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# The Crucible

## Price Providers Respond to Members' Questions

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The magazine of the Minor Metals Trade Association

5th Edition 2015/November www.mmta.co.uk

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# IN BRIEF

## Welcome to Our New Team Member

We would like you to join us in welcoming our new p/t Administrative Assistant, Gillian Amadi, who many of you will have met at the recent MMTA Anniversary Dinner. After a period of acclimatisation, Gillian will assist the Executive Team in further developing the Association's activities. Gillian has a degree in Chemical Engineering, and a background in IT.

## NEW MMTA MEMBER

## BTG Pactual

BTG Pactual is the largest investment bank in South America, headquartered in Brazil with an equity in excess of USD 25 Billion. Two years ago BTG Pactual Banking decided to enter the commodity space creating a trading company with offices across the globe, today we have five hundred people in the trading group. We handle Cobalt, Nickel, Copper, Tin, Tantalum, Tungsten, as well as Copper/Lead/Zinc Concentrates. We can offer both spot and long term contracts with significant inventory to back our sales.

**Primary contact:** Tony Southgate

**Email:** Tony.Southgate@btgpactual.com

**Website:** http://www.btgpactual.com

**Phone:** 0207 016 1113

## Exotech, Inc. welcomes a new team member

Exotech, Inc. (Pompano Beach, FL USA) is pleased to announce the addition of Joel Nields to their sales team. His 10 years of experience with Ta, Nb, and V will complement Exotech's pre-existing business in these areas, as well as expand their suite of minor metals to include Hf, Zr, Re and their alloys. Exotech also specializes in Mo, W, Ti, In, Ge, Ni, Co, Cr and Ir scrap metals.

Exotech, Inc., a CFSI Certified Tantalum Smelter, is a major supplier of minor metals and high temperature alloys. In addition, they manufacture high purity Chromium Powder for the electronics and solar industries. Celebrating its 25th anniversary, Exotech will soon be opening a new ICP Laboratory (Nov. 2015) and its 3rd processing facility (Q1, 2016). This will expand their existing physical, thermal and chemical processing capabilities.

See photos from our recent MMTA Anniversary Dinner

https://www.flickr.com/gp/130001963@N06/NC8jHe

## INSIDE THIS ISSUE



**The MMTA promotes essential elements that add quality, safety and enjoyment to our lives.**

The MMTA is the world's leading minor metals industry organisation.


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## What attendees had to say about our 2015 Conference:

*"A great opportunity to meet with customers, suppliers and colleagues. The key factors for us attending the conference are the wealth of information provided by the speakers and a convenient method to interface with the key individuals in our in businesses.."*

**Matt Danish, Telex Metals , USA**

*"The Conference is well-organized, industry attendance is excellent, and the presentations are relevant and interesting. From a trader's perspective, it not only provides insight into new business opportunities but also delivers a platform where you can meet the partners necessary to embark on a new project."*

**Melvin Hill, Aminco Resources , USA**

*"We get to meet up with all the suppliers of our strategic materials in first class surroundings at a well organised topical conference."*

**Wavell Coulson, Rolls-Royce Plc, UK**

*"There is a large gathering of our clients within one location giving the opportunity to meet with and or be available to our clients within a specified time frame...the opportunity to meet with potential new clients also at the same time and learn about their businesses."*

**Paul Chew, Alfred H. Knight, UK**

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# EU Critical Raw Materials Seminar, Stuttgart Report

Critical Raw Materials (CRMs) are increasingly being referred to in political policy. The MMTA and the IMA (International Magnesium Association) organised a seminar in September kindly hosted by the German Aerospace Center's (DLR) Institute of Vehicle Concepts, Stuttgart aiming to inform and educate Members and Associates on what the European CRM list means for their businesses.

Maria Cox, MMTA General Manager, introduced the seminar and placed it within the context of the role of the MMTA to inform and educate on the topical issues affecting the minor metals sector, as well as to participate in the debate around future CRM policy developments. Christian Payn from IMA then gave an introduction to magnesium, its uses and supply issues. During 2014, for example, there was around 900,000 tonnes of primary production with 84% produced in China.

From the DLR, Simone Ehrenberger introduced this German national research institute which is engaged in projects relating to transport and aerospace, including new materials and concepts for road vehicles and railway. Areas of research interest include new technical solutions such as economic and environmental assessments, as well as sources of the raw materials employed in developing vehicle solutions.

**The German political approach to the importance of CRMs**

Dr. Christian Kühne of the Ministry for Environment, Climate and Energy, Baden-Württemberg stressed the importance of critical raw materials for Germany, and for the region in particular. Manufacturing is a significant contributor to Germany's GDP, at around 22%, a much higher percentage than for most European countries, with the figure for Baden-Württemberg being even higher, at 35%.

Within that figure, material costs make up 43% of the manufacturing cost, therefore there is a keen interest in maintaining the supply of those critical raw materials essential to the German and Baden-Württemberg manufacturing sector.

There has been a massive increase in the number of elements used over the past century and by 2030, there will be a need for in excess of current world supply in many elements, for example gallium and indium, in order for technology to develop and meet its potential in the way they would like. There is high raw material demand for emerging technologies, for example photovoltaics and permanent magnets. If there is a shortage of raw materials for these applications then technological innovation will be impeded. Therefore government policy needs to consider this.

The German government currently has several programmes on raw materials including the government's Raw Materials Strategy, using policy instruments, encouraging material efficiency and establishing a specific mineral resource agency, the 2012 Resource Efficiency Programme, which helps German companies secure supply of raw materials.

The Baden-Württemberg region itself has done a strategic study on material flows for companies based in the region, categorising their relevancy for the local economy. The region has identified 29 economically relevant raw materials. The resource strategy for the region is to decouple economic growth from resource consumption and to establish secure and sustainable materials supply. Strengthening the Circular Economy is also a focus; Baden-Württemberg has already engaged in stakeholder dialogue and workshop on the subject.

**EU Policy and CRMs**

Alexis Van Maercke from DG Grow talked about the EU policy towards CRMs, highlighting that the German approach outlined by Dr Kühne holds many similarities.


The third CRM list will begin preparation next year with a methodology review scheduled. It seems likely, however, that in order to compare with the previous lists there will not be any major changes. Alexis explained how the CRM list is used as a policy tool and has been the inspiration for similar lists in other European countries, as well as Japan and the U.S.A. The audience was informed that funding from Horizon 2020 has a category on new technologies for the enhanced recovery of by-products for 2016.

The audience posed some questions to Alexis: Martin Tauber, President of the CRM Alliance, asked for clarification on whether 'Associate' countries would be treated like EU Members in terms of funding. It was confirmed that Associate countries, such as Norway, Turkey and Serbia can apply for funding equal to EU-member states. Another participant asked about the EU's approach to the Circular Economy. Alexis was able to confirm that the EU Commission is developing a proposal towards the Circular Economy by the end of the year, with legislation expected within one to two years.

**Supply risks and economic importance**

Looking more deeply at the CRM methodology was Dr. Frank Marscheider-Weidemann from the Fraunhofer-Gesellschaft in Germany. The Institute worked on the previous CRM list methodology and has studied dynamic materials flow modelling, including how technical changes influence demand for raw materials.

Dr. Marscheider-Weidemann explained why materials move on and off the CRM list. Reasons include:

- Changes in the end-use structure (or end-use data)
- Changes in the "value added" assigned to the mega sectors. Ie whether a particular sector has more or less economic importance
- Changes in Supply risk: closing, re-opening and establishing of primary production
- Changes in the concentration of production
- Changes in governance / environmental performance rating of producing countries
- Changes in recycling rates
- Changes in assessment of substitutability

He was also able to give conclusive advice on what the list does and does not do in terms of how it should be viewed and used. The list provides transparent estimates for the relative ranking both in supply risk and economic importance, but only gives a relative ranking at one point in time. Raw materials are considered on the basis of their economic benefit to society and it considers all the uses of the raw material. Secondary raw materials are explicitly acknowledged for their contribution to society. A controversial point for the audience was the emphasis on the importance of substitution.

The list does not provide a view into the future, consider the effect of market size (e.g. scale of problem and rate of change of indicators) or explicitly consider the interdependence between different metal markets (either on the supply or the demand side).

Christian Payn asked Dr. Marscheider-Weidemann about the substitution of magnesium in some aluminium alloys and the effect of this on the industry. The response acknowledged the difficulties of taking into account the quality of a material and the possibility of looking deeper into this.

The final speaker in the morning session was Heleen Vollers, the Coordinator of the CRM Alliance. Heleen explained the role of the stakeholder group in promoting and protecting the interests of those involved in CRMs. The group works together to provide relevant information to the EU policy makers on CRMs, such as the European Commission, Members of the European Parliament, important mining country representations to the EU and downstream users of CRMs. The Alliance has organised events on how CRMs should be considered in terms of industrial and trade policy and REACH. The group now covers 15 of the 20 CRM materials and has been granted observer status at various EU raw material groups. The EU needs input from industry to make the right decisions, and the Alliance is working hard to provide this.

During the afternoon, companies had the chance to explain what it meant to them to produce or use materials that are classified as critical. Martin Tauber called for consideration of the end usages of these materials and how they contribute to peoples' lifestyles. He also encouraged the audience to reflect on how innovation might have developed if primary production and a secure supply of these often extraordinary materials had been supported and established in Europe.


