

European Policy Brief

STRADE

Strategic Dialogue on Sustainable Raw Materials for Europe (STRADE)
No. 03 / 2016

Locating the European Union in Mineral Exploration Expenditure Budgets

24 August 2016

Mark Ferguson, Tiffany Steel, Masuma Farooki and Alexander Malden
SNL Financial Ltd.



Funded by the
Horizon 2020 Programme
of the European Union

STRADE is an EU-funded research project focusing on the development of dialogue-based, innovative policy recommendations for a European strategy on future raw materials supplies. In a series of policy briefs and reports the project will offer critical analysis and recommendations on EU raw materials policy.

This policy brief is part of a series of research articles and reports to be produced under STRADE. This brief reviews the exploration expenditure budget trends in the mineral sector and examines the EU's current and future share of global exploration budgets.

Introduction

The Raw Materials Initiative (2008), the European Union's strategy to address issues of access to minerals in the EU, considers as one of its pillars the sustainable supply of raw materials within the EU.

The EU28's share of global production for major minerals and metals has declined over the last decade, as has its share of global exploration expenditure budgets (EEBs). The 2003-2012 commodity price boom and the accompanying increase in mineral exploration expenditure benefitted a number of regions. Between 2007 and 2012, global EEBs¹ nearly doubled, from USD 11 billion to USD 20.5 billion. Budgets nearly tripled in Pacific and Southeast Asia and more than doubled in Latin America and Europe and near doubled in Africa.

This policy brief tracks the trends in EEBs over the past decade, focusing on the allocation by location, stage of activity, actor and metal. The brief then examines the profile of the EU in greater detail and forecasts exploration trends for the region for the period 2017-2020.

The data presented here is based on SNL's estimates on conversations with company representatives, published sources, and information gathered from joint venture partners. SNL also estimates all or part of a company's budget breakdown when the company is unable or unwilling to provide it.

Mineral Coverage includes budgets for gold, base metals, platinum group metals, diamonds, U3O8 (coverage initiated in 2007), silver, rare earths, potash/phosphate, and many other hard-rock metals, but specifically excludes exploration budgets for iron ore, coal, aluminum, oil and gas, and many industrial minerals. Exploration budget data for cobalt, lithium, molybdenum, niobium potash/phosphates, REEs, silver, tantalum, tin, and some other industrial minerals are aggregated as "other" budgets.

Stages of development include grassroots, late state and feasibility and mine site expenditure. *Grassroots* is defined as exploration from the earliest stage through perimeter drilling to the quantification of initial resources; also includes reconnaissance and evaluative forays. *Late stage and feasibility* covers exploration to further define, quantify and upgrade a previously identified orebody after initial resources have been quantified; also includes all feasibility work up to the point of a positive production decision. *Mine site expenditure* covers all exploration (regardless of stage) at or immediately around an existing mine site held by the company (excluding production geology on the orebody being mined, such as geotechnical/ rock engineering, reserves estimation and grade-control or confirmation drilling on the producing orebody); includes searching for satellite orebodies within an economic transportation distance of an operating mine, and exploration at or immediately around a project that is committed to development (preproduction stage).

¹ EEBs reflects gold, base metals, platinum group metals, diamonds, U3O8, silver, rare earths, potash/phosphate, and many other hard-rock metals, but specifically exclude exploration budgets for iron ore, coal, aluminium, oil and gas, and many industrial minerals.

Actors: Five classifications for companies or other organisations are used in this brief. *Major* – A company with adjusted annual nonferrous mining-related revenue of at least USD 500 million, which is considered to have the financial strength to develop a major mine on its own. *Intermediate* – Based primarily on a company’s adjusted annual revenue, with at least USD 50 million in annual nonferrous revenue but less than the USD 500 million major-company threshold. *Junior* – The company’s principal means of funding exploration is through equity financing, although some companies may have limited revenues below the USD 50 million intermediate-company threshold. This category mainly includes pure explorers, but also includes many aspiring producers that have not yet reached the intermediate-company threshold. *Government* – Consists of wholly government-controlled entities operating primarily in national or provincial/state interests rather than as private entities. To be included, the company must be commercially oriented; direct exploration efforts by government-related geological surveys are generally excluded. *Other* – Includes all other companies that do not fit the criteria for one of the previous four categories.

