BRIEFING NOTE

South West England's Technology Metal Resources

Regional economic development and national security of supply

Authors:
Frances Wall,
Eva Marquis
Karen Hudson-Edwards
(Camborne School of Mines and Environment and Sustainability Institute, University of Exeter),
Aleks Cavoski,
Robert Lee,
and Jyoti Ahuja
(School of Law,
University of Birmingham)

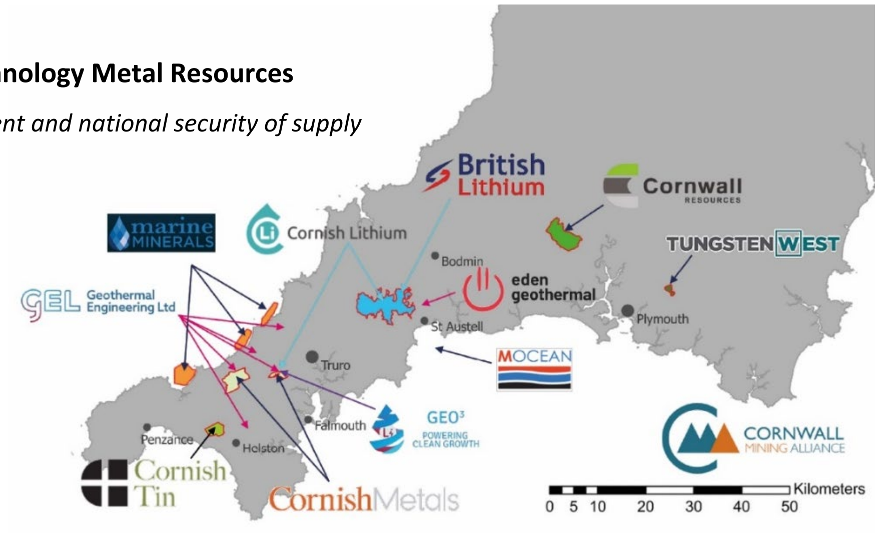


Figure 1 Eleven technology metal and geothermal energy exploration, scoping and mining projects in SW England

The UKRI Interdisciplinary Circular Economy Centre for Technology Metals (Met4Tech) is using Cornwall as a case study of how a new technology metals ecosystem can be informed by circular economy principles as it develops. This includes creating new geological models at the first stages of exploration, integration of co-products and renewable energy, re-use of waste, development of the downstream value chain and recommendations to improve the planning and regulatory environment. We are testing the new UN Resource Management System as a framework for sustainable development. This is an interim briefing note to inform preparation of the UK Critical Mineral strategy.

1. Cornwall and West Devon technology metals: context and opportunity

This is an exciting time for the development of geological resources in Cornwall and West Devon, with eleven technology metal and geothermal projects across the region, as well as the existing china clay industry (Fig 1). Lithium is the 'headline' metal at the moment but Cornwall's resources of tin and tungsten are also important. All of the geological resources in the region relate to the granite body that underlies West Devon, Cornwall and the Isles of Scilly (Fig. 2).

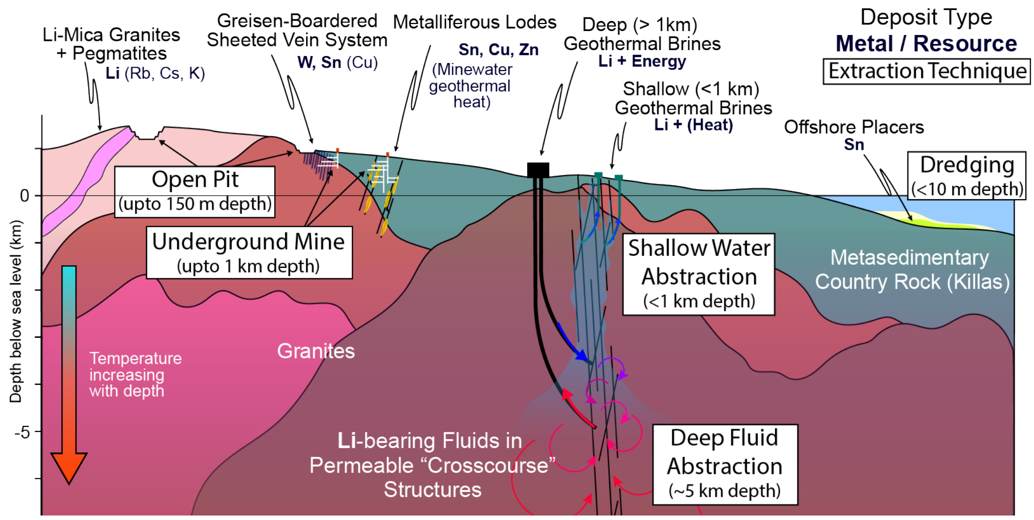


Figure 2 Technology metal mineralisation styles, associated resources, and extraction techniques for projects in SW England. All of the mineral occurrences have their origin in the granites.