The case studies looked at different elements of supply risk and economic importance for Europe. European primary production of Mg in Turkey was looked at first with Eczacibasi ESAN, a new Turkish Magnesium producer that has recently started production, talking about having a supply of this critical material from Europe, reducing the reliance on China and other regions. Turkey is associate EU member, with shorter transport distance meaning lower emissions and material from an ISO certified site. Ilhan Goknel mentioned that the first CRM report in 2010 was the trigger for their magnesium project in Turkey.

Mark Saxon from Tasman Metal, the Swedish rare earths project, talked about the difficulty of developing primary production in Europe. He said that the rare earth industry has had far too much attention in comparison to its size in recent years, with the rare earth crisis being a political issue and not to do with the supply in the ground. The aim of Tasman is to establish a secure and stable REE supply in Europe away from the dominance of China, where the quality of the product may be low and the environmental impact high. Traditional mining investors have moved on to tech and pharmaceutical start-ups. In Europe land access is a huge issue, as well as poor shareholder returns. In order for Europe to stay competitive it needs to be active in small high value markets.

Armin Buschhausen, MD, Cellmark Metals Germany gave the attendees a unique perspective of criticality from a trader's point of view. He talked about supply risks including the pricing of materials in USD and the volatile small markets of many of the CRMs. Most metals, and indeed commodities in general, have low prices at the moment, but Armin also believes that there are more opportunities than risks working with China. He also highlighted some specific examples of trade issues and restrictions such as EU anti-dumping policies on silicon being very beneficial for some local producers.

Claire Mikolajczak from Indium Corporation looked at the state of the indium market. Indium Corporation has a factory in Asia as 90% of the ITO (indium tin oxide) market is in Asia. Claire talked about free trade and fair trade in terms of indium. She also discussed the opaqueness of the industry and the scarcity of information available to policy makers, meaning that they have to make decisions on limited and incomplete data that is sometimes out-of-date. Claire was clear that consultation with industry is essential.

A closing question from the audience focused on whether the Earth can provide the resources we need into the future? The panel agreed that generally higher prices lead to more sources, as they become economically viable and that shortage of supply is generally due to prices rather than lack of resources in the ground.

The MMTA and IMA would like to thank all the speakers and attendees at this seminar; we look forward to welcoming you again to another insightful and informative event on prominent issues affecting your businesses.

**Tamara Alliot,** MMTA

# Securing the Material Processing Capability for Manufacturing

The second largest Blast Furnace in Europe, and the associated coke ovens, have now been shut down – for the second time in less than 10 years. Could this be because they have the misfortune of being located in the UK rather than in a country that considers steel making to be an integral part of a modern manufacturing economy? It is true that a lot has changed since Bismarck's suggestion that a nation is founded on 'Iron and Blood", but the study by PWC in 2014 suggested that the 'Foundation Industries' continue to play an important role in modern economies – beyond the simple value of their direct outputs. This article is not a comment on the specific situation at Teesside – that would require much more detailed analysis. Nevertheless, the Teesside closure follows the shutdown of two primary aluminium smelters in the UK in the last 10 years, so I believe that it is important to consider the position of metal production and other energy intensive industries in developed economies.

The UK's economy was built on the development of mineral resources that supported the establishment of an economy based on manufacturing. Since then, as global sources of minerals have been developed, many of the metal production operations that had been established in the UK have shutdown, with production moving to overseas locations with better access to mineral resources and/or lower costs. However this has not been a global trend. Despite having virtually no mineral resources and high labour costs, Japan has maintained its metal manufacturing industries – they are regarded as important components of the advanced manufacturing supply chain.

Globalisation has resulted in many changes, and there are few nations that seek to be completely self-sufficient. Nature has dictated that some countries are better endowed with mineral resources than others, and the important factor now is that these should be developed in ways that are commensurate with sustainable development of the global economy. Each country must analyse how its specific strengths can be employed in the global system. Although countries such as France, Germany and Japan do not have world-class deposits of certain minerals, this has not prevented them from continuing to produce the relevant metals from imported raw materials. One European metal producer, Umicore in Belgium, has converted from the use of primary resources to the utilization of a range of secondary materials.

If a country is to strive to be a manufacturer of products that utilize a range of metals, there is some advantage in having some supplies from local producers (short supply chains, shared knowledge, collaborative innovations, etc.). If there are no local suppliers, the justification for the location of the manufacturer could be questioned. Why not manufacture closer to the source of the materials required (especially if those countries offer incentives to do so)?

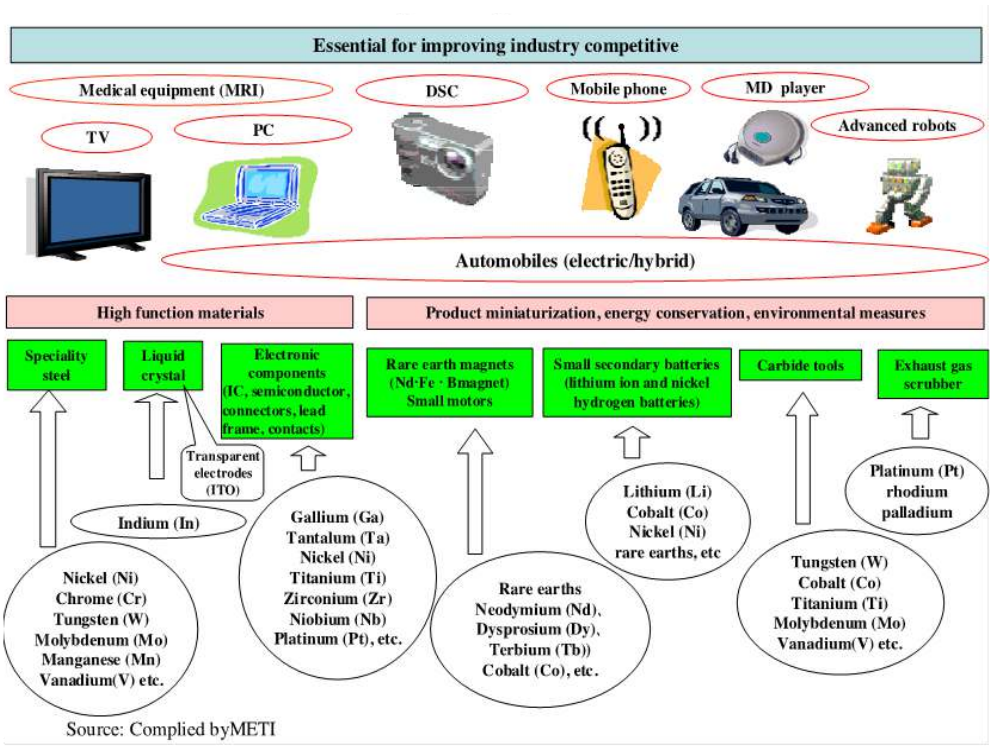
The MMSD study on sustainable development of the minerals and metals industry– 'Breaking New Ground' – suggested that the efficient utilization of the five forms of capital should be considered: -

- Natural
- Social
- Human
- Physical
- Financial

In a facility such as the steelworks at Teesside there has been a significant investment in the facilities, infrastructure and human resources required to operate a modern steelmaking facility. How do we account for the loss of these investments? When such a unit closes, it is not just the value of the output, and its multiplication effect in the local community and down-stream industries, but there is a danger that a capability is lost. It is not surprising that at this stage of the economic cycle and with the uncertainty over energy and environmental costs for steel production in the UK that there has been no commercial interest in taking over this facility.

Of course the loss of energy intensive industries may have a beneficial impact on the apparent direct GHG emissions from an individual country (and contribute to the UK meeting its Climate Change Commitments) but in a global context this is may be an illusion – there could be a negative impact dependent on the Life Cycle Impact Assessment of the impact of the imported materials/products that replace the lost production.

Some countries consider the strategic importance of their metal producing facilities. This allows the metal producers to work together with the government to ensure that the capabilities are in place. It could be argued that a country with no strategy is effectively penalizing metal production in their territory. Without a clear strategy, there is a real risk that the remaining metal production facilities could move offshore and that industries that rely on special alloy supply - aerospace, automotive, etc. could follow.



This is not intended to be a 'Luddite' appeal against progress, modernization or globalisation. Advanced technologies like 'Additive Layer Manufacturing' offer exciting prospects, but we must not forget that this is a technology that is dependent on the capability to produce high specification input materials for advanced applications like aerospace. It is important that each country makes the best use of all of its overall resources and capabilities. However it is important to recognize that there are a wide range of materials that are used to produce the machines and systems that deliver the services required in an advanced economy. It is suggested that the strategic impact of the loss of any material production capabilities should be analysed carefully before it is allowed to wither away. A careful analysis should consider ways of mitigation against any major adverse impacts identified.