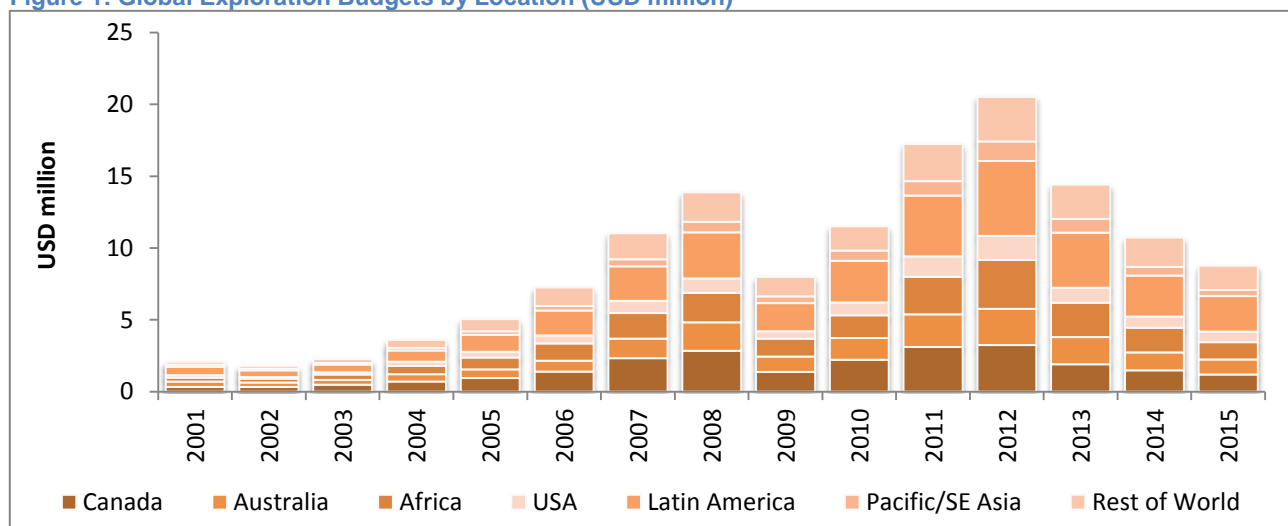
Exploration expenditure by location

Global exploration expenditure in the mining sector has been slowing down since 2012, mirroring the stagnation in global economic growth rates; expenditure has more than halved from the USD 20.5 billion in 2012, to USD 8.8 billion in 2015 (Figure 1).

In 2015, the European region accounted for USD 396.6 million of the USD 8.8 billion spent on mineral exploration worldwide. In contrast, Latin American countries accounted for 28%, Pacific/South East Asia (including Australia) for 17% and Africa for 14%.

At the country level, Canada (USD 1.2 billion) and Australia (USD 1.1 billion) lead the EEB tables, with individual European Union (EU) member states ranked outside the top 20 countries; Finland (USD 66.8 million) and Sweden (USD 52.8 million) are the highest ranked EU members.

Figure 1: Global Exploration Budgets by Location (USD million)



Source: SNL Metals & Mining

Exploration expenditure by stage of activity

Grassroots exploration activity accounted for 29% (USD 2.5 billion) of global exploration EEBs in 2015, falling from a previous high of USD 6.3 billion in 2012. Late-stage and feasibility studies declined from a peak of USD 9.0 billion in 2012 to USD 3.2 billion in 2015. Mine site exploration from its highest level of USD 3 billion over the same period (Figure 1).

Within the regions, the same dispersion by stage of activity is evident, with late stage activity taking a larger share than grassroots or mine site activity. Apart from the Pacific/Southeast Asia, where there is an equal share amongst the three stages. In the EU, late stage activity has more than half of the share of exploration activity.