The mineral deposits include traditional 'hard rock' tin, tungsten and lithium deposits, in which rock would be extracted in quarries or in underground mines and then processed to concentrate the ore minerals, and new types of deposits in which lithium is extracted from underground brines.

There is also potential for production from mine waste, such as china clay waste, and extraction of metals from legacy mine drainage. Geothermal resources range from new boreholes 5 km deep in granite that can be used for electricity generation to legacy mines that could produce mine-water, low carbon heating for local houses and businesses.

Although Cornwall is a world-famous former mining area neither 'Cornwall' nor the 'UK' feature in current compilations of world mining areas and significant world deposits despite the region having deposits of global and national significance. Hemerdon is the 3rd largest tungsten resource globally[1] and did feature in international lists such as the United States Geological Survey world production when the mine was working (Appendix I). Likewise, if South Crofty started production it would be listed in USGS statistics and would be the largest primary supply of tin in Europe (Appendix I). Early results from geothermal brines indicate significant lithium concentrations, higher than similar projects in the Rhine Graben (France, Germany). The proposed production of 30,000 tpa LCE lithium from hard rock lithium resources would cover production of ~780,000 60 kWh lithium iron phosphate batteries per year (*i.e.* as used by Tesla in their smaller cars). The UK is projected to manufacture 1.5 million EVs in 2030[2] and thus UK production could make a significant contribution of about half that projected UK lithium requirement. The Department for International Trade has identified technology metals in the South West region as a high potential opportunity for incoming investment and outgoing exports. The issue is that most projects are still at an early stage of development (Fig. 3), with long and risky journeys towards production ahead of them.

Box 1: United Nations Framework Classification (UNFC)
Tracking Projects from Concept to Creation

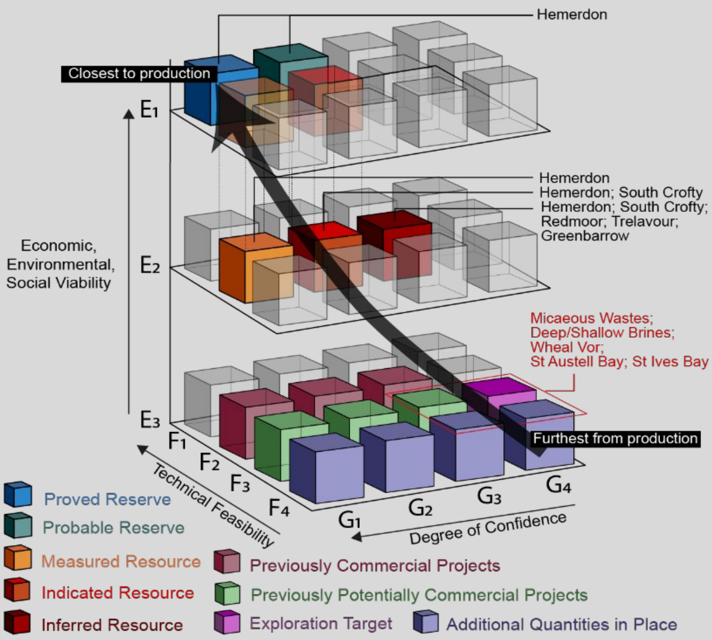


Figure 3 UNFC scheme with active technology metal resource projects mapped according to reported progress (see appendix I for details).

Developed by the United Nations Economic Forum for Europe (UNECE), the UNFC was designed as a harmonised international 'resource' project-based and principals-based classification systems. Bridging documents explain the relationship between the UNFC and classification systems recognised as 'Aligned Systems' as endorsed by the 'Expert Group on Resource Classification'.

This enables projects of differing types to be compared in terms of their progress toward production of a 'product', such as a mineral concentrate, oil and gas, energy *etc.* (Fig. 3).

The product of a mineral/metal resource is typically a mineral concentrate. In regions with favourable conditions for mine development the time from project concept to start-up of product production is a minimum of 10-15 years (Fig. 5). This often takes longer if projects are interrupted or conditions for development are unfavourable (*e.g.,* lack of social license to operate, insufficient environmental protection, inadequate supporting infrastructure, poor market conditions, skills shortages *etc.*)

[1] https://www.tungstenwest.com/overview-and-strategy
[2] https://www.apcuk.co.uk/app/uploads/2022/03/APC_xEV_Demand_Q42021.pdf

There is also potential for by-products (*e.g.* for every tonne of Li, ~16 tonnes of potassium (as KCl, KSO_4) might be produced at the Cornish Lithium Trelavour project and used towards the 41,000 tonnes K_2O or 34,000 t K[3], [4], required in the South West Region). Once mines and processing plants have been established, it may become economic to extract more metals from waste in the region as well as from other new deposits. Consideration of the whole industrial ecosystem within a circular economy framework is essential to obtain maximum value from the new developments and given them the highest chance of economic success.