The House of Commons website repeats information in Briefing Paper Number 07317 on 'UK steel industry statistics and policy'. This presented a summary of the Manufacture of Iron and Steel in the UK in 2014: -


**Sources:** MMSD; 2002. "Breaking New Ground', http://pubs.iied.org/pdfs/9084IIED.pdf

PWC; 2014 'Understanding the Economic Contribution of the Foundation Industries', http://www.tatasteeleurope.com/static_files/StaticFiles/Functions/Media/Foundation_Industries_Report.pdf

House of Commons, 2015, 'UK steel industry: statistics and policy,' http://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7317#fullreport

Federal Ministry of Economics & Technology. 'The German Government's raw materials strategy', http://www.bmwi.de/English/Redaktion/Pdf/raw-materials-strategy,property=pdf,bereich=bmwi2012,sprache=en,rwb=true.pdf

JOGMEC, History of JOGMEC, http://www.jogmec.go.jp/english/about/about003.html


**These are the personal views of Tony Hartwell, an extractive metallurgist who has worked across the resource supply chain in more than 35 countries over 40 years. He now works part-time with the Knowledge Transfer Network.**

| | Total | % of UK |
|---|---|---|
| Economic Output (£, million) | 1,690 | 0.1 |
| Businesses | 465 | 0.04 |
| Employees | 34,500 | 0.1 |

The figures above are the direct outputs from steel production, but steel is used in many applications – enabling the construction of buildings and the manufacture of machinery and transport systems – all of which deliver added value. It is true that at present the steel required may be imported more cheaply than it was being produced at Teesside. If the same logic is followed then all metal production in the UK might be terminated. UK product manufacturers would then be solely reliant on imports. What would this mean for the structure of the economy?

It is not just the output that is lost when a metal producing facility is closed permanently – the capability to produce the materials required by the manufacturing industry is also lost, as is the capacity for manufacturer and material supplier to support collaborative innovation in local supply chains. In times of plenty this may not appear to be an issue, but during disruptions to the global supply chains this would be a concern.

The UK Government has acknowledged the importance of the steel sector – indeed the future supply of materials for the manufacturing sector is worthy of detailed analysis. If the aim is to re-balance the economy and develop the manufacturing sector, the capability to supply the materials required will need to be critical factor. National governments have a duty to create the conditions for the national economy to thrive and ensure the development of the appropriate infrastructure. In addition to the structure for the supply of utilities, energy, water, ICT, it is vital that a strategy for the supply of materials required for the manufacturing industry is in place. In the past this was considered to be critical for military reasons – it is still vital to ensure the supply of the materials in the form required by the advanced manufacturing industries (aerospace, automotive, machine production, etc.). There have been a lot of studies on the supply of Critical Materials, but it is important to recognise that the capability to convert them into the forms required is equally important.

The report produced for the German government is a good example of an effective strategic approach, and the Japanese government has recognised the importance of the materials supply chain for many years and has a national agency to coordinate action (JOGMEC).

History will castigate any government that through a lack of vision presides over a withering away of the capabilities to produce materials in the forms required to supply a sustainable national economy. This would surely be viewed as a dereliction of duty.

## Aluminum could boost lithium-ion battery power

Researchers from the Massachusetts Institute of Technology (MIT), Cambridge, and Tsinghua University, China have come up with a possible solution to the problem with electrodes in rechargeable batteries. An electrode goes through repeated cycles of charging and discharging, which means that it shrinks and expands during each one of these cycles. This change in volume causes the skin layer to shed and reform, damaging the battery's performance over time.

The researchers have an unlikely inspiration for their solution: the humble egg. They have created an electrode made of nanoparticles with a solid shell, and a yolk inside that can change size again and again without affecting the shell. The yoke is made from aluminium rather than the more commonly used graphite, with the nanoparticle shell made from titanium dioxide; this combination appears to be the most effective.

Aluminium is a low-cost solution with a high capacity, but it needs the shell because of the expansion and contraction of the aluminium particles. The shell remains stable, so the aluminium is protected from the electrolyte in the battery.

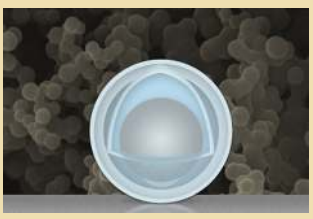


*Image courtesy of Christine Daniloff/MIT.*

The most exciting aspect for the research team is that the manufacturing process appears simple and easily scalable, and they are confident that not only could battery cycle life be drastically improved, but the battery's capacity and power can be dramatically increased.

To read a full report on this development see: ASM International: http://www.asminternational.org/search/-/journal_content/56/10180/25668348/NEWS

# To Hf or Hf not – Who cares about Hafnium?

Perhaps the recent history of hafnium answers the question – 'What are minor metal merchants for?'

A minor metals trader of the 1970s, it is fair to say, could safely get through his career without breathing the two letters –'Hf'. After all, the element was only first separated in 1923 and has few uses even today. If pressed, today's traders of more voluminous elements, such as cobalt or molybdenum, probably know there is a market in hafnium, but would not be tempted to go as far as to trade it.

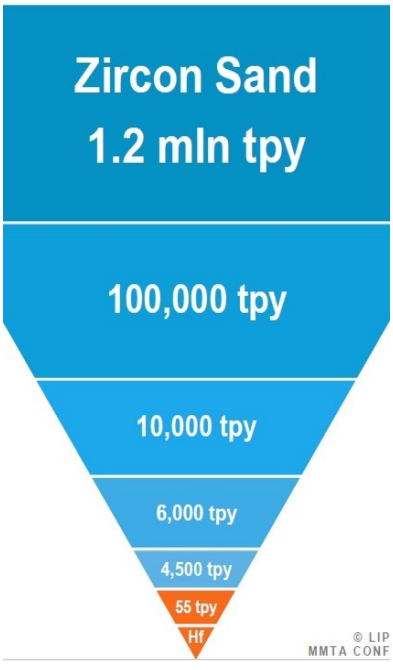
If they know something about it, it might be its application in the strategic world of nuclear physics where hafnium's property of repelling neutrons means it is used in control rods to slow the nuclear reaction. Perhaps they would also know of hafnium's high melting point of 2233°C. But, today, applications are moving on swiftly. Not a hundred years since its discovery, hafnium now has two growing non-nuclear uses: in plasma cutting tips and as an addition in directionally solidified alloys and single crystal alloys for the hot parts of gas turbine engines. In the former, a tiny tip made of hafnium is needed to survive the high temperatures generated by a spark between a negative electrode and the metal to be cut. In DS alloys the Hf migrates to grain boundaries, pins them, preventing movement/cracks/fracture/fatigue.

All well and good – 'Let's mine more hafnium', you might think; except that minor metals are rarely substances to be bought 'off-the-shelf' like Heinz Baked Beans. And in the case of hafnium, there are no hafnium mines, which makes it a rather longer journey from bean to can.

As with so many ultra-minor elements, metallurgists and engineers tend to devise outstanding uses for metals that can transform an industry. However, the same materials scientists are not paid to be concerned where they come from. Such is the case of hafnium, where its growing use in complex alloys is gradually leading those who use it to ask – 'Where does hafnium come from?' and 'How much of it is available in the form needed in the market?'

So where does hafnium come from?

In nature, while rare, it is not the rarest – 45th most abundant in the periodic table (compared to, say, rhenium, 77th) and it is found at 1 part to every 50 parts in zirconia (Zr:Hf 1:50). With 1.2 mln tons of zirconia mined each year, there should be plenty. In fact, at 65% ZrO2 in zirconia, there should be 15,600 mt of the stuff. So why is there only about 55mt produced per year?




It is, actually, a frustratingly simple question to answer – and it is to do with the zirconia, not the hafnia. For, in all zirconia's main uses (ceramics, refractory bricks, catalyst substrates and others) hafnia is not deleterious. Therefore, it is simply not removed.

The only time hafnium is recovered, is when nuclear grade zirconium is required. So, let's go back to our nuclear reaction. In the nuclear reaction, neutrons are used to bombard the weak uranium atoms causing the atom to split and release further neutrons which split further uranium atoms (the chain reaction). Only hafnium-free zirconium may be used in the fuel assemblies which are used to contain the uranium – because hafnium would block neutrons and slow the reaction.

It is something of a startling fact to think this is the only reason that hafnium is commercially generated, which is in turn the cause of the inelasticity in the market. Removing hafnium is a costly process and, at the time of writing, no other route to its production is conceived of. Talk of Hf's presence in mines in Australia or elsewhere is irrelevant, as that is not where the shortage lies. The world is reliant not on a mine but a process – and because of the nuclear industry's strategic significance, it is a process at present only carried out by the great nuclear powers – USA, France and, to some extent, Russia. China is trying to de-hafniate, but is not there yet. There are no cottage industries producing hafnium.

Even so, all would perhaps have been well. After all, the nuclear industry was, until recently, in something of an upturn and the need for more nuclear grade zirconium ought to have generated more hafnium. But then it was hit by one big and unexpected factor. Following the Fukushima Tsunami in March 2011, the world briefly stepped back from nuclear power. Japan closed all 48 reactors and Germany pledged to remove all of theirs by 2022. In other parts of the world, the so-called nuclear renaissance was stopped in its tracks.

From 6000mtpy of zirconium production, the industry slimmed to not more than about 3000 mtpy, and with less zirconium metal production, there is a lid on hafnium by-product. Meanwhile, the 55mt output expected will be easily consumed in turbine alloy orders, not to speak of plasma cutting tips and the few other minor areas hafnium is used in.

Meanwhile, its growing use in superalloys is easy to understand. As turbines run hotter, substances that assist engines to withstand high temperatures increase in demand, and hafnium-bearing alloys are being used to increase engine efficiency and reduce emissions. Key to this development is the application of a series of alloys devised by Martin Marietta Corp, of which MAR M 002 and MAR M 247 (Hf 1.5%) are best known. In fact, so far has engine design travelled, that it is today inconceivable that an industrial gas turbine could be operated without these alloys at the core of the engine.