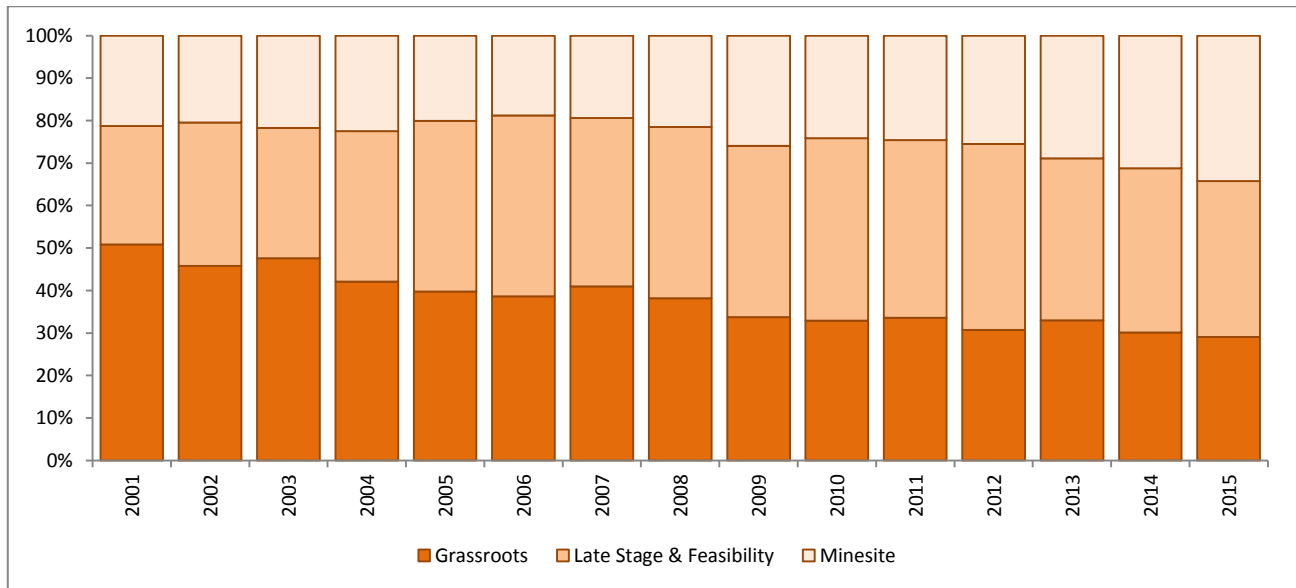
Table 1 Percentage Share of Exploration Expenditure by Region and Stage of Activity (2015)

	Grassroots %	Late Stage %	Mine site %
Africa	27	41	32
Latin America	28	38	34
Pacific/South East Asia (including Australia)	33	34	33
Canada/US	27	37	36
EU	25	51	24

Source: SNL Metals & Mining

In 2015 within the EU, the largest share of exploration expenditure was allocated to late stage activity (USD 123 million), followed by grassroots activity (USD 60 million) and mine site activity (USD 56.2 million). Finland had the largest share in grassroots and late stage activity, with Sweden accounting for the largest share in mine site activity.

Figure 1 Global Exploration Budget Trends by Stage (% Share)



Source: SNL Metals & Mining

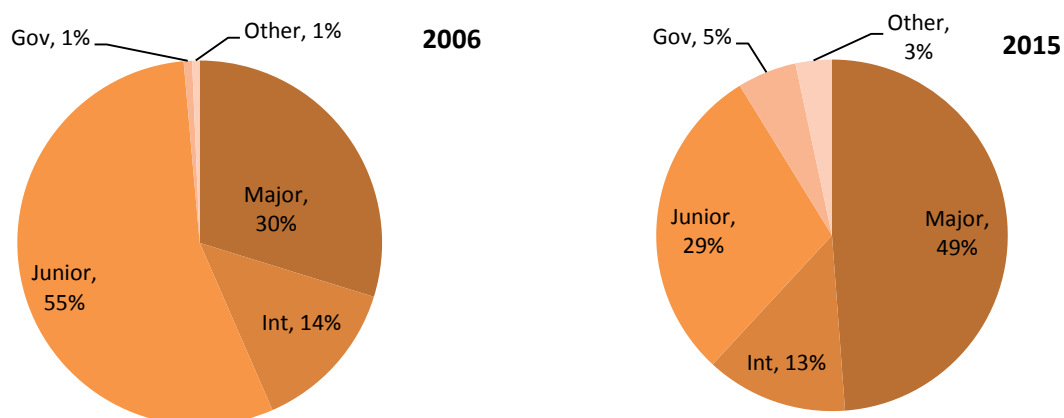
Exploration expenditure by mining company

Using five categories to identify mining companies, Figure 2 contrasts the changes between 2006 and 2015. In 2006, the junior companies (mostly exploration-only companies) accounted for well over half the share of exploration activity, followed by the majors and the intermediates. The share for governments was around 1%.

As investment activity in the mining sector decreased after the fall in metal prices post-2011, juniors faced increasing challenges in raising investment funds and their level of EEBs consequently dropped. By 2015, majors accounted for nearly half of the share of EEBs, while there was a noticeable decrease in the junior activity.

Government activity also increased, albeit by a small share, from USD 43.3 million in 2006 to USD 477.6 million in 2015.

Figure 2 Percentage Share of Exploration Expenditure by Company Type



Source: SNL Metals & Mining

Robust junior sectors help mature mining jurisdictions

Aside from relatively strong geological potential, several countries rely on healthy junior sectors to promote exploration and subsequent development of their mineral resource potential. Junior mining companies' participation along with policies that encourage such participation impact the levels of exploration expenditure in a country.

One of the reasons behind Canada's high exploration expenditure rankings is its fiscal policy for junior companies. In the early 2000s, Canada developed an innovative mineral tax scheme that has since evolved into one of the world's leading tax incentives. The "super" flow-through system comprises the longstanding Canadian federal tax deduction for exploration expenses known as "flow-through shares" (whereby 100% of an investment can be deducted from an individual's income before federal tax is applied), combined with the federal mineral exploration tax credit (METC). The tax scheme has spurred exploration investment by junior companies in the country, helping it to become the top global destination for investment and keeping exploration going even during the economic downturn.

More recently, Australia recognized the significant negative impact the recent downturn had on explorers and launched the Exploration Development Incentive (EDI). The EDI allows small mineral exploration companies with no taxable income to provide exploration credits, paid as a refundable tax offset to their Australian resident shareholders for greenfield mineral exploration. Greenfields exploration eligible for the tax offset will be limited to onshore minerals, excluding oil and gas; the scheme is capped at AUD 100 million over the forward estimates period. Exploration credits will be capped at AUD 25 million for exploration spending in 2014-15, AUD 35 million for 2015-16 and AUD 40 million for 2016-17.

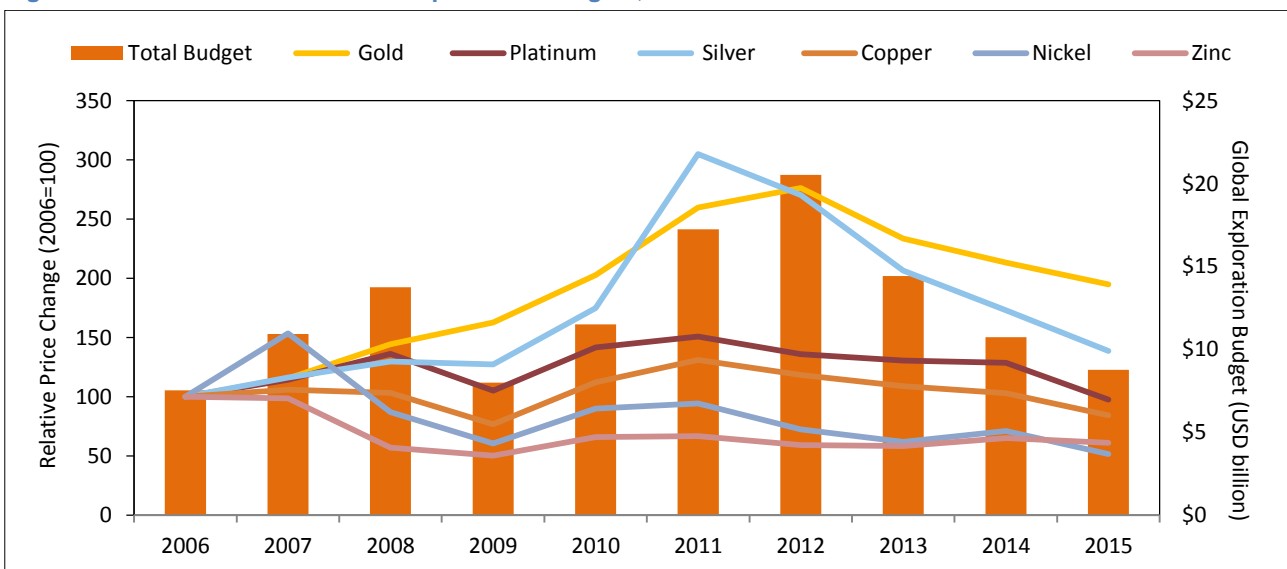
In the EU, Scandinavia and Poland comprise the region's traditional exploration destinations. In the past decade, Greece and Spain saw their exploration sector expand, only to be damaged by the great recession. Other promising areas are Ireland – rich in zinc-lead and now gold thanks to Conroy Gold & Natural Resource's exploration in the country – as well as Serbia due to copper prospects that have attracted junior companies and major Freeport McMoRan.

Exploration expenditure by mineral/metal

Historically, gold has attracted the highest levels of exploration expenditure, followed by base metals; largely driven by the global price levels of these (Figure 3).

Gold remained the most attractive target in 2015, accounting for 45% of the global budget total — up from 43% in 2014. The base metals share slipped by 1% year on year to 33%. The uranium budget continued to decline since 2011, with its share down 19% to 3.8% from 4.7% in 2014. The PGM allocation was down to USD 120 million after being more than halved in 2013, and its share has slipped almost 13% year on year to 1.4%. The budget for other targets (including silver, molybdenum, cobalt, tin, mineral sands, potash/phosphates, lithium/rare earths, chromite and some industrial minerals) is down to USD 1.09 billion from a 2012 peak of USD 2.75 billion, but remained steady year on year at 12.5% of the global budget.

Figure 3 Annual Metals Prices and Exploration Budgets, 2006-15



Source: SNL Metals & Mining

EU as an exploration expenditure destination

The EU's share of global exploration expenditure has been low for the last decade, and the uptick in budgets that occurred during the commodity price boom was largely seen for regions other than the EU. EU headquartered companies were more active in the exploration space than their American, Chinese (where data is reported) and Japanese counterparts, but less than 13% of the exploration budget was allocated domestically (Table 2). China and Australia allocated more than half of the share of their exploration expenditure domestically, with Canada and the United States focusing on international jurisdictions. Japan, as expected, allocated nearly all of its expenditures in other countries.

Table 2 Domestic Allocation of Exploration Expenditure (2015)

Location of headquarters	Total budget (USDM)	Total non-domestic budget (USDM)	Allocated domestically (%)
Canada	2,792.7	1,828.1	35
Australia	1,416.7	630.0	56
United States	501.6	290.8	42
China	734.1	222.6	70
Japan	148.1	141.5	5
EU	815.6	711.1	13

Source: SNL Metals & Mining

Different countries have different geographical areas, mineral potential, regulations and legislation that affect exploration activities and business risk. To compare the levels of exploration expenditures across countries, it is useful to look at the exploration budget per square kilometer, which is a ratio the country's land mass and the exploration budget total. According to SNL estimates, the most intense exploration investment, in 2015, were undertaken in Nevada (USD 1,040.3/km²) followed by Chile (USD 813.4/km²) and Peru (USD 390.4/km²). Finland and Sweden, the main recipients of exploration expenditures in the EU, were at USD 197.5/km² and USD 117.3/km² respectively. Burkina Faso, Ghana and Bolivia had higher per kilometer square EEBs than these European countries.

Of the exploration companies SNL was able to track², there were 30 Canadian and 20 Australian headquartered companies conducting exploration activity in the EU in 2015. One Japanese company, Sojitz with a budgeted USD 0.2 million was recorded, conducting mine site exploration for tungsten in Portugal. No US headquartered company reported to budgeted exploration expenditures in the EU region for 2015.

There is a great deal of variance in the mineral sector investment attractiveness of EU member states. Each EU member state surveyed in the Fraser Institute Mining survey (Table 3) received a more preferable ranking in the policy perception index than it did in the overall Investment Attractiveness Index. Indeed, the EU is the only region to have three countries in the top ten (Ireland = 1, Sweden = 3, Finland = 5).

Table 3 Ranking of EU Countries in the 2015 Fraser Institute mining survey

Out of 109 countries surveyed	The Investment Attractiveness Index	Best Practices Mineral Potential index	Policy Perception index
Bulgaria	63	78	46
Finland	5	15	5
France	80	97	49
Greece	106	106	93
Ireland	4	17	1
Poland	57	78	33
Portugal	22	45	16
Romania	67	54	73
Spain	48	6	35
Sweden	13	35	3

Source: Fraser Institute (2015)

Ireland and Greece can illustrate the contrast between member states as investment destinations.

Ireland – Ireland was ranked first in the policy perception index, reflecting a concerted effort by the country to attract mineral investment. The Minister of State responsible for natural resources noted that the country has revised its mineral policies to ensure it has low levels of regulatory duplicates and inconsistencies, as well as a good taxation regime³.

² Information on state owned Chinese and Japanese company expenditures are not regularly reported and difficult to track.

³ <http://www.dcenr.gov.ie/news-and-media/en-ie/Pages/PressRelease/Ireland-first-in-the-world-for-attractiveness-of-mining-policy-to-industry.aspx>

The country has also furthered the quality of its geological database. The Department of Communications, Energy and Natural Resources have enacted a policy of free release of company data. In 2014, this resulted in the publication of 321 exploration reports and 5,500 drill hole logs. The Geological Survey of Ireland has also recently completed its Tellus Border project⁴, which extended the geological information from Northern Ireland into the border counties of Ireland.

Greece – On the other end of the scale, Greece was ranked 106 out of the 109 countries surveyed in the Fraser Institute mining survey 2015. Greece has had disputes with mining companies, most notably with Eldorado Gold, a Canadian gold mining company with four operations in Greece. Eldorado is one of the largest foreign investors in Greece, having invested over USD 700 million since 2012⁵.

Greece's Environmental minister denied Eldorado a mining licence on the grounds of environmental regulations violations. The Council of State, Greece's highest administrative court, annulled the decision. However, the Greek ministry responsible chose to ignore the court's ruling. As a result, Eldorado suspended its investment plans for its Greek operations and accused the government of using its mineral licensing as a political tool.

EU as an exploration expenditure destination in the future

Given the fluctuations in the exploration sector over the past decade, discussed above, the following analysis covers exploration budgets for commodities of interest to the STRADE project (copper, gold, iron ore, lead, nickel and zinc) over the next five years. The forecast is based on expected global GDP growth (including the slowdown of the Chinese economy), reported and inferred exploration expenditure by the mining industry (with emphasis on the juniors), and the continued expectation of weak metal prices.

Global exploration expenditure budgets to increase from 2017

Exploration expenditure is expected to increase between 2017 and 2020. SNL does not expect growth to be as strong as the last boom cycle (2003-2012) due to continued economic instability and weakening Chinese demand.

2015 was the third consecutive year of industry doldrums, which followed a decade of robust investment and growth in the mining sector. This directly led to increased production levels exceeding demand for most metals, driving most metals prices significantly lower. In addition, high levels of political turmoil and a slowing Chinese economy left investors understandably wary of the mining industry.

Following such a gloomy period, the first quarter of 2016 saw a strengthening of metals prices, giving hope to a struggling mining industry. Despite the increase, weak price outlooks and China's slowdown caused the International Monetary Fund to drop its global growth forecast from 3.5% to 3.2%. With continued uncertainty in the industry, SNL projects a net decrease of 16% in EEB for 2016.

As supply increasingly becomes balanced with the more modest global demand for commodities, metals prices are expected to slowly recover, leading exploration expenditures to increase between 2017 and 2020. SNL does not expect growth to be as strong as the last boom cycle (2003-2012) due to continued economic instability and weakened Chinese demand.

In 2017, SNL forecasts a modest EEB increase of 6% as investors wade back into the industry and junior explorers are able to attract much needed capital. As confidence and metals prices improve, exploration expenditure in 2017-2020 will ramp up globally with year on year increases averaging 12% for the period to reach USD 11.64 billion.

EU-focused exploration expenditure to grow at an average 8% year on year

For the period 2016-2020, SNL expects Canada⁶ and Africa to see the most growth in EEB at an average of 15% year on year, with Australia close behind at an average of 13%. EU exploration will grow more cautiously due to the region's economic woes as well as its relatively small junior sector – a sector which propels EEB during boom periods (as outlined in the previous section on the importance of the junior). Without change to the EU's mining regimes structures, including support for the junior explorers, SNL expects the EU's exploration expenditure to grow at an average of 8% over the period, on par with the Other Areas⁷ region and just ahead of the USA's 7% average year on year growth (Figure 4).

⁴ <http://www.tellusborder.eu/>

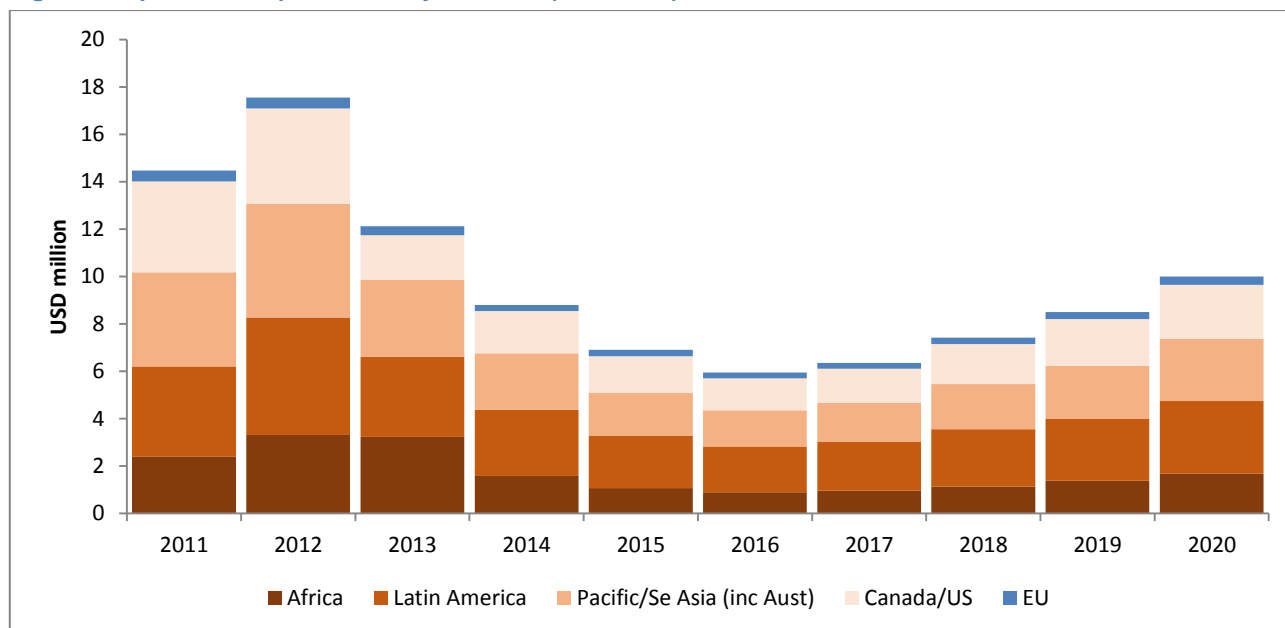
⁵ <http://greece.greekreporter.com/2016/02/24/rift-between-greek-environment-minister-and-canadian-mining-company/>

⁶ SNL treats Canada, Australia and the United States as regions due to their robust exploration sectors.

⁷ Other Areas includes non-EU European countries, former Soviet Union countries, Middle East and most of mainland Asia.

The EU accounted for 3% of global EEB in 2015; like most regions, SNL does not expect the EU's share to change substantially by 2020. The Other Areas region is predicted to decrease from 16% in 2015 to 14% by 2020 and for Canada's share to increase from 11% to 13%.

Figure 4 Exploration Expenditures by Location (2011-2020)



Source: SNL Metals & Mining

Conclusion

Exploration expenditure budgets in the EU over the past decade have been comparatively lower than other budgets worldwide and, given the current environment, are not expected to pick up considerably in the coming years.

As part of the STRADE project, the research team will be providing recommendations to the EU to attract greater investment to the region. The EU does have certain advantages to offer, including a stable political climate and legislative framework, strong transport and infrastructure networks and strong investment into R&I – especially from public funds. While attractive as a general business environment, the EU may need to develop more specific actions to support the junior sector, which plays a crucial role in exploration activity.

The EU's geo-potential knowledge base and access to such information has been weak⁸. The scoping study for a European Mineral Investment Platform may potentially increase cooperation with the private sector to develop the EU's mineral resources⁹. Additionally, projects such as the Minerals4EU¹⁰, which developed the EU Minerals Knowledge Data Platform, and MICA11 which looks to develop an ontology-based European Union Raw Materials Intelligence Capacity Platform, aim to support better access to geological information.

This policy brief located the current and expected position of the EU within general exploration expenditure budget trends. Future reports will explore possibilities for increasing EU attractiveness as a mining destination.

⁸ http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=8237&lang=en&title=Study-on-the-Competitiveness-of-the-EU-Primary-and-Secondary-Mineral-Raw-Materials-Sectors

⁹ <https://ec.europa.eu/growth/tools-databases/eip-raw-materials/en/community/document/european-minerals-investment-platform-discussion-paper>

¹⁰ <http://minerals4eu.brgm-rec.fr/>

¹¹ <http://mica.eurogeosurveys.org/>

Project Background

The Strategic Dialogue on Sustainable Raw Materials for Europe (STRADE) addresses the long-term security and sustainability of the European raw material supply from European and non-European countries.

Using a dialogue-based approach in a seven-member consortium, the project brings together governments, industry and civil society to deliver policy recommendations for an innovative European strategy on future EU mineral raw-material supplies.

The project holds environmental and social sustainability as its foundation in its approach to augmenting the security of the European Union mineral raw-material supply and enhancing competitiveness of the EU mining industry.

Over a three year period (2016-2018), STRADE shall bring together research, practical experience, legislation, best practice technologies and know-how in the following areas:

1. A European cooperation strategy with resource-rich countries
2. Internationally sustainable raw-material production & supply
3. Strengthening the European raw-materials sector

Project Identity

Project Name	Strategic Dialogue on Sustainable Raw Materials for Europe (STRADE)	
Coordinator	Oeko-Institut; Doris Schueler, Project Coordinator, d.schueler@oeko.de	
Consortium		
	OEKO-INSTITUT E.V. – INSTITUT FUER ANGEWANDTE OEKOLOGIE	
	Merzhauser Strasse 173, Freiburg 79100, Germany	
	SNL Financial (AB)	
	Olof Palmes gata 13, Se -111 37, Stockholm, Sweden	
	PROJEKT-CONSULT BERATUNG IN ENTWICKLUNGS-LAENDERN GMBH	
	Laechenstrasse 12, Bad Vilbel 61118, Germany	
	UNIVERSITY OF DUNDEE	
	Nethergate, DD1 4HN Dundee, United Kingdom	
	GEORANGE IDEELLA FORENING	
	Box 43, Mala 93070, Sweden	
	UNIVERSITY OF WITWATERSRAND JOHANNESBURG	
	Jan Smuts Avenue 1, Johannesburg 2001, South Africa	
	DMT-KAI BATLA (PTY) LTD	
	P.O Box 41955, Craighall, 2024, South Africa	
Funding Scheme	This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689364	 Funded by the Horizon 2020 Programme of the European Union
Duration	1.12.2015 – 30.11.2018	
Budget	EU funding: €1 977 508.75	
Website	www.STRADEproject.eu	

The views expressed in STRADE Policy Briefs are those of the respective author(s) and do not necessarily reflect the views of all the STRADE Consortium members. The European Union is not responsible for any use made of the information in this publication.