New projects are able to build on the expertise and experience of the china clay industry, the Cornwall Mining Alliance cluster of service and consultancy companies (cornwallminingalliance.org) and the Camborne School of Mines (University of Exeter, www.exeter.ac.uk/csm). All the projects require a high degree of innovation. In particular, production of lithium as a main or by-product of geothermal waters, and production from the lithium-bearing micas in the Cornish granites, require new techniques and procedures, even for resource assessment. In all cases, the new operations need to consider environmental and socio-economic factors in the region and comply with the highest international environmental, social and governance standards. The geological resources complement the other renewable energy aspirations of the south west, e.g. floating offshore wind. The term 'SW Natural Powerhouse'[5] has been used to describe this integrated concept.

There are many synergies and common topics of development, ranging from the research needed to understand better the geological models and resource to the production technologies, environmental protection and community understanding and interaction. Geothermal energy is closely related to the technology metals (Fig. 2). The projects in the region need to be considered as an industrial ecosystem.

An economic study in 2019[6] showed that if the then current exploration projects came to production they could generate directly an additional £1 billion GVA over the next 20 years in a world-leading, highly specialist sector.

A supply of high-quality technology metals should be an innovation kick-starter. Technology enterprise zones might be developed around the proposed production centres, such as St Austell, United Downs and Camborne. Such zones could foster innovation of novel up-stream production and downstream usage for the UK enabling a larger high-value industrial ecosystem to develop. A tin smelter could be a realistic possibility in the region, enabling processing of primary ores and recycling. A feasibility study is needed for this.

---

3 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972089/regionalstatistics_southwest_23mar21.pdf

4 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/722240/fertiliseruse-statsnotice2017-5july2018.pdf

5 https://www.plymouth.ac.uk/research/the-natural-powerhouse

6 https://emps.exeter.ac.uk/media/universityofexeter/emps/csm/csmresearch/Georesources_Cornwall_version_10_Oct.pdf

2. Ensuring sustainable development - the opportunity to lead

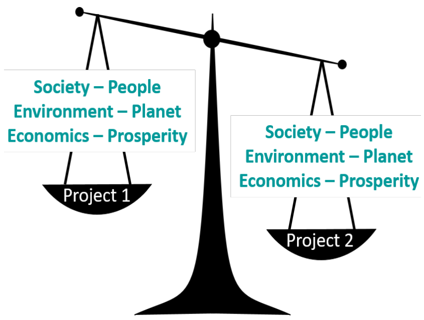


Figure 4 UNRMS helps to balance and assess projects to ensure they will contribute to sustainable development (figure from the UN RMS)

Ensuring sustainable development through the extraction of natural resources requires a much wider range of actions than simply supporting exploration and extraction companies. It is about much more than how much of a commodity might be produced, or the direct economic returns this might bring. The **UN Resource Management System**[7] launched in draft in 2021 aims to create a comprehensive global voluntary system for resource management to be used by governments, industry, investors and civil society (Fig. 3). Given the desire to be applicable across a range of resources, the full system is rather 'heavy-going' but the importance is that it gives a framework, that can be treated as an 'a la carte' menu of the full picture of sustainable development related to the use of natural resources. True sustainable development requires exchange of the natural capital for infrastructure and human capital that will enrich the region even after the extraction has finished.

The provisional fundamental principles of the UNRMS and its requirements have been simplified to produce Table 1. Through the Met4Tech Centre, we are working with the UN Economic Commission for Europe on a case study applying the UNRMS in Cornwall. We have been using the UN Framework Classification as a means to view stage of development of the resources and help determine the types and levels of investment needed (Box 1; Appendix I). We will report on our circular economy studies that contribute to service orientation and how best to combine circularity principles into deposit geological models.

Table 1 UN Resource Management system summary and potential use in Cornwall

First step to determine priorities	
Rights and responsibilities in the management of resources (state, regional)	Understand how resources and their development are managed in UK/Cornwall. Decide how to use UN RMS, including prioritising most important aspects.
Key actions	
Responsibility to the planet (Environment)	UK has strong environmental regulations and permitting but ideally regions should also do a strategic environmental impact assessment and make sure projects go above and beyond statutory requirements, complementing biodiversity and climate change for example.
Responsibility to people (Social)	Health and Safety is well regulated by current systems. Social licence to operate – community relationships and partnerships at different scales is key and requires regional strategy of knowledge building and dialogue with civil society as well as the work by individual projects.
Governance and integrated management of resources (Governance)	UN Framework Classification used to show project progress. Consider investment requirements relevant to projects at different stages. Strategy to provide low C and cost-competitive energy. Many of the UK regulatory features are not always well adapted for minerals development and make starting new projects more difficult than in competing areas overseas, improvements are needed for mineral rights administration and the planning and permitting journey.
Service orientation and circularity (Economy)	Maximise the opportunity for recovery and use of resources, including avoiding waste/use of waste streams, considering valorising other metal sources. Define opportunities to build the value chain, including the **key smelting/refining** stage, especially for **tin and lithium**, needed for manufacturing and recycling. Pilot some product service schemes to improve circularity of resources.