So what is the correct role of the minor metal merchant in all this?

Well, companies like ours, who have been trading the metal for 20 years, took an interest in its supply-demand when there was no imperative to do so. This was not genius on our part – rather, when Russia/Ukraine first came to export such elements following the Soviet break-up in the 1990s, counterparties were needed to invest time and effort to find outlets for the often absurdly illiquid market of hafnium. At that time, it was illiquid in demand, today it is illiquid in supply; so today we find ourselves at least with sufficient trading experience to understand the relative grades, where to convert and who to sell to.

It is a minor, minor metal story and one to justify the much maligned world of metal merchants. Such markets require someone to take time to study them; but when all was going swimmingly for so many other elements, poring over supply/demand patterns of hafnium was more likely to get you put out to pasture than a pat on the back.

Twenty years ago, when my staff asked me for guidance on what they should say at the MMTA Dinner should anyone ask what we were trading, I said 'hafnium' (as we were not trading it). This year I have suggested 'lutetium'.

Well...who knows?

**Anthony Lipmann,** Lipmann Walton & Co Ltd


# LETTER FROM NORTH AMERICA

Dear Members

After a really very pleasant summer here in New York, fall seems finally to have come. At least the trees on my street are shedding leaves. Or maybe they're just dying.

And when it comes to dying, industry here in the U.S. continues to wish that the SEC's Dodd-Frank Act-related conflict minerals rule would do just that - die. There was quite a flurry of stories in the press here in both August and September around the rule, its legality and its effectiveness.

On the legal front, there was a rehearing in the U.S. Court of Appeals down in Washington DC over the question of whether companies have their rights of free speech under the First Amendment violated by the requirement that forces them to declare if their products are "conflict free". To the delight of many, and the dismay of many others, the court upheld an earlier decision that requiring such a declaration was, indeed, a violation of free speech under the First Amendment. As can be imagined, the SEC (which, albeit unvoiced, would really rather not have to have anything to do with all this), has said it is reviewing its position in the matter.

Also back in August, the U.S. Government Accountability Office reported to Congressional Committees on the SEC's conflict minerals rule. To leave no-one in any doubt, emblazoned across the front page of the report was its conclusion: "Initial Disclosures Indicate Most Companies Were Unable to Determine the Source of Their Conflict Minerals."

I believe it best for the GAO to speak of the results for itself: "Most companies were based in the United States (87 percent). Almost all of the companies (99 percent) reported performing country-of-origin inquiries for conflict minerals used. Companies GAO spoke to cited difficulty obtaining necessary information from suppliers because of delays and other challenges in communication. Most of the companies (94 percent) reported exercising due diligence on the source and chain of custody of conflict minerals used. However, most (67 percent) were unable to determine whether those minerals came from the DRC or adjoining countries (Covered Countries), and none could determine whether the minerals financed or benefited armed groups in those countries. " Needless to say, opinions differ widely on why this should be the case.

Finally, at the end of September, The Business Roundtable (an association of CEOs of leading U.S. companies) went to Congress with a plea over securities filings, asking that it stop adding rules requiring companies to make what they consider to be non-material disclosures. Amongst these rules is, of course, that covering conflict minerals. The roundtable's reasoning was two pronged. On the one hand, the materiality, i.e. use to investors, of such disclosures was, in its view, questionable. On the other hand, there was considerable (unnecessary) cost involved: "For those choosing to continue purchasing minerals that might be from the DRC, the SEC estimated that initial implementation of Section 1502 of the Dodd-Frank Act would cost public companies $3 to $4 billion."

For how long, and in what form, the SEC's current conflict minerals rule survives remains uncertain.

As everything runs its course, I remain, from a pleasant New York, with best wishes to MMTA members everywhere.

**Tom Butcher**, October 14th, 2015

# *"The Elements of Power"*

## A Q & A session with author, David Abraham

I recently had the opportunity to speak with David Abraham about his book "*The Elements of Power - Gadgets, Guns, and the Struggle for a Sustainable Future in the Rare Metal Age*" published by Yale University Press on October 27 this year.

In his book David tracks these "elements of power" as they wend their entwined ways from, say, in the case of niobium, Brazil, to a bridge in India. Or, in the case of indium, from China, to the screen of your iPhone. He tells the tales not only of those who produce the metals, but also of those who trade them and those who use them. And details just how and why we are, now, so dependent on them.

As he further explains, rare in their power and often rare in themselves, these metals, and what they enable us to do, have become inextricably woven into the fabric of both our lives and the world we live in. His book sets out to provide the wider context. And, perhaps most importantly, the responsibilities, on so many fronts, that we either do, or should, assume as an element makes its way, for example, from mine to magnet.

### Who is your audience?

I think that, essentially, the book is for people who do not realize the complexity of the products that they use every day. If you take the example, say, of a minor metals trader, I believe this book can help her explain to someone: "This is what I do and this is why it's important." It gives insight into the work that metals traders do. Too often, trading is just explained as getting some material from one place to another. But there's a deeper story in how metals move from the ground to our pockets. This book explains not only just how materials get from one place to another, but also how they got there in the first place.

The audience for this book is really quite wide. It includes people interested in geopolitics, in investing, in mining, and in the environment.

Looking at it another way, people know where their shirts come from – perhaps a factory worker in Cambodia sewed it together. But people often have no idea about other products just as close to us. Take for example our cell phones. People have no idea how it takes half the elements known to man to create the thing. The fact that we have the supply chain actually to make it at all is as impressive as what it can do!

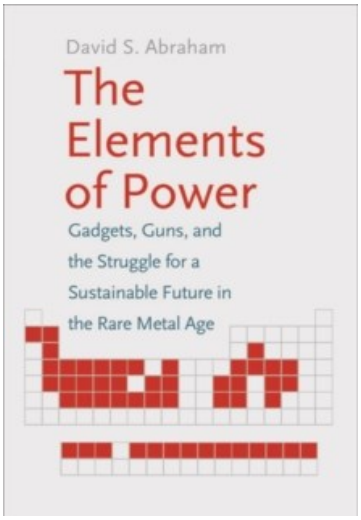
What I'm trying to do is explain the hidden trail of these materials from mine to use.

### What is the most important thing you want readers to "take away" with them having read your book?

I think the most important thing is that we've got these products that just come to us in a box. We have no understanding that practically everything we use is either mined or grown. And that the more complex the product, your computer, say, or your telephone, is, the deeper it is related to mining. I think that there is this significant disconnect between what we understand about the stuff we get in boxes and resources used to make that stuff. I'm hoping to draw a greater connection between those two, and I use the trading of minor metals to draw that out.

### But why is that so important?

Whether you are looking at sustainable living, or whether you want to invest, you need to have an understanding of the impacts of the decisions you make as an individual, or that people make as a group. I think that this understanding of the impacts is an important thing, regardless of whether it may be an ethical issue or a resource issue. You really should understand, if you're going to do either "x" or "y", what are the impacts will be and what resources you'll be using.




Strange as it may seem, the activity of mining and metals trading is not divorced from, but, rather, a critical reason why, we all have smartphones. I want the reader to see that connection. People may rail against mining or oil and gas production, but they don't actually understand the complexities and the resources that they need to lead the lives to which they are accustomed.

The book tries to be an eye-opening experience because, so often, we just don't know where the stuff we use comes from. And the book highlights that, even after research, we often still don't know where it comes from!

### Why do you call it "The Elements of Power", with the emphasis on the word "power"?

It's because they are resources that have very specific purposes and without them we might not have the applications in which they are used. For example, without dysprosium, you would not have a rare earth magnet that makes your 'phone vibrate. Without indium, your 'phone would not respond to your touch. I'm essentially ascribing the word power to the individual elements themselves in an attempt to raise their statures and characterize the unique "power" they have to do the jobs they do.

### How and why did you choose the individual elements that you did?

When I came in to looking at minor metals, I came in through rare earths. I was in Japan when China restricted rare earth access in 2010. I was at Japan's Ministry of Economy, Trade and Industry, so I had a ringside seat to the resource battle. Since I came in with a geopolitical background, I was really interested in the geopolitics behind these materials. I started looking at what rare earths did. And then I started looking more broadly at minor metals, as the Japanese government was very focused not just on rare earths, but on a whole a slew of other metals.

So, essentially, I started looking at a group of metals that had some characteristic of criticality. For example, was the metal geologically rare, or was it concentrated in one country like, for example, niobium. Was its production predominantly from one mine? Or, even, was the country from which it came not too friendly to the rest of the world? Then it went to where I could get information and what products were of most interest. That led, for example, to indium: I could get information about it and I understood where it fitted in with 'phones or solar power. But, really, I tried to focus on metals that had a technological angle to them.

### What, if any, is your "Call to Action"?

I think that there are several. Perhaps the first is for people to try to understand where things come from. Or, at the very least, to think about it as something they *should* understand. Second, there's the whole issue of understanding the impacts of some of the decisions that people make. As I have already mentioned, mining and metals trading are not really divorced from the act of making a 'phone call. The third, and I know it might sound grandiose, is that we use resources more efficiently.

Interview conducted by **Tom Butcher**

# Critical Raw Materials and REACH

On 22 September 2015 the CRM Alliance, of which the MMTA is an active member, came together in Brussels to participate in a luncheon event sponsored by CRM Alliance member, Etimine S.A., from Luxembourg. Etimine SA was established in 1984 and is a subsidiary of Eti Maden IGM, a Turkish state-owned company. It is the biggest borate producer in the world and also has the largest share of the world boron market.

The luncheon event focused on a highly sensitive issue for several critical raw materials – EU environmental legislation (REACH), with a particular focus on borates. Since the EU is highly dependent on the import of borates and other CRMs into the EU from third countries such as Turkey and the United States, the discussion generally centered on the impact REACH has on trade.

Concerning REACH, the CRM Alliance advocates having the socio-economic assessment undertaken at the beginning of the REACH process, rather than at the end. For critical materials this would mean that it could be concluded at an early stage that authorization, restriction or Candidate Listing cannot be realistic options, given their socio-economic importance. Other risk management options could then play a more important role, such as Occupational Exposure Limits for workers.

The CRM luncheon event was hosted by Member of the European Parliament Prof. Carlos Zorrinho. Speakers representing the European Parliament, European Commission and affected industry representatives presented their views to the audience. A lively Q & A session followed.

Speaker Bjorn Hansen, Head of Unit at DG Environment and in charge of REACH could be called one of the founding fathers of REACH. Although Mr. Hansen was of the opinion that REACH has so far proven to be a success, he was very interested to hear the opinion of industry concerning its REACH experiences and how industry and regulators might find solutions to current problems. He explained that while his REACH colleagues at DG GROW work on ensuring access to critical materials from the industry side, his task within REACH is to protect human health and the environment. The final goal of REACH is to ensure a level playing field, as well as to promote innovation and European industrial competitiveness. Although those tasks seem to be far apart, they also have commonalities.

Firstly, he explained, through its requirements and transparency, REACH establishes a level playing field. Not just for economic importers of substances but also between substances. REACH tries to include safety aspects into the actual marketing of the products, and internalises not just the cost but also the safety know-how of the products being sold.

Secondly, REACH establishes an obligation to use substances safely. This intentionally includes the pressure to substitute certain substances. Mr. Hansen believes this objective to have a positive effect on CRMs. By using a substance sensibly, the result is that a hazardous substance is not used if there is a less hazardous substance available. Since many CRMs are hazardous, REACH puts pressure on actors using those substances to look for substitutes and rewards those actors that use substitutes where possible. Moreover, it increases the efficiency of the use of all chemicals such as critical materials, as REACH helps to reduce the wastage of CRMs, and therefore ensures their availability for those applications critical for the EU economy for which there are no substitutes.

Concerning the recent European Court of Justice ruling on "once an article always an article", Mr Hansen explained that this ruling effectively creates parity between importers of articles and EU manufacturers, whereas previously the latter had a perceived competitive disadvantage vis-a-vis competing importers. In his opinion there would be no scope for this ruling to be challenged at WTO level.

Given the very definition of a CRM as being of particular importance to the EU, Mr. Hansen stated that there is a specific role in REACH for CRMs. REACH is based on a sequence of decisions, starting with risks, ending with RMOAs. If the socio-economic importance can be demonstrated, it can influence decision-making, which means there is room within its current frame. However, he was also aware of the fact that authorization is very complex, while it was initially supposed to be much simpler. In practice this means that for substances such as the borates which are used in many applications, the process is not only very complex, but also very costly. A solution for this issue is yet to be found.

Successes of REACH are also clearly visible, Mr. Hansen stated. Using borates as an example, according to their chemical safety report, the borates industry is using borates safely. Many substances already registered have qualitatively high registration dossiers which has resulted in a significant improvement in risk management. Listing substances as Substances of Very High Concern provides an extra check to see if the risk is properly controlled by industry and whether the substance's continued use is justified from a socio-economic perspective. To bring industry and regulators closer together, special meetings take place between the European Chemicals Agency, the European Commission and industry associations. Specific industry concerns should be raised through these channels. Studies indicate that the registration process was mainly very expensive due to a lack of transparency. Therefore, the substance exchange forum was set up to ensure that data holders transparently declare the costs of the data they hold. In Mr. Hansen's view, once companies understand why they have to pay 10,000 EUR to register a substance, they generally pay.

The final speaker was Bayram Ankarali – General Manager of Etimine S.A. who provided the audience with a clear overview of the pressing situation in which the borates industry currently finds itself.

Dr Paul Rübig , MEP

Dr Paul Rübig – Member of the European Parliament's center-right party and member of the MEP Interest Group on Critical Raw Materials, stressed that given the current situation the EU finds itself in regarding global competition, 'if we suffer from unemployment with many new migrants looking for new jobs, we need to look to stay competitive'. 'How do we keep our employment in the important area of critical raw materials?'

One of the major issues he mentioned, is how to bring back industry, since industry is leaving the EU. The EU has gone from a figure of 15% to 14% reindustrialisation, while the target is to achieve a level of 20% by 2020. REACH is pushing hazardous substances off the market, whether necessary or not. Therefore the European Commission has to initiate legislation to better protect critical raw materials. It is then up to the co-legislators to make it official legislation. Dr Rübig underlined the importance the MEP Interest Group on CRMs plays in this regard, since it is essential that some MEPs look more closely into the different issues at stake, such as sustainable environment, resources, jobs and growth.

Terence Civic – Health, Safety and Regulatory Affairs Director at Materion Corporation, mentioned that the ECJ ruling on "once an article always an article" places an extreme burden on borates or beryllium. It is not only importers and manufacturers which have to address who uses those substances that are added to the Candidate List. Now a burden is placed on upstream suppliers that may not even be subject to REACH. Mr. Civic wondered whether importers are now having to go to third countries and if this would be a WTO violation.

Hakan Kanli – Operations, Quality & Regulatory Affairs Manager at Etimine, emphasized that industry is not trying to escape authorisation because it does not like to be burdened, but that it is in fact the other way around. The borates industry is very willing to engage with policy-makers to find a good solution for both parties, but so far the authorities have refused to look at independent studies conducted by the borates industry. Moreover, exposure scenarios contain very detailed information outlining the risks and what precautions should be taken, yet, some borates – critical for various applications - are recommended to be placed on the Candidate List while no risk management measures have been assessed. Therefore, the borates industry is at a loss as to why authorities are not engaging more with industry to protect critical materials.

Maria Cox – General Manager of the Minor Metals Trade Association expressed concerns regarding the preparation for the REACH 2018 registration deadline, that a number of the Association's Members are preparing for. A significant proportion of MMTA members are SMEs, and are dealing with relatively low volumes of multiple metals. The requirement to register multiple metals in 2018 is posing a significant burden on their businesses. With each registration costing up to 10,000 EUR, Maria asked the Commission how aware they are of the impact on small businesses, and whether there is a danger that the supply of some substances will be limited to bigger players in the market, thus limiting competition.

The EU Commission responded to Maria's question with information on two approaches they are taking. The first is to ensure transparency from Consortia on how they calculate the costs which they recoup from the later registrants. This reassures the company that what they are paying to register a substance reflects the cost of putting the information together. The second action is discussions at the Directors' Contact Group, where the Commission meet with trade association to talk about practical solutions for problems facing registrants. One such action is allowing a company to register on time but to submit their statistics at a later date, which lessens the pressure on a small business.

Chris Dagger – Chairman Europe of the International Magnesium Association, questioned the validity of the data used in the reports by the UK and the NL finding that only 1-2% of the administrative burden is imposed by EU environmental legislation, as mentioned by Mr. Hansen. He also wondered how individual REACH consortia should price the contribution of newcomers of having done the initial research to be REACH compliant.

Sean O'Sullivan – Regulatory Affairs Manager at Glencore, was of the opinion that whilst REACH as a framework is certainly recognized to be solid and sound in what it wants to achieve, nonetheless there is an assumption of guilt before innocence. He underlined the problems industry is experiencing with Candidate Listing. He mentioned that in reality, candidate listing is a stigmatization of an issue. Once a substance is put on this Candidate List, downstream users will stop using those substances, regardless of whether they can be replaced or not. According to Mr. O'Sullivan this is an unintended consequence of REACH and the authorization process. Policy-makers should be aware that industry wants to play a sensible and responsible role in this process, but if the European Commission and other regulatory authorities are not willing to engage meaningfully with industry and accept independent reports then industry has some very serious questions which have to be addressed. According to Mr. O'Sullivan, it would have been easier if authorization was not driven by the ethos of substitution.

Bjorn Hansen, Head of Unit at DG Environment

Ines Vanlierde - Secretary General of EuroAlliages, stated that nearly 5 years after the first REACH registration deadline there is nothing in practice that has been put into place at customs to determine whether imports are REACH compliant or not. This means that importers who have made the effort and costs to be compliant, are now disadvantaged. She wondered therefore where the level playing field is, as well as what the sanctions are for not complying. "Where is the control at the border to ensure that everybody is obeying the rules?"

This was a point which found general agreement amongst attendees and speakers alike, but for which there did not seem to be a ready solution. Mr. Hansen, too, agreed that although the function of his department does not extend to import control, enforcement was a key area to be addressed.

Following this successful meeting, the CRM Alliance would like to thank all participants for their interest in the subject and their active contributions made during the meetings. We hope to see you again in 2016.

**Summary of CRM Alliance event, produced with permission**

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Contact the MMTA to book the meeting room.

# How MMTA support helps the people of Mufulira in Zambia

Members of the MMTA will be aware of our Association's link with the copper-belt town of Mufulira, the place where copper has been mined since the 1930s. It is a town all too familiar with the ups and downs of the copper price. Today, with copper at $5000 per mt, the price is half what it was in 2010. The result, at the unshiny end of the telescope, is loss of jobs and deprivation in a country trying to haul itself out of poverty. Here the copper price is not a matter of just passing interest to traders; so dependent is the Zambian economy on the red metal for 70% of its exports that the Kwacha has depreciated 30% since January 2015, meaning this land-locked country dependent on imports is pushed further back.

However, there is one constant in Mufulira, and that is the quiet unspun support that our members have given, and continue to give, to a cause that has resonance with metal people – a community entirely given over to mining and production of a metal on which our Western society depends.

Through our links established with doctors and teachers, our support is targeted to a single hospital in need of most assistance – Kamuchanga District Hospital - serving a catchment area of 90,000 people. So far MMTA members have provided an anaesthetic machine and other medical equipment. Other members, off their own bat, are offering grants to medical students from UK to link with the hospital too. But the ongoing project of lasting value is the provision of water.

So far funds, raised by MMTA for Phase 1, have provided water storage sufficient to supply a new laundry. In Phase 2 a second tank has been put in place to ensure sufficient capacity to store water for the hospital's 24 hour needs, replacing oil barrels filled during the few hours when water flows from the local water company. With the second tank now up and running we are now aiming for Phase 3 – plumbing from the new tank to the kitchen, mortuary and perhaps maternity wards. This is a phased operation to ensure no funds go astray and that each step is accounted for. As further insurance to make sure funds reach their goal, works are carried out by local engineers with photographic evidence of completed works before payment. It is slow work but it is saving lives and I would like to thank all those members of the MMTA who have shown their support. If anyone wants to know more, please contact me, and if anyone is thinking of travelling a group is going from UK in March 2016.

**Anthony Lipmann,** Lipmann Walton & Co Ltd

The MMTA was delighted to raise £2000 for the next phase of this project at its recent LME Week Anniversary Dinner.

Many thanks to all who donated prizes—Westbrook Resources, Alfred H Knight, Lipmann Walton & Co, Maritime House and The Intercontinental Hotel—and also to those who took part in the charity raffle.

## BOOK NOW FOR THE MMTA'S CHRISTMAS LUNCH

**Wednesday 17th December 2015 from 12—4pm**

**Ironmongers' Hall, London**

**Celebrate the festive period with friends, colleagues and clients.**

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# MMTA Press Members Respond to Submitted Questions

**We would like to thank the press Members for their time and detailed replies to questions submitted by fellow MMTA Members. Responses were received (in alphabetical order) from Argus Media, CRU, Fastmarkets, Metal Bulletin and Platts, and each set of responses are reproduced over the following pages.**

**Should you wish to respond specifically to any of the points raised, we would be happy to pass on your comments to the relevant party(ies).**

**Questions submitted were as follows: Please note that press Members responded to those questions they felt relevant to their particular activities:**

**1.** How will minor metals pricing be handled, going forward, given that there is much more political and regulatory pressure on the horizon because of the issues surrounding benchmark scandals - LIBOR, gold and forex. The regulators have not got around to what they consider which benchmarks needs strong oversight - they have stopped at the major ones, such as forex, gold and oil - for now. But if they expand their scope towards some of the major minors, it has implications for publication pricing, as the costs and work needed to meet IOSCO requirements could well impact the ability of news providers to continue reporting pricing.

**2.** Do you see a role for the industry press in reporting on issues such as the implications of an EU Conflict Mineral Program?

**3.** To what extent would you cover whether the effects in the DRC region, for industry and at a political/regulatory level following the implementation of Dodd Frank? For example with regard to developments in the civil war and prosperity of the people, impacts on different types of business, success of implementation etc., whether there is any correlation known between the conflict mineral programme and the flight of people from the country? (closure of mines leading to unemployment etc.)

**4.** Have you done any investigations via the consortia, for example, regarding REACH and the possible creation of Cartels or similar developments regarding market concentration? How is the REACH regulation controlled by the different EU countries, and are there are there any signs of distortion of competition due to lack of control in certain EU countries?

**5.** There have been significant increases in subscription prices over the past 10 years and for small companies, especially those specialising in only a few minor metals, it may prove unfeasible to subscribe. What would be your thoughts on a "pay-as-you-go" or "pay-per-view" subscription for specific articles and/or prices. For example, perhaps 1 or 2 articles/quarter, or similarly for price quotes, rather than subscribing to prices if they only change very infrequently, would it be possible to pay for recent or historical prices of certain metals instead?

**6.** How do you go about mirroring the extremely volatile and thin market in many minor metals? Is there a danger that by cutting off 'extremes' in prices, even where these relate to actual transactions, you may be influencing the market rather than simply mirroring it?

**7.** With reference to 6, there have been concerns expressed that this may create compliance/anti-trust issues. What can be done to ensure sufficient transparency and completeness of price reporting to ensure that this does not occur?

**8.** There has been concern expressed about the rolling forward of prices for days where no trading has taken place, which gives the impression that there is a market where in fact there is not – is this something you could give your thoughts on?

**9.** When prices are reported and in some cases have moved markets down, only to find in the future this material has been rejected on quality issues, how do we know we are comparing a like for like product?

**10.** When material has been booked on a current average – how does this then imply the market has moved down? The average price comes from the quotes' high and low point.

**11.** When prices are reported, is it possible to indicate to what extent the pricing relates to 'dead' market days, and what volumes have informed the price?

**12.** There are certain grey areas created in pricing, relating to the difference in packaging between big bags and drums (a cost differential of $0.06-$0.07/LB of Mo) and also between Mo Oxide powder vs briquettes – how might this be addressed? In the case of Fe-Ti, also, it has been suggested that more emphasis should be placed on the specifics of quality and packaging rather than on country of origin or paid/unpaid for example.

**13.** How do you deal with inevitable changes in personnel and train up new staff to cover these very niche materials?

# Argus Media response to MMTA questions


**1.** Argus has been providing independent price assessments for physical energy markets for 45 years and it is pleased to be able to bring this experience and expertise as a new publishing entrant to the minor metals markets. In addition to oil, petroleum and energy markets, Argus also provides market reporting and pricing to the fertilizer, petrochemical and ferrous metals markets.

As an independent publisher, Argus is free of the inherent conflicts of interest that have directly led to scandals in financial markets such as Libor. Argus has no vested interest in the level of any price that it publishes. It operates in a competitive setting where market participants have a choice of which pricing service to subscribe to.

It is important to note that benchmark scandals have been in financial markets rather than physical commodity markets, reflecting the strength of independent price reporting in physical markets.

Argus has consistently been at the forefront of best practice in commodities price reporting. It has invested heavily in its operations, compliance and controls framework in recent years. This including rigorous internal, and for some prices external, auditing. Its reporting of key benchmark prices has been fully compliant with the principles for price reporting agencies (PRAs) set out by the International Organization of Securities Commissions (the Iosco PRA Principles), since their development in 2010. Forthcoming EU regulation on benchmarks is expected to fully reflect these Iosco PRA Principles.

In line with the Iosco PRA Principles, Argus completes annual external assurance reviews of its energy, petrochemical and fertilizer price benchmarks. These reviews are conducted by independent professional services firm PwC. Non-ferrous metals price reporting regularly completes rigorous periodic internal audit by the Argus internal compliance team as part of the internal process of alignment with the Iosco PRA Principles.

Argus encourages all market participants to engage with its editorial price reporting team regarding their activities in the market, to ensure that Argus can provide the most reliable and robust prices needed by the industry. This voluntary flow of information to PRAs is crucial to the price reporting process and the efficient functioning of physical commodity markets, a point acknowledged by regulators.

**2.** As an independent reporting agency, Argus is ready to report all stories of relevance to the markets it covers. The Argus approach is to report and analyse the implications of the story to the market in terms of supply-demand fundamentals and spot prices.

**3.** This is certainly a story that we monitor and report on, with a clear focus on its impact on the market and on prices.

**4.** REACH is an evolving story and one which our reporting team monitors, with a focus on its impact on market fundamentals and on spot prices.

**5.** Argus is investing in its metals services and its new products — Argus Minor Metals, Argus Ferro-Alloys, Argus Rare Earths, Argus Steel Feedstocks and Argus Black Sea Steel — provide specialist in-depth information and robust price assessments. But pay-as-you-go is not the current business model. Argus is pleased to be a new publishing entrant to the metal markets, and to provide greater competition among price reporting agencies and improved choice to subscribers and potential subscribers.

**6.** Argus has vast experience in reporting thin and illiquid markets, and its methodologies set out in detail the criteria for the identification and treatment of prices and trades that appear to be out of step with the wider market. All Argus methodologies are freely and publicly available on the company website. One of the key tests undertaken by Argus reporters during the price assessment process is whether a trade or price is repeatable in the spot market. Trades which are subject to special premiums or specifications linked to a term contract, for example, would fail this test. Genuine spot price volatility is reflected in the low-high range of the price assessment. For example, a particularly low price which is repeatable in the spot market and not tethered by any special conditions could be included.

**7.** Argus methodologies set out in detail the process for testing trades and prices against wider market conditions and establishing repeatability. At the same time, Argus has strict rules to ensure that all confidential information gathered or reported to it is protected and not disclosed. These commitments are set out within the company's Editorial Code of Conduct and its Global Compliance Policy, both of which are published on the company website. In line with the methodology, Argus reporters have a responsibility to gather information from as many sources as possible. All companies providing information to Argus can be reassured that Argus' published prices are never set by a single source or piece of gathered information, so there are no anti-trust issues in reporting information to Argus. This is especially the case given Argus' fully independent role in publishing price assessments reflecting prevailing spot market price levels.

**8.** Argus assesses prices twice a week in a process based on a hierarchy of information, as set out in the public methodology: Verified spot trades; bids and offers; a survey of where market participants think the metal would trade if business were to be concluded. Other factors, such as associated raw-material costs and other parallel markets with greater liquidity, will be considered when there is no spot business to take into account.

During periods of low liquidity and no reported spot business, Argus continues to assess the market and adjusts prices where appropriate. This approach captures the often gradual convergence of buyers and sellers' views over time, and eliminates the artificial volatility that can occur if prices are moved only on the basis of reported trades. This is a tried and tested approach to producing reliable and representative price assessments that, among other benefits, help participants to track their exposure during periods of low liquidity.

## Links to Argus Methodologies:

http://www.argusmedia.com/~/media/3D4A6B9C85DB43FAA2713DB25018487D.ashx

http://www.argusmedia.com/~/media/15B0157FA859463682D51D1050F0C8B1.ashx

http://www.argusmedia.com/~/media/B79E8143A6564655AC4792B95814362C.ashx

# Argus Media response cont'd

**9.** If a transaction is entered into on the basis of a specific quality, then the price assessment process considers that quality in identifying the price. Subsequent rejection of the material on quality issues does not alter the assessment made on the day of publication, because the assessment process is carried out on the basis of the specified quality. The trade and price involved would have undergone the usual Argus tests to check its relevance to the spot market assessment.

**10.** Argus assessments are based on arms-length spot transactions and not on trades with special conditions attached, such as contract formulas and term contracts. A spot trade priced at the previous assessment's mid-range price could, if verified, be taken into account but would not necessarily form the high or low of the new assessment.

**11.** Argus' minor metals methodology does not currently include the publication of verified trades taken into account when assessing spot prices. In some other commodity markets, Argus does publish anonymised trades with volume and prices and, in some markets, Argus publishes full transactional information including the named buyer and seller. Sometimes this information is published on online bulletin boards. Some markets accept this practice and the greater transparency it brings. Argus is committed to providing transparency to physical markets and would definitely consider the publication of concluded minor metal trades if consultation with the market showed sufficient support for it.

**12.** Argus constantly strives to keep its methodologies relevant and welcomes all feedback from the market. Feedback is fed into a clear process involving transparent consultation with the wider market before the implementation of any changes to the methodology.

Spot markets sometimes require a degree of normalisation in order to capture sufficient liquidity, a process that Argus documents in its methodologies. These are all freely available on the company website.

**13.** Argus is remarkably good at retaining staff, giving it continuity and a highly experienced editorial team. This is part of the company's competitive edge and one of the reasons why firms are increasingly switching to Argus as their preferred supplier of independent pricing information.

The Argus minor metals reporting team includes some reporters with more than a decade of relevant experience. Argus has Investors in People (IIP) accreditation, reflecting the company's commitment to the highest standards in staff recruitment, training and development.

Argus recognises the importance of maintaining the high quality of its price reporting during occasional changes in personnel. Recruitment of new market reporters involves a rigorous assessment and interview process followed by a training process that is laid down within the compliance structure and fully documented by senior editors. Argus' editorial training places a strong emphasis on understanding and consistently applying methodology, as well as on identifying and understanding the specific factors driving prices. All new recruits attend an in-depth Argus induction course.

Before starting to undertake price assessments, new reporters shadow experienced reporters for up to six months, depending on the market being covered. The trainee will produce shadow assessments, for internal use only, and discuss the process he or she has gone through to arrive at these prices. In addition, new reporters are taught about their market by experienced supervisors, with an emphasis on supply-demand fundamentals and other price drivers such as end-use applications and regulation.

In order to progress, new reporters have to complete a six-month appraisal, which includes a written test on methodology and compliance.

# Fast Markets response to MMTA questions:

**1.** IOSCO compliance, if it were to become mandatory, would increase costs for smaller agencies, who would have to consider whether to continue offering minor metals pricing. There is a significant five-figure sum involved—regular auditing, etc, as well as ensuring adequate legal protection. Fastmarkets has a team of several people handling non-ferrous physical premiums (LME metals), and is moving towards IOSCO recognition.

The bigger pricing providers have the financial capacity to roll this out to minor metals and rare earths. But the danger is there will be fewer independent price discoverers if smaller providers are not able to follow suit.

There is also the possibility that regulators decide minors would need to have an auction process, like gold, silver and the PGMs. In that case, pricing would have to migrate to another platform by the likes of Thomson Reuters, the LME or ICE, who handle (at a cost) the others.

**4.** REACH seems to be an information platform - costly for the minor metals trade, but it is not leading to cartels that influence business to the extent of monopolistic practice.

**5.** If prices move away from publications to platforms (see 1), it will cost users even more to access the data they need. There have been protests about passing on costs for the gold, silver, platinum and palladium fixes.

**6-12.** These are issues that may come under regulatory scrutiny. This type of pricing is not something that Fastmarkets is expert in, but it does seem that it will make it more cumbersome and costly for those PRAs (price reference agencies), who are engaged in this type of pricing activity.

**13** - There may well be a generation retiring soon, but often a newer, younger influx adapts to inevitable changes in business and trading patterns - witness social media. Personally, I don't think there will be a succession issue..

# Metal Bulletin response to MMTA questions:

**1.** Metal Bulletin has already carried out most of the necessary work to align its prices and pricing procedures, including minor metals and alloys prices, to the IOSCO principles for price reporting agencies. The investment in staff and technology this work has entailed is central to the future of Metal Bulletin, which is committed to producing free, independent reporting on prices and markets. Market participants recognise the value of the work we have done in this area, which enhances our capacity to report prices rather than diminishing it.

**2 & 3.** Metal Bulletin has covered the debate on how to legislate on conflict minerals, including whether there should be greater regulation and whether this should be mandatory, and how this would affect metal markets. This has included the responses from interest groups like Global Witness and EU parliamentary figures such as Iuliu Winkler.

As the debate has progressed, and following the introduction of mandatory certification, Metal Bulletin's coverage has also looked at the practical implications of conflict minerals law: the assistance available in understanding the EU legislation to importers of 3TGs, and how the ruling could affect imports, smelters and refiners.

Our primary focus is on markets, but obviously in writing about mine closures, for example, we discuss the impact on employees: witness our reports on Glencore's recent moves to shut copper production in Africa, in which we discussed the effects of care and maintenance programmes and employment contracts on workers affected by the closures.

*Trade MEPs call for more clarity about EU plans on conflict minerals* (November 2014)
http://www.metalbulletin.com/Article/3398672/Trade-MEPs-call-for-more-clarity-about-EU-plans-on-conflict.html
*CONFLICT MINERALS: Iuliu Winkler speaks on planned EU legislation after Global Witness criticisms* (April 2015)

http://www.metalbulletin.com/Article/3446274/CONFLICT-MINERALS-Iuliu-Winkler-speaks-on-planned-EU.html

*CONFLICT MINERALS: Global Witness, Amnesty International applaud call for tougher law from MEPs* (May 2015)
http://www.metalbulletin.com/Article/3455694/CONFLICT-MINERALS-Global-Witness-Amnesty-International.html

*CFSI 'ready to help' companies with requirements of planned EU conflict minerals law* (May 2015)
http://www.metalbulletin.com/Article/3457610/CFSI-ready-to-help-companies-with-requirements-of-planned.html

**4.** When the Reach legislation came into force, and was at the forefront of the market's attention, MB wrote about it frequently and in depth. If anybody has information about cartel concerns, we'd be very interested to discuss them.

**5.** There is internal and external interest in metered access, and it's something Euromoney Institutional Investor, the London-listed company that owns MB, is looking into. MB already enables subscribers with a particular interest to tailor website, prices and emails to reflect that interest. Price feeds alone are also available.

**6.** Metal Bulletin's pricing methodology aims to produce representative price assessments of the market it covers. The methodology provides reporters with criteria to deal with 'extreme' prices. 'Extreme' prices are considered outliers and discarded when the price is questionable (e.g. we don't receive a proof of contract upon request), or the deal has been made on terms different from our specification in a way that defies ready normalisation. At times of extremely volatile markets, we would produce our assessment taking the volatile circumstances into account with the aim of producing a representative assessment of the market.

**7.** Our methodology and price specs are publicly available to meet IOSCO requirement of sufficient transparency. We are excited by the response of the market to our trade logs (which detail prices, volumes and locations of transactions, bids and offers without naming participants in the deal) and want to continue to put out trade logs for minor metals and alloys. The numbers we receive from the market are taken in good faith, and there is an audit trail. And, of course, we're happy to discuss the best way of receiving transaction data from the market to make sure we can provide as much transparency as possible.

**8.** Metal Bulletin's pricing methodology gives greater weight to actual transactions, but also reserve the right to reporters to use bid/offer information as well as indications or assessments by market participants in periods of low liquidity. If no transaction has taken place we don't simply roll forward the price but produce our assessment based on other information, i.e. we still talk to the market even if no deals are happening. We only roll over the price in case of bank holidays providing in advance a notice to subscribers. On another level, it's important to note that the price assessments that we publish arguably have greater value in periods of low liquidity than high.

**9.** Our policy for price corrections allows for situations in which price data that subsequently turns out to be erroneous has been included. In a scenario like the one described we would go back, review the published price and see whether the new information should cause us to change it. Obviously we would issue pricing notices to inform the market about what was going on.

**11.** In some of the larger markets, MB publishes trade logs to give people more of an indication of what is underpinning the price assessment. As discussed earlier we would like to publish more. Conversely, it has been suggested that in the case of very small markets providing detailed trade logs might allow parties to be identified.

# Metal Bulletin response cont'd

**12.** On the first question, MB's quotation for moly oxide stipulates drummed, so if material is in big bags, we would ask for a net back to our requirement. The quotation is also specifically for powder, not briquettes, so while we might pick up some data for briquette prices, that wouldn't be used in setting the quotation. It's possible to net back on repacking, but briquettes are really a separate material. Occasionally, powder and briquette prices do fall in line with each other, but usually, it's understood that there's a premium for briquettes.

The published specs are here. http://www.metalbulletin.com/Article/3209142/Search/PRICING-NOTICE-Metal-Bulletins-European-molybdic-oxide.html?PageId=196010&Keywords=pricing+notice+molybdic+oxide&OrderType=1#axzz3IA7LmTjX

For ferro-titanium we do take specifics of quality and packaging into account. Our specification stipulates that we price standard lumpy material, so if that's not what's been sold, then we'll either discard the price point (e.g. if it's 0-2mm material) or ask for an explanation of how any differences in chemical content affect the price (e.g. low oxygen, low vanadium, low aluminium). That will be taken into account and noted in our pricing database Mind when setting the price.

In terms of packaging, a similar principle applies: if the material has had to be repacked (which it sometimes does if a producer buys in extra to make up shortfall in an order), then we'll ask how much that added to the cost and take that into account. I don't think it's right to suggest that this should have more emphasis than country of origin or paid/unpaid, though – those factors can make a big difference. For example, it's widely understood that Russian material, issues of quality aside, is often sold at lower prices because it's cheap to produce, readily available and the rouble/dollar exchange rate has also been favourable. It also carries a duty, so if that's excluded, it knocks 2.7% off the price.

**13.** All new staff who will be reporting on minor metals and ferro-alloys undergo an induction on materials, markets, pricing and reporting when they start at MB, which includes formal training on pricing. Over the past five years, however, we have developed a cadre of senior journalists who can support newer team members. At present every member of the editorial team in London has specific experience of pricing either minor metals or ferro-alloys, or both. All our prices prior to publication undergo a peer review process, which ensures that reporters are also familiar with other markets than those they currently price.

# Platts response to MMTA queries:

**1.** Platts tracks and keeps records of its assessments, including those used in the settlement of financial derivative contracts and therefore categorized as "benchmarks" for purposes of the IOSCO Principles for Oil Price Reporting Agencies (PRA Principles) and similar purposes.

In 2013, Platts announced it would voluntarily apply the IOSCO Price Reporting Agency Principles to its non-oil benchmarks in power, petrochemicals, metals and agriculture and therefore include those assessments in the annual independent assurance reviews of its alignment to the Principles. In 2014 Platts engaged a major accounting firm to conduct an annual independent assurance review of its non-oil alignment to the Principles. The review was completed in February 2015 and, included a comprehensive review of Platts' documentation of its processes for price assessments used for power, petrochemicals, metals and agriculture in Houston, London and Singapore as at 28th February 2015.

The reasonable assurance review for non-oil demonstrated Platts' alignment to the PRA Principles. You can read the press release through this link

http://www.platts.com/pressreleases/2015/042215/no. We can also make the E&Y report for non-oil commodities available to you should you require.

**2.** There is clearly a role for the industry press in reporting on such issues. Platts as an organization produces both industry news and price information, but from a market perspective, in regard to the importance of wider societal issues, the primary concern for a pricing organization needs to be how the issue impacts pricing.

**3.** As above, our primary focus in covering these and similar issues would be to track their impact on the market. For example, in the case of conflict minerals legislation, the implications in terms of supply and thus potentially on pricing would be of direct relevance to the price assessing process.

**6.** Platts' minor metals assessments use a survey methodology. For such assessments, Platts collects a wide variety of transactional and market information through a survey of relevant market participants. Platts market reporters will call market sources through the course of the day and week to gather as much information on the relevant and related markets as possible. Platts seeks to receive market information from as broad a cross-section of the market as possible.

Platts seeks to collect and analyze as much information as possible in survey markets, including bids, offers, interest to trade, transactions that have been previously concluded, and indications of value from participants in the market, and encourages market participants to provide all relevant information. It should be noted, however, that market reporters may not be able to establish every detail of each dimension of a trade.

Platts aims to include data of the highest quality in its price assessments. Platts' assessment guidelines are designed to avoid any distortion of the final price assessment; therefore, inputs that are not fully verifiable may be eliminated and "one-off" or unrepeatable transaction data may be disregarded from the price assessment process. Platts first considers fully transparent and verifiable data, and gives less consideration to data as its transparency and verifiability wanes. That said all market information is welcome and may be useful in informing Platts about its price assessment process, even if particular data is excluded from the price assessment process itself.

A key Platts editorial principle is for the price data received to meet a repeatability test. Platts will ensure that the price reflected in its assessment is a repeatable market price as opposed to an outlier relevant only to a counterparty or a subset of the broader market. As a note, an outlier transaction could result from a number of circumstances including special trade agreements or embedded options, which make the specific circumstances of that transaction unique and therefore not repeatable by others in the marketplace for the given commodity.

**7.** Platts specifies that transactions reported must be at arm's length and not conducted between corporate affiliates. Platts routinely reviews companies participating in its price assessment process. These reviews aim to ensure the suitability of data and information that are used to formulate Platts' price assessments and indices. Platts has developed guidelines for Management of Sources that address source identification, source evaluation, source development, using source information and source dependency. Platts records non-arm's length relationships that companies may have with associated entities. Additionally, Platts expects its sources to comply with their internal policies, including those regarding affiliated-entity transactions.

More broadly, Platts understands that market participants will independently structure and enforce their own compliance requirements and Platts meanwhile will continue to report on its portfolio of commodities and markets while adhering to its own transparent and orderly editorial processes. Front office market sources are often well informed on market and price activity since these individuals are actually transacting. Nevertheless, Platts will also talk to middle office staff. No source is categorically eliminated from the collection of market information as a matter of Platts policy. Platts will also contact PR and compliance departments to gather relevant market information.

**8.** As noted in the response to question 6, Platts seeks to collect and analyse as much information as possible in survey markets, including bids, offers, interest to trade, transactions that have been previously concluded, and indications of value from participants in the market. While minor metals and ferroalloys markets can be illiquid, with a limited number of transactions taking place, we believe that there is sufficient information available in the marketplace to form a realistic assessment of the tradable value of the commodity in question.

**9.** As noted, Platts' reporters are trained to seek a wide variety of information to test reported transactional activity, including the specific price agreed, the counterparty to the trade, the point of origin and destination for delivery of the commodity, the size of the transaction, any physical quality commitments agreed as part of the trade, the terms and conditions of a trade and when a trade was agreed. Platts aims to include data of the highest quality in its price assessments. Platts' assessment guidelines are designed to avoid any distortion of the final price assessment; therefore, inputs that are not fully verifiable may be eliminated and "one-off" or unrepeatable transaction data may be disregarded from the price assessment process.

While Platts has an exceedingly low correction rate for its price assessments, corrections are inevitable given the sheer volume of information we publish. We issue corrections for price assessments as soon as discrepancies are identified, but only when a technical error has affected the price, or when a correction is issued by a third-party data source. Platts does not issue corrections to published price assessments to reflect information that may become available after publication.

**12.** Platts regularly normalizes disparate information from the diverse physical commodity markets back to the standard reflected in Platts' price assessments. This is done by analyzing quality premiums (for quality differences), the movements of all markets through time (for time differences), and other premiums associated with the size of trades, delivery terms, packaging etc.

In the case of moly oxide briquettes, there is typically a premium associated with briquettes compared to moly oxide powder. This is a fluid number however, and does not simply reflect the cost of briquetting, so the process of normalization would include gathering information from the market on the prevailing premium levels on any given day.

As far as the question of quality and packaging as against country of origin and duty status, Platts continually checks its price assessment specifications to ensure they remain relevant and fit for purpose, and welcome market feedback. We also have defined processes in place to manage any amendments that are made.

**13.** All Platts market reporters are trained to analyze the data they receive and to question sources to establish the fullest set of information possible around transactional data. This training, which includes a full Basics of Market Reporting course completed by every market reporter when they start with Platts, highlights the importance of seeking confirmation of all dimensions of trading activity, even those that may not be reported in a survey environment on first contact.

Reporters are trained to seek a wide variety of information to test reported transactional activity, including the specific price agreed, the counterparty to the trade, the point of origin and destination for delivery of the commodity, the size of the transaction, any physical quