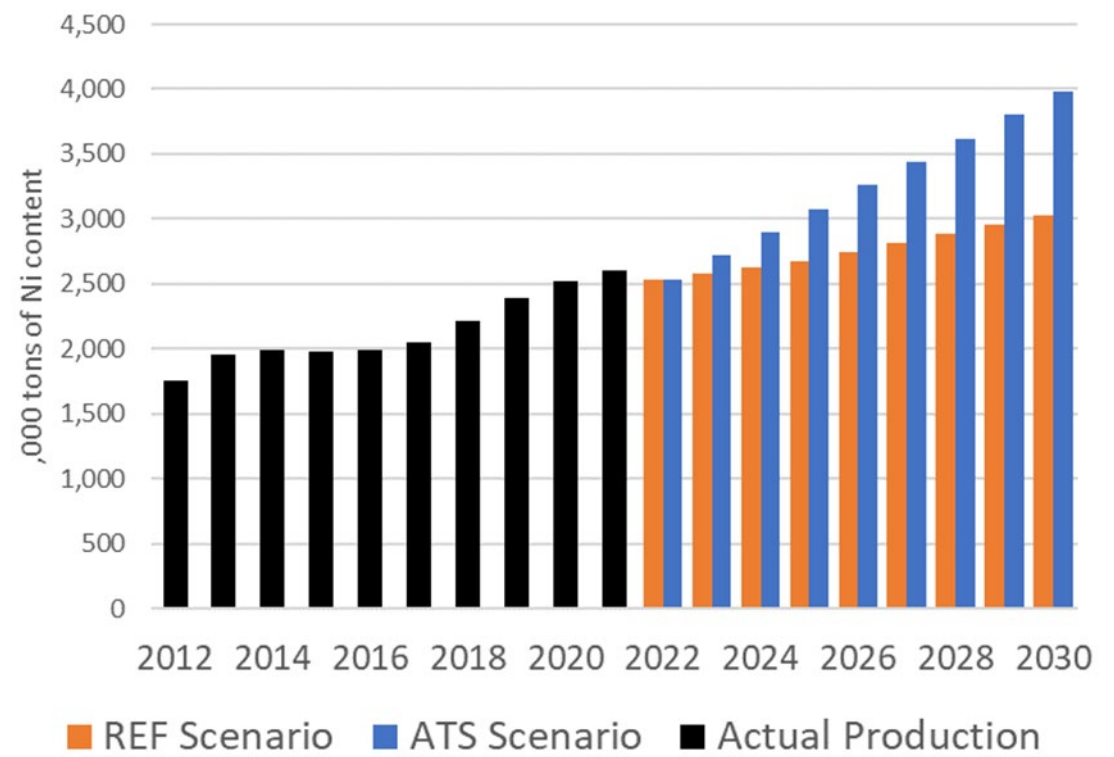
Global Demand forecasting of CN-related Minerals

- Following a study outsourced by JOGMEC in 2022, IEEJ simulated the demand projections to 2050 about 12 minerals. IEEJ set two scenarios, Reference Scenario (REF) and Advanced Technologies Scenario (ATS), based on the “IEEJ Outlook 2023”.
 - **REF Scenario** reflects past trends with technology progress and current energy policies, without any aggressive policies for low-carbon measures.
 - **ATS Scenario** assumes introduction of powerful policies to address energy security and climate change issues with the utmost penetration of low-carbon technologies.

Actual production & Demand projection of Li

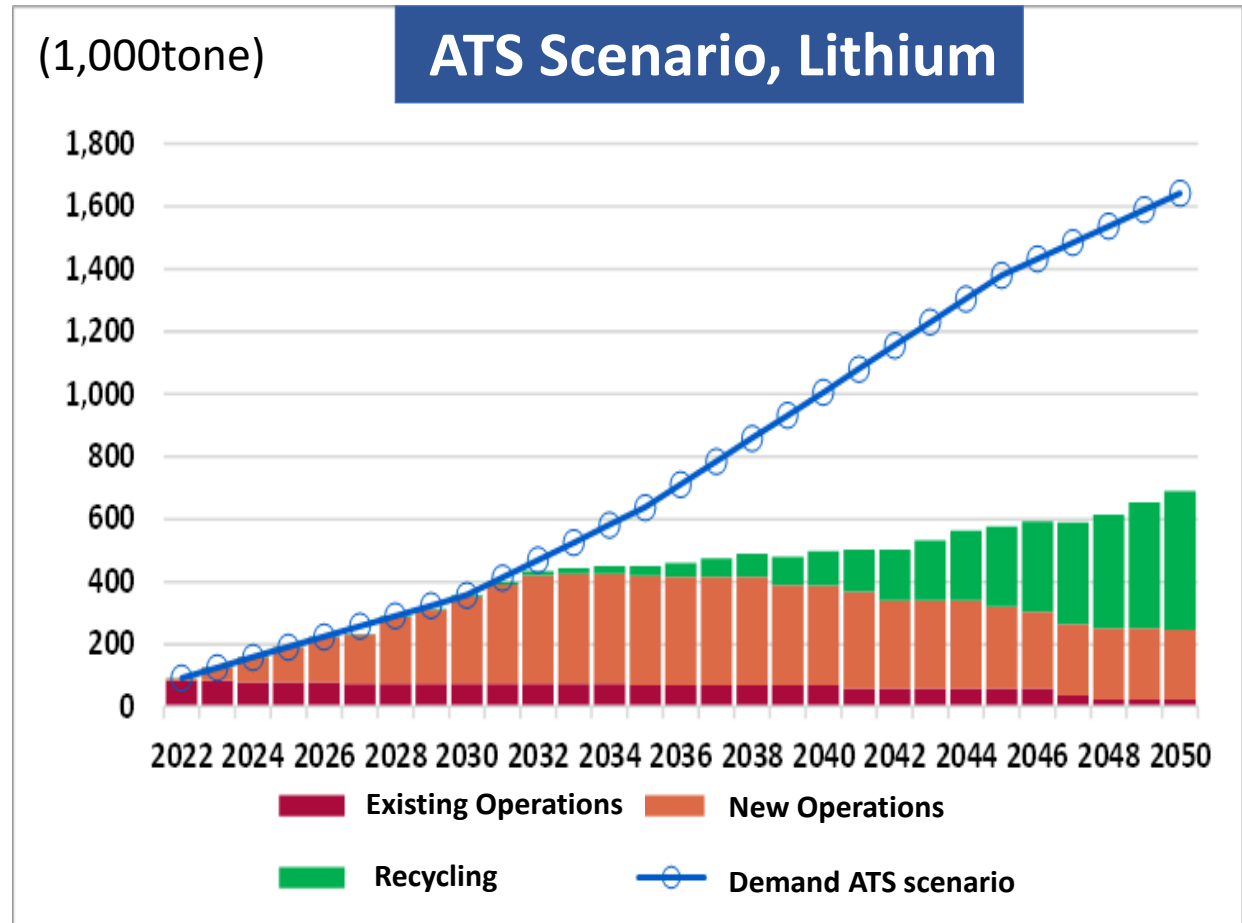
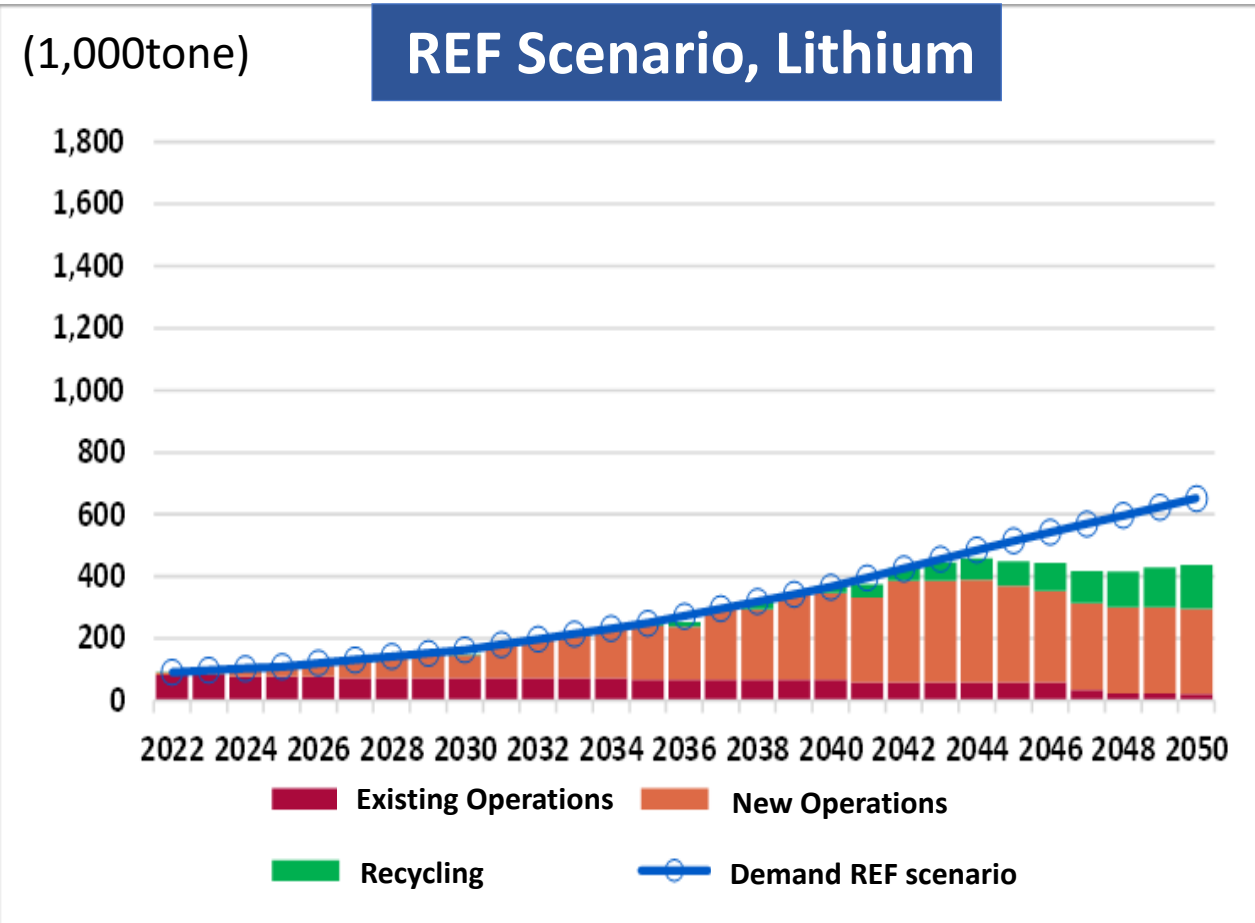


Actual production & Demand projection of Ni



Global forecasting Supply / Demand of Lithium

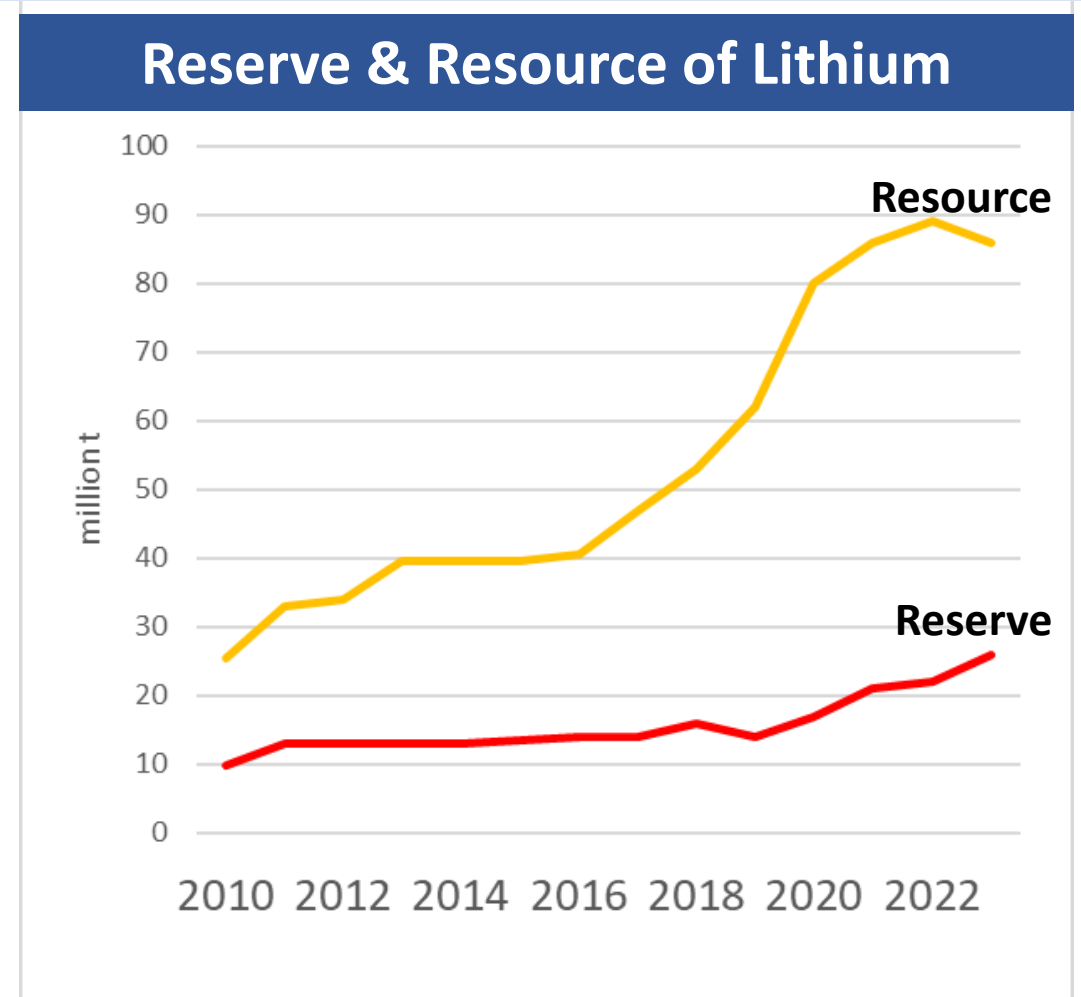
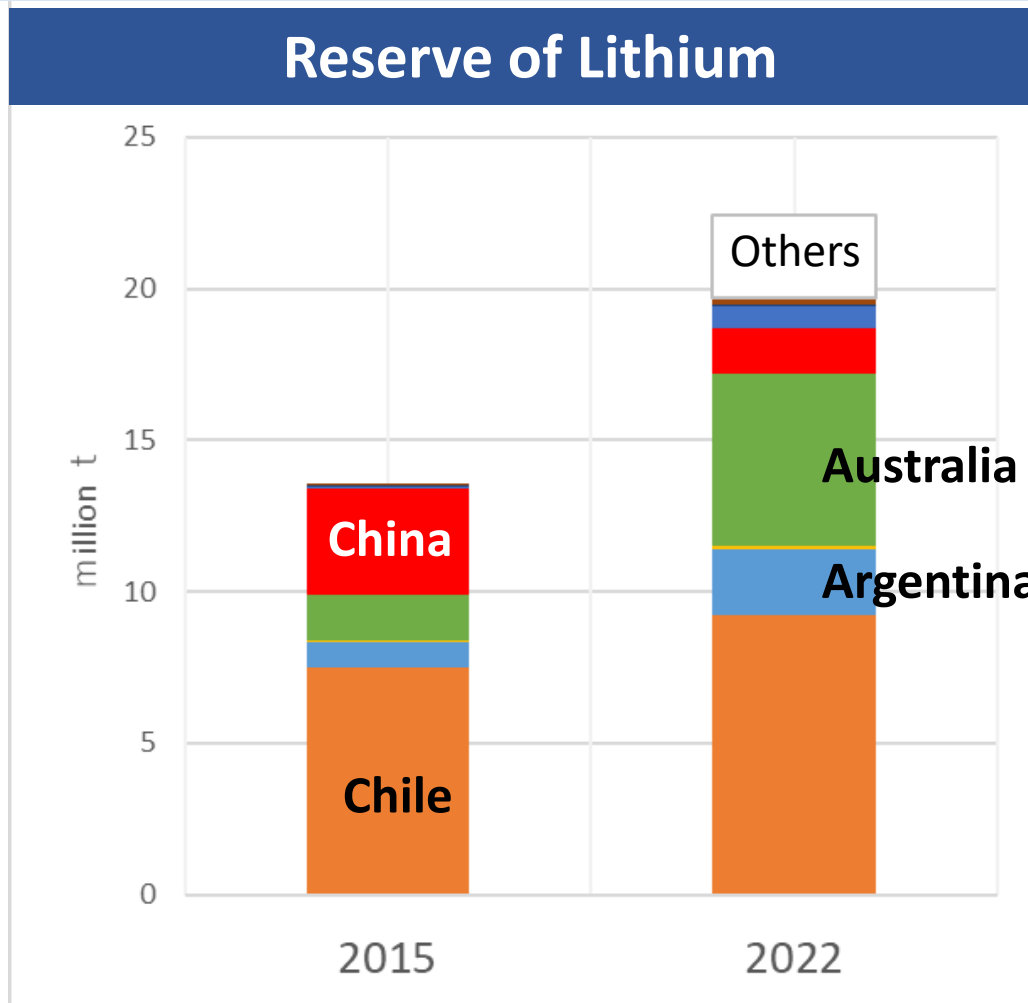
- On the supply side, MURC simulated in line with demand projection by IEEJ.
- Mine expansion and new developments are being built up in addition to supply from existing operations. Using the S&P database, the project stages, costs and budgets etc. were set and simulated to ensure that new operations were set up in a way that did not exceed demand.
- MURC set the recycling rate from existing papers and multiplied it by the amount of waste to estimate the amount recycled.



※https://mric.jogmec.go.jp/wp-content/uploads/2022/11/seminars2022_1110_03.pdf

Reserve & Resource of Lithium show increases

- Left figure (**Lithium reserves**) : The increase in reserves in recent years has been significant. In particular, compared to 2015, Australia and Argentina have grown.
- Right figure (**Lithium reserve & resources**) : The growth of Resource in recent years has been even greater than that of reserves.



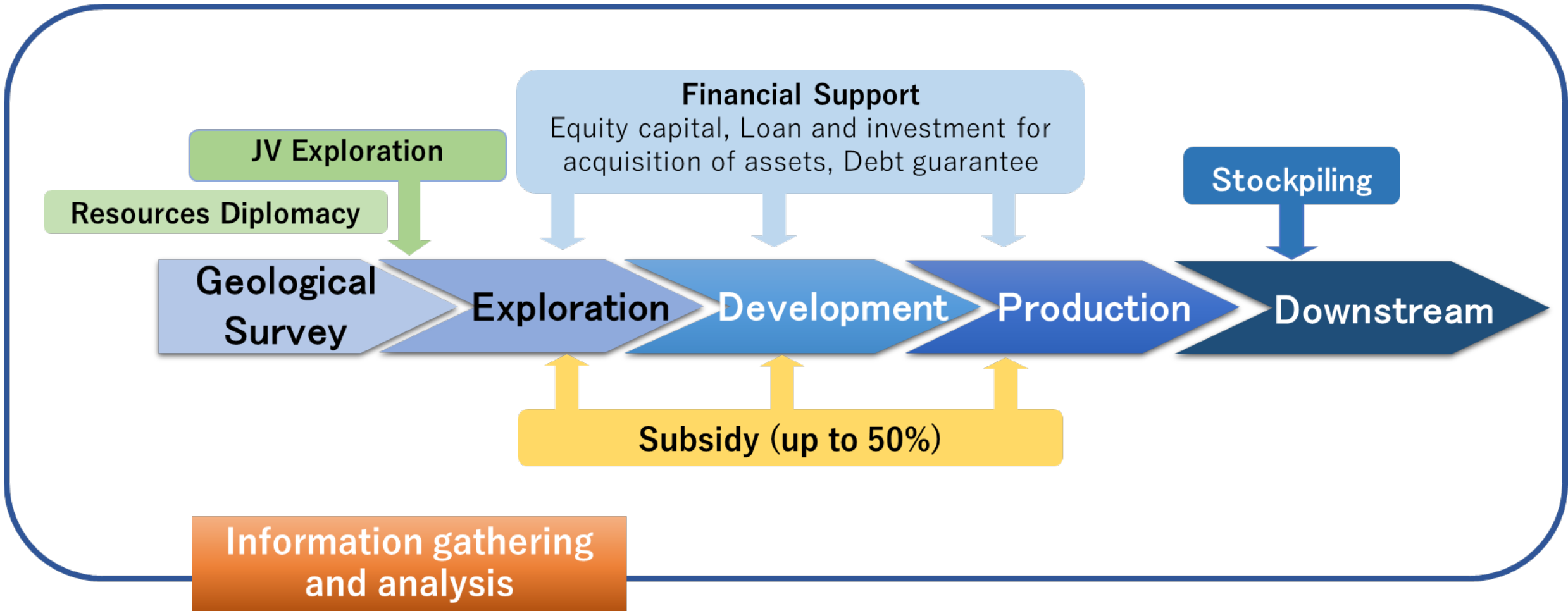
Data source: USGS mineral commodity Summaries

Lithium mining asset transaction in 2021 & 2022 _Top 20

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Target company	Acquirer company	Acquisition interests (%)	Transaction amount (\$M)	Project	Country of Project	Stage
<i>Galaxy Resources Limited</i>	<i>Orocobre Limited</i>	100.00	1,213.62	<i>Sal de Vida</i> <i>James Bay</i>	<i>Argentina</i> <i>Australia</i>	<i>Preproduction</i>
Lithea Inc.	GFL International	100.00	962.00	Pozuelos, Pastos Grandes	Argentina	Reserves Development -Pre F/S
<i>Rincon Mining Pty Limited</i>	<i>Rio Tinto Group</i>	100.00	825.00	<i>Rincon</i>	<i>Australia</i>	<i>Feasibility - Feasibility Complete</i>
Lakkor Tso Salt Lake	Zijin Mining Group	70.00	741.07	Lakkor Tso Salt Lake	China	Target Outline
Neo Lithium Corp.	Zijin Mining Group	100.00	721.46	Tres Quebradas	Argentina	Preproduction - Constuction Started
Millennial Lithium Corp.	Lithium Americas Corp.	100.00	363.11	Pastos Grandes	Argentina	Production - Operating
Arcadia Lithium Project	Zhejiang Huayou Cobalt	87.00	342.90	Arcadia	Zimbabwe	Preproduction - Construction Planned
Bacanora Lithium Plc	Ganfeng International Trading	71.10	262.05	Sonora (Bacanora 50%)	Mexico	Preproduction - Construction Planned
Manono project	Suzhou CATH Energy Technologies	24.00	240.00	Manono	Dem. Rep. Congo	Feasibility - Feasibility Complete
Minmetals Salt Lake	Qinghai Liangcheng Mining Co., Ltd.	49.00	226.31	Qinghai Yiliping	China	Preproduction - Construction Planned
Bikita Minerals (PTY) Ltd	Sinomine Resource Group	100.00	211.77	Bikita	Zimbabwe	Production - Operating
Arena Minerals Inc.	Lithium Americas Corp.	63.10	138.68	Pastos Grandes	Argentina	Production - Operating
<i>Moblan project</i>	<i>Sayona Mining Limited</i>	60.00	87.50	<i>Moblan project</i>	<i>Canada</i>	<i>Feasibility Complete</i>
Essential Metals Limited	Tianqi Lithium Energy Australia	100.00	84.28	Pioneer Dome	Australia	Prefea/Scoping
<i>North American Lithium</i>	<i>Sayona Quebec Inc.</i>	100.00	77.89	<i>North American Lithium</i>	<i>Canada</i>	<i>Production - Operating</i>
<i>Prairie Lithium Corporation</i>	<i>Arizona Lithium Limited</i>	100.00	50.08	<i>Prairie Lithium</i>	<i>Canada</i>	<i>Reserves Development</i>
<i>Keliber Oy</i>	<i>Sibanye Stillwater Limited</i>	20.00	49.10	<i>Keliber</i>	<i>Finland</i>	<i>Preproduction - Construction Started</i>
Arcadia project	Zhejiang Huayou Cobalt	13.00	44.24	Arcadia	Zimbabwe	Preproduction - Construction Planned
<i>Minera Salar Blanco SpA</i>	<i>Lithium Power International</i>	100.00	41.22	<i>Maricunga (31.86%)</i>	<i>Chile</i>	<i>Preproduction - Construction Planned</i>
Lithium Chile Inc.	Gator Capital Ltd	19.35	25.77	Salar de Arizaro	Argentina	Reserves Development - Prefeas/Scoping

- **About JOGMEC:** A policy implementation organization under the Ministry of Economy, Trade and Industry, Japan. JOGMEC has a variety of private sector support tools for the stable supply of mineral resources. JOGMEC provides support for upstream projects such as high-risk exploration and mine development, information gathering and provision, and metals stockpiling.

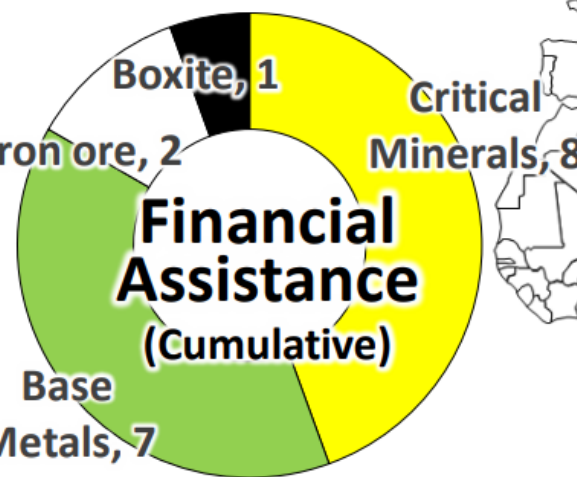
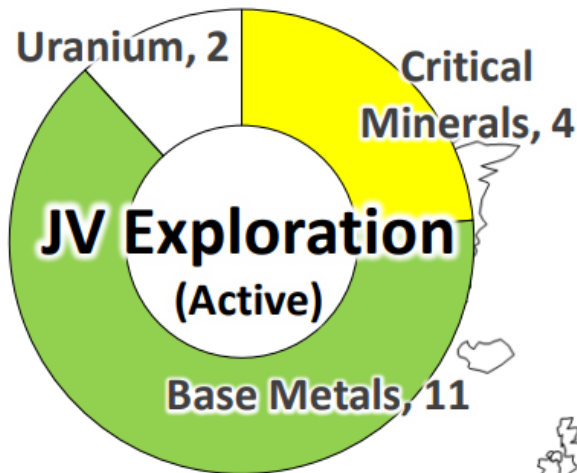


As of August, 2022

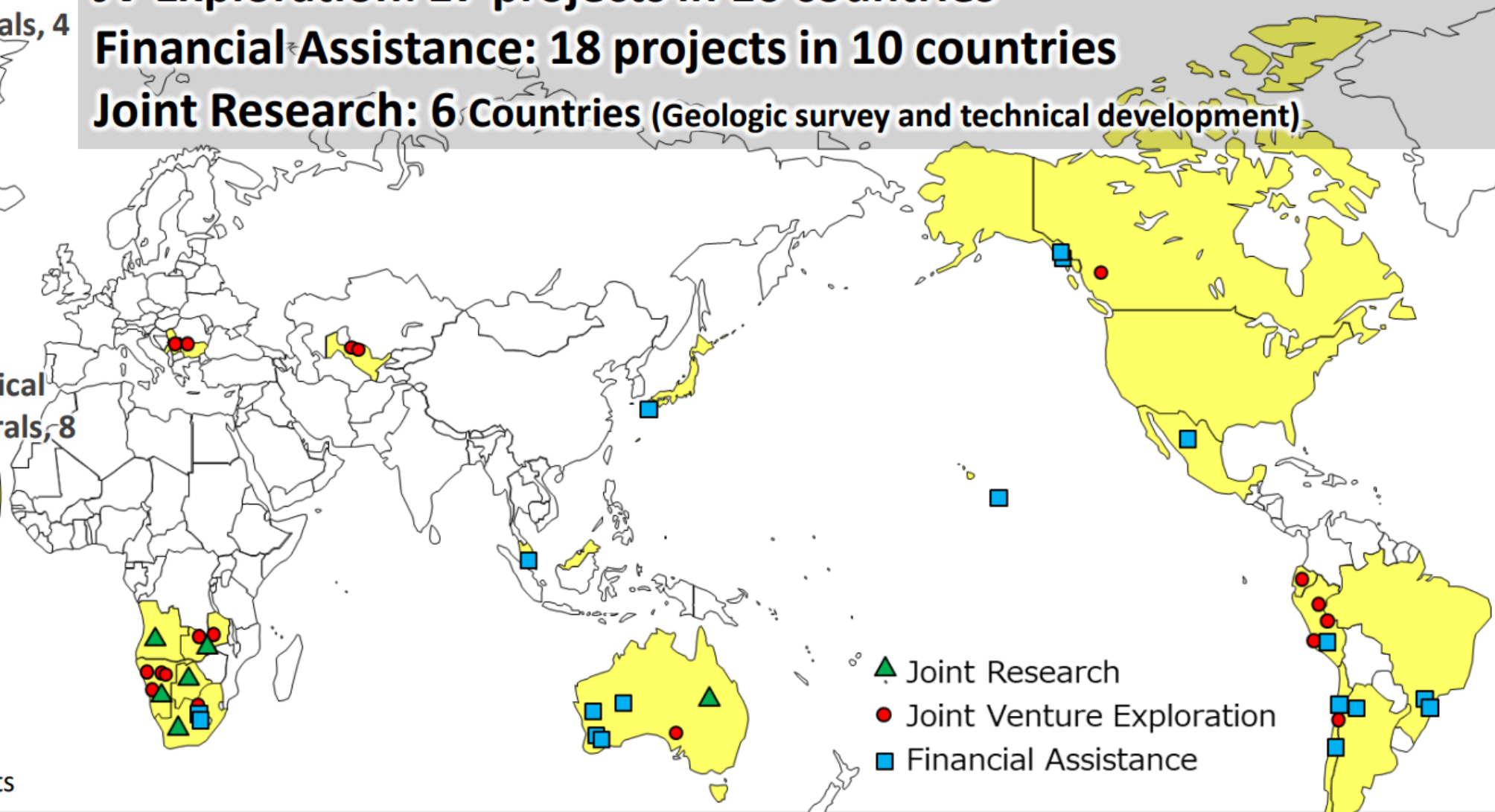
JV Exploration: 17 projects in 10 countries

Financial Assistance: 18 projects in 10 countries

Joint Research: 6 Countries (Geologic survey and technical development)



Equity Capital: 6 projects
Loan: 9 projects
Debt Guarantee: 3 projects



JOGMEC financial support projects

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Investee	Project	Metal	Support tools	Effective date
Americas				
Caserones Finance Netherlands B.V.	Chile · Caserones	Cu, Mo	Loan, Debt guarantee	(Loan) 2006.Aug (Guarantee) 2011.Jul
JX Nippon Mining & Metals Mitsui Mining & Smetlting	Peru · Quechua	Cu	Loan	2008.Mar
Nichiboku niobium	Brazil · Araxa	Nb	Equity capital, Debt guarantee	2011.Mar
Sales de Jujuy S.A.	Argentine · Olaroz	Li	Debt guarantee	2012.Sep
DMM Palmer	USA · Palmer	Zn, Cu	Equity capital	2014.Mar
DOWA Metal Mine	Mexico · Los Gatos	Zn, Pb	Loan	2015.Mar
Nittetsu Mining	Chile · Arqueos	Cu	Loan	2019.Mar
Oceania				
Japan Australia Rare Earths B.V.	Australia, Mt Weld	REE	Equity capital	2011.Mar
Toho Zinc	Australia, Abra	Pb	Loan	2019.Jun
Africa				
ITC Platinum Development Ltd.	South Africa, Platreef	PGM	Loan	2011. Aug
Samancor Chrome Holdings	South Africa, Samancor chrome	Cr	Loan	2017. Mar

- Based on the **Economic Security Promotion Act (ESPA)**, the Policy on Initiatives to Ensure Stable Supplies of Critical Minerals will enter into force as decree-law of METI in January 2023, following a public consultation process. https://www.meti.go.jp/policy/economy/economic_security/metal/torikumihoshin.pdf
- As specific measures, the supply chain is divided into **four categories**: **Exploration and F/S, Mine development, Processing** and other operations, and **technology development**, and a **subsidy scheme** (up to 1/2 of the costs) is provided for each.
- The target group was set to **critical minerals** (35 mineral types) including rare metals, for the time being **Manganese, Nickel, Cobalt, Lithium** and **Graphite**, which are the raw materials for LiB, and **Rare earths** for permanent magnets.
- **Multi-year supply plans** are approved by the government, and subsidies based on these plans are granted by **JOGMEC** as the legal entity responsible for providing stability and security support services.