[7] https://unece.org/sites/default/files/2021-05/UNRMS_Print_20210505_0.pdf

Facilitating actions	
Innovation	Fund and encourage research and innovation needed for projects to succeed, and for the UK to lead in technical, socio-economic and environmental areas. International, national and regional initiatives.
Collaboration	Exchange best practice, create dialogues between stakeholders, including companies, research, education, UK regions, European Mining regions (Saxony is closest comparison to Cornwall).
Competency and capability	Across the board – of employees for the operations, and related sectors and for regulators and stakeholders. Includes HE including Camborne School of Mines (must have mining engineering, minerals processing plus geosciences) and need leading FE directly connected to the sector for core skills development.
Transparency	An essential part of good governance to secure investment and social licence to operate. UK is member of Extractive Industries Transparency Initiative. Improve mineral rights administration.

3. Accelerating development of critical minerals projects

The development of a new technology metals mine usually takes a minimum of 10 to 15 years. Exploration is often done by small companies who need time to raise funding for each step of development. Listed companies must go through a series of specified steps and due process of resource development. Planning takes time and there are many different permits to be obtained from different authorities. If local communities or other civil society organisations oppose the project, this is also likely to cause further delays or even failure. Figure 5 represents the timelines of the two most advanced projects in the south west, at Hemerdon and South Crofty. Mining at Hemerdon commenced in 2015 but closed again in 2018 owing to problems with minerals processing. A new processing plant has been designed with the view of re-opening the mine. South Crofty mine closed in 1998 and is now the subject of new exploration below the old mine and in the nearby area. The company Cornish Metals have recently secured investment to dewater the mine ready for the next stages of exploration and development.

To accelerate development time whilst still observing due process, some initial suggestions are:

1. Fund pre-competitive research and innovation including geological models, geophysics and extraction processes;
2. Fund industry-led innovation investment, especially for establishment of processing;
3. Consider a georesources distributed enterprise zone to signal Government support;
4. Implement the UN Resource Management System at regional level to help ensure good community partnerships and sustainable development from the extractive industries;
5. Make interventions to help join up the UK value chains in critical metals (i.e. help secure customers) and encourage new circular economy systems;
6. Invest in power infrastructure to help facilitate extraction operations and renewable energy generation and use;
7. Coordinate education and training to ensure qualified personnel are available;
8. Rapid improvement to mineral rights information in exploration hotspots such as Cornwall; (e.g. using the Deep Digital Cornwall information hub to hold volunteered and publically available mineral rights information). See also: *Regulatory Study Findings: main themes from qualitative analysis of interview data (2023), A. Cavoski, J. Ahuja and R. Lee,* Met4Tech.org;
9. Invest to ensure staff capacity, competency and collaboration in planning and permitting organisations.

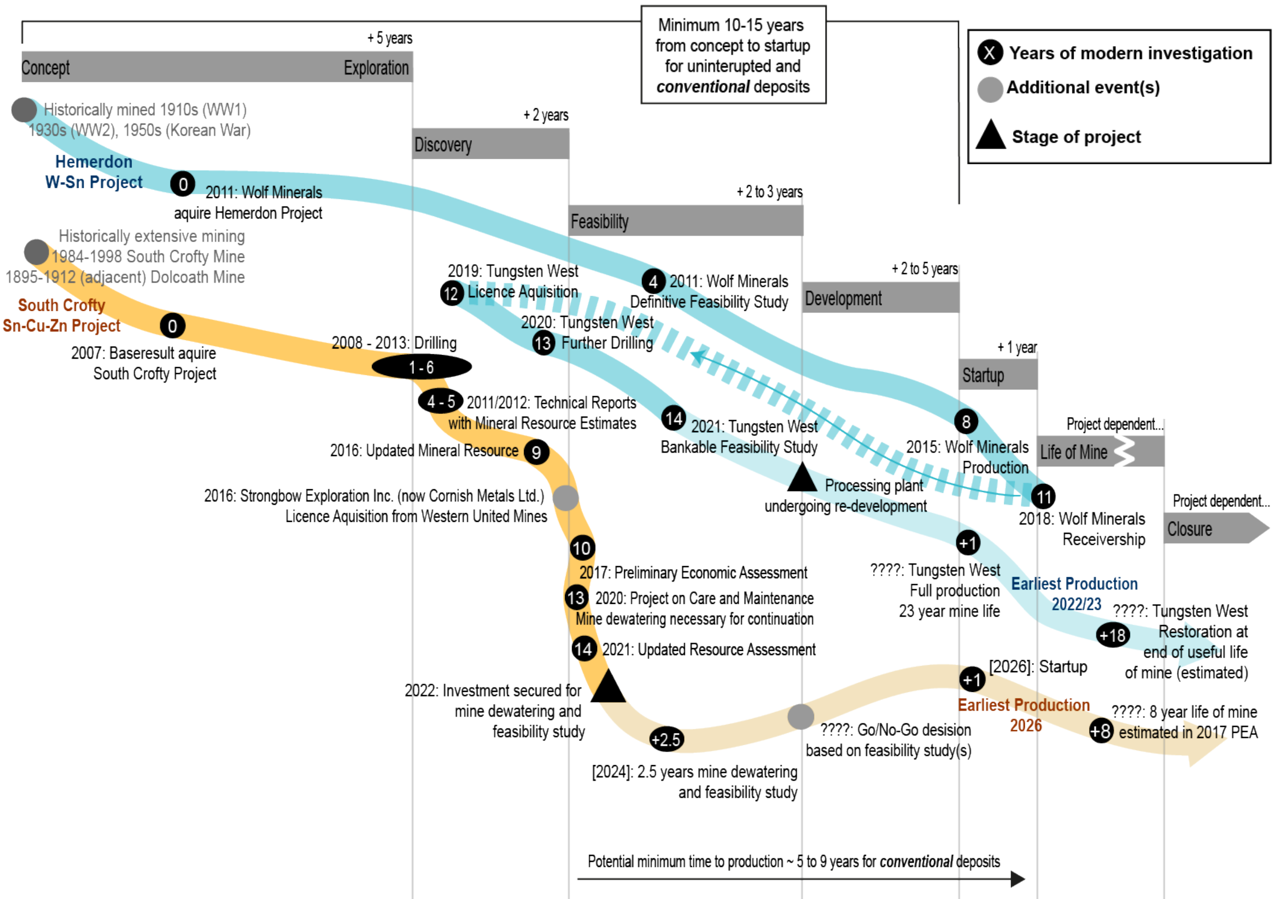


Figure 5 Project timelines from concept to current state of play for the Hemerdon and South Crofty projects. These two projects represent the most advanced metalliferous resource projects in SW England; remaining projects are pre-feasibility stage.

This study was funded by the UK Research and Innovation (UKRI) Interdisciplinary Circular Economy Centre for Technology Metals (Met4Tech) (EP/V011855/1).

Met4Tech Briefing note prepared as an interim briefing note to inform preparation of the UK Critical Mineral strategy by Frances Wall, Eva Marquis, Karen Hudson-Edwards (Camborne School of Mines and Environment and Sustainability Institute, University of Exeter), Aleks Cavoski, Robert Lee, and Jyoti Ahuja (School of Law, University of Birmingham) [May 2022]. A full version will be published in due course.

For any questions on this topic, please contact: Eva Marquis, e.marquis@exeter.ac.uk, Frances Wall, f.wall@exeter.ac.uk.

For any general enquiries, please contact: Met4Tech@exeter.ac.uk

Further reading

Georesources Cornwall (2019):
http://emps.exeter.ac.uk/media/universityofexeter/emps/csm/csmresearch/Georesources_Cornwall_version_10_Oct.pdf

Georesources for sustainability:
https://tevi.co.uk/wp-content/uploads/2021/05/Tevi_Georesources-for-Sustainability.pdf

UN Resource Management System:
https://unece.org/sustainable-energy/unfc-and-sustainable-resource-management/unrms

Appendix I: Global Context of South West UK Technology Metal Deposits

Lithium

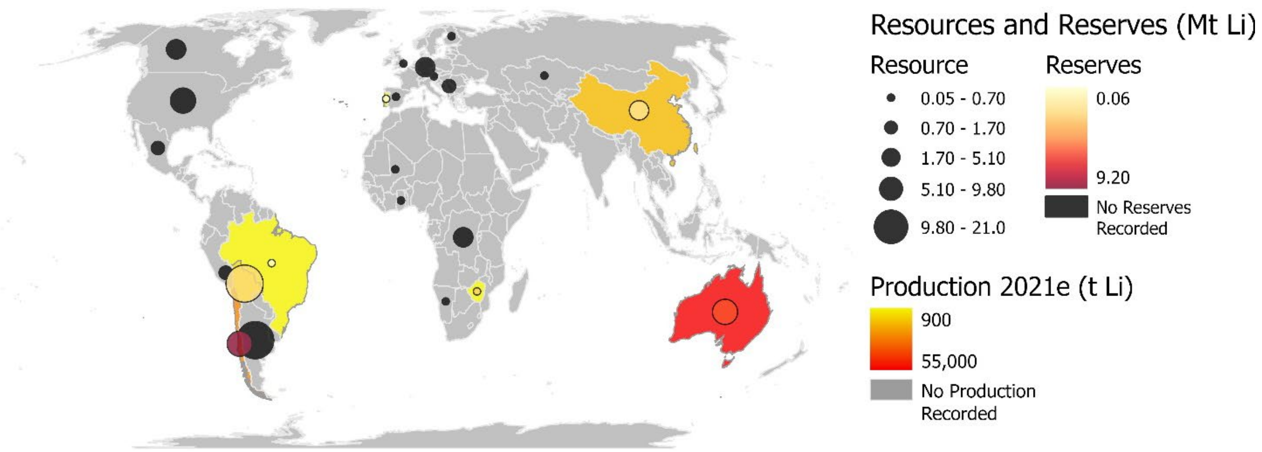
United States Geological Survey Mineral Commodity Summary for metric tons of contained lithium does not feature the UK (USGS 2022) but see comment and map about resource below.

World Mine Production and Reserves: Reserves for Argentina, Australia, and "Other countries" were revised base on new information from Government and industry sources.

	Mine production		Reserves[6]
	2020	2021[e]	
United States	W	W	750,000
Argentina	5,900	6,200	2,200,000
Australia	39,700	55,000	[7]5,700,000
Brazil	1,420	1,500	95,000
Chile	21,500	26,000	9,200,000
China	13,300	14,000	1,500,000
Portugal	348	900	60,000
Zimbabwe	417	1,200	220,000
Other countries[8]	—	—	2,700,000
World total (rounded)	[9]82,500	[9]100,000	22,000,000

World Resources:[6] Owing to continuing exploration, identified lithium resources have increased substantially worldwide and total about 89 million tons. Identified lithium resources in the United States—from continental brines, geothermal brines, hectorite, oilfield brines, pegmatites, and searlesite—are 9.1 million tons. Identified lithium resources in other countries have been revised to 80 million tons. Identified lithium resources are distributed as follows: Bolivia, 21 million tons; Argentina, 19 million tons; Chile, 9.8 million tons; Australia, 7.3 million tons; China, 5.1 million tons; Congo (Kinshasa), 3 million tons; Canada, 2.9 million tons; Germany, 2.7 million tons; Mexico, 1.7 million tons; Czechia, 1.3 million tons; Serbia, 1.2 million tons; Russia, 1 million tons; Peru, 880,000 tons; Mali, 700,000 tons; Zimbabwe, 500,000 tons; Brazil, 470,000 tons; Spain, 300,000 tons; Portugal, 270,000 tons; Ghana, 130,000 tons; Austria, 60,000 tons; and Finland, Kazakhstan, and Namibia, 50,000 tons each.

Figures for production, resources and reserves collated by the United States Geological Survey are shown on the map below. As these do not include recent published estimates (see Appendix II) for UK lithium resources these have been added.



Data source(s): USGS, 2022; Met4Tech, 2022

Tin

United States Geological Survey Mineral Commodity Summary for metric tons of contained tin does not feature the UK (USGS 2022) but see comment about reserves and resource below.

World Mine Production and Reserves: Reserves for Australia, Burma, Congo (Kinshasa), Malaysia, Peru, Russia, and "Other countries" were revised based on information from company and Government reports.

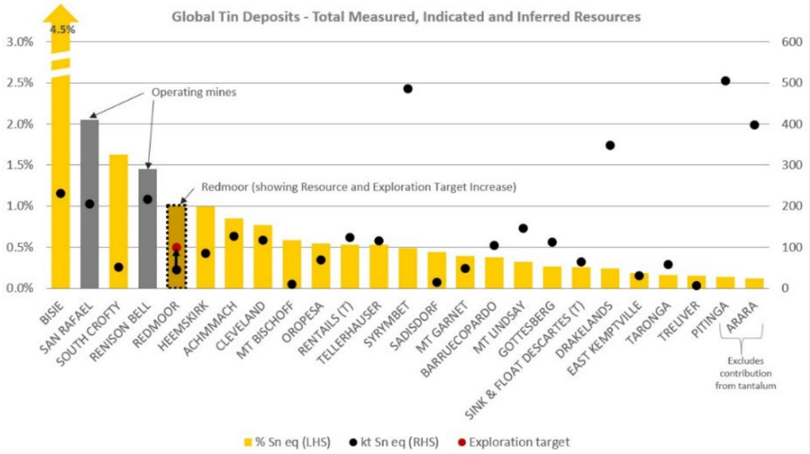
	Mine production		Reserves[5]
	2020	2021[e]	
United States	—	—	—
Australia	8,120	8,300	[6]560,000
Bolivia	14,700	18,000	400,000
Brazil	16,900	22,000	420,000
Burma[e]	29,000	28,000	700,000
China[e]	84,000	91,000	1,100,000
Congo (Kinshasa)[e]	17,300	16,000	130,000
Indonesia[e]	53,000	71,000	800,000
Laos[e]	1,400	1,600	NA
Malaysia	2,960	3,100	81,000
Nigeria[e]	5,000	1,200	NA
Peru	20,600	30,000	150,000
Russia	2,500	3,500	200,000
Rwanda[e]	1,800	2,200	NA
Vietnam[e]	5,400	6,100	11,000
Other countries	782	930	310,000
World total (rounded)	264,000	300,000	4,900,000

World Resources:[5] Identified resources of tin in the United States, primarily in Alaska, were insignificant compared with those of the rest of the world. World resources, principally in western Africa, southeastern Asia, Australia, Bolivia, Brazil, Indonesia, and Russia, are extensive and, if developed, could sustain recent annual production rates well into the future.

[5]Reserves data are dynamic. They may be reduced as ore is mined and (or) the feasibility of extraction diminishes, or more commonly, they may continue to increase as additional deposits (known or recently discovered) are developed, or currently exploited deposits are more thoroughly explored and (or) new technology or economic variables improve their economic feasibility. Reserves may be considered a working inventory of mining companies' supplies of an economically extractable mineral commodity. (USGS, 2022).

The figures for reserves are much smaller than resources, which are less well-defined potential economic sources of the elements. Ore deposits in Cornwall and West Devon with tin as the main product have not defined reserves yet (see Appendix II). For example, if Cornish Metals' indicated resource (the highest level of resource definition it has so far) were to translate into a reserve, it would have 33136 t of contained tin, which is about 10% of the reserve in the Other Countries category and higher than Vietnam's reserve. South Crofty aims to produce 4500 t of tin annually making it the largest primary tin mine in Europe. Once in production, the UK would appear in the USGS world listing. (https://www.internationaltin.org/cornish-metals-receive-funds-to-advance-south-crofty/#:~:text=According%20to%20Cornish%20Metals%2C%20production,primary%20tin%20mine%20in%20Europe. Accessed 28.5.22).

The UK explorers make the point that the Cornish tin deposits are some of the highest grade, i.e. richest in the world, i.e. good in terms of having to produce less 'waste' rock for each tonne of tin:



(https://www.strategicminerals.net/projects/redmoor-tin-tungsten-exploration.html accessed 28.5.22).

Tungsten

USGS Mineral Commodity Summary for tungsten in 2019 shows that when the Hemerdon deposit was actively mined, the UK featured in the United States Geological Survey global list of production (USGS 2019). See comment above in the tin section regarding the definition of reserves.

World Mine Production and Reserves: Reserves for China and Russia were revised based on company or Government reports.

	Mine production 2017	Mine production 2018[e]	Reserves[8]
United States	—	—	NA
Austria	975	980	10,000
Bolivia	994	1,000	NA
China	67,000	67,000	1,900,000
Portugal	724	770	3,100
Russia	2,090	2,100	240,000
Rwanda	720	830	NA
Spain	564	750	54,000
United Kingdom	1,090	900	43,000
Vietnam	6,600	6,000	95,000
Other countries	1,300	1,400	1,000,000
World total (rounded)	82,100	82,000	3,300,000

World Resources: World tungsten resources are geographically widespread. China ranks first in the world in terms of tungsten resources and reserves and has some of the largest deposits. Canada, Kazakhstan, Russia, and the United States also have significant tungsten resources.

USGS Mineral Commodity Summary for tungsten in 2022 does not feature the UK. When the Hemerdon deposit comes back into production it will feature again in the list of globally significant production (USGS 2022)

World Mine Production and Reserves: Reserves for Portugal, Spain, Vietnam, and "Other countries" were revised based on updated company data and (or) information from the Governments of those countries.

	Mine production 2020	Mine production 2021[e]	Reserves[9]
United States	—	—	NA
Austria	890	900	10,000
Bolivia	1,350	1,400	NA
China	66,000	66,000	1,900,000
Korea, North	410	400	29,000
Portugal	550	620	5,100
Russia	2,400	2,400	400,000
Rwanda	860	950	NA
Spain	500	900	52,000
Vietnam	4,500	4,500	100,000
Other countries	960	1,200	1,200,000
World total (rounded)	78,400	79,000	3,700,000

World Resources:[9] World tungsten resources are geographically widespread. China ranks first in the world in terms of tungsten resources and reserves and has some of the largest deposits. Canada, Kazakhstan, Russia, and the United States also have significant tungsten resources.

Appendix II – Technology Metal Resources SW England

Table 2 Projects with published resource-reserve estimates (Mt = million metric tonnes)

Company	Project - type	Effective date	Tonnage (Mt)	Metal %	Code	Type	UNFC: Bide et al. (2022)
Cornwall Resources Ltd.	Redmoor – greisen bordered sheeted vein system	16/05/2019	7.2	WO_3 0.59%; Sn 0.1%; Cu 0.39%	JORC	Inferred Mineable, Inclusive	E2 F2.1 G3
Tungsten West Ltd.	Hemerdon – greisen bordered sheeted vein system	07/12/2020	42.5	WO_3 0.17%; Sn 0.03%	JORC	** Measured	E2 F2 G1
		07/12/2020	123.6	WO_3 0.13%; Sn 0.03%	JORC	** Indicated	E2 F2 G2
		07/12/2020	161.9	WO_3 0.1%; Sn 0.03%	JORC	Inferred	E2 F2 G3
		01/03/2021	34.1	WO_3 0.18%; Sn 0.03%	JORC	**Proved (inclusive of modified resources)	E1 F1 G1
		01/03/2021	29.1	WO_3 0.18%; Sn 0.03%	JORC	**Probable (inclusive of modified resources)	E1 F1 G2
Cornish Metals Ltd.	South Crofty Upper Mine – polymetallic sulfide metalliferous lodes	07/06/2021	0.277	Sn 0.67%; Cu 0.78%; Zn 0.57%	NI 43-101	Indicated	E2 F2 G2
		07/06/2021	0.493	Sn 0.64%; Cu 0.63%; Zn 0.63%	NI 43-101	Inferred	E2 F2 G3
	South Crofty Lower Mine – Sn-dominated metalliferous lodes	07/06/2021	1.937	Sn 1.67%	NI 43-101	Inferred	E2 F2 G3
		07/06/2021	2.084	Sn 1.59%	NI 43-101	Indicated	E2 F2 G2
British Lithium Ltd.	Greenbarrow – Li mica granite and pegmatite	2021	100 to 120	Li_2O 0.5%	JORC (report not in public domain)	Inferred	E2 F2 G3*
Cornish Lithium Ltd.	Trelavour Li – Li mica granite	02/12/2012	51.7	Li_2O 0.24%; Rb 0.11%; Cs 0.0066%; K 3.93%	JORC (report not in public domain)	Inferred	E2 F2 G3*

***** Proven and Probable Reserves given as inclusive of modified Indicated and Measured Resources. To avoid double counting, estimated residual Measured and Indicated Resources have been given below:***

****Tungsten West**	Hemerdon	8.4 Mt @	WO_3 0.13%; Sn 0.03%	Residual Measured calculated with assumption all Probable converted from Indicated
		94.5 Mt @	WO_3 0.11%; Sn 0.03%	Residual Indicated calculated with assumption all Proven converted from Measured

**** Company statements include reference to CRIRSCO-compliant resource estimates. Reports are not in public domain and have not been seen.***

Table 3 Projects without resource/reserve estimates published

Company(s)	Project	Metals of interest	Notes	UNFC CRIRSCO	UNFC: Bide et al. (2022)
Cornish Metals Ltd.	United Downs – polymetallic sulfide metalliferous lodes	Cu ± Sn ± Ag	Mineralization intercepted no resource estimate available/quantity unknown.	NA exploration target too early stage to classify	E3 F3 G4
Cornish Lithium Ltd. **+ Imerys** **+ HSSMI**	CLiCCC – micaceous residues of kaolin industry	Li (Rb?, Cs?, K?)	Academic studies have indicated that Li can be extracted from micaceous residues. Quantity and scaled technical feasibility is unknown.		E3 F3 G4
Cornish Lithium Ltd.	United Downs Shallow Brines – shallow (<1 km) brines bearing lithium	Li	Reported that brines contain "encouraging" Li concentrations, no quantity estimates available. Pilot plant and trials for direct Li extraction in progress.		E3 F3 G4
GeoCubed **+ Cornish Lithium Ltd.** **+ Geothermal Engineering Ltd.**	United Downs Deep Geothermal Brines – deep geothermal brines (5 km) extracted for geothermal energy and bearing lithium	Li	Concentration of Li in brines reported as avg. 220 mg/L, no quantity estimates available. Pilot plant and trials for direct Li extraction in progress.		E3 F3 G4
Cornish Tin Ltd.	Wheal Vor – polymetallic sulfide and Sn metalliferous lodes	Sn, Cu, Zn	Mineralization intercepted no resource estimate available/quantity unknown.		E3 F3 G4
MOCEAN	Offshore Tin (South Coast) – placer Sn in sunken river valleys	Sn	Area targeted on basis of favorable geological conditions but no specific data published. No further development work.		E3 F4 G4
Marine Minerals Ltd.	Offshore Tin (North Coast) – placer Sn in beach and shallow shelf sands	Sn	Metal present but no modern resource estimate available/quantity unknown.	NA Non-code compliant historic estimate + exploration target too early stage to classify	E3 F3 G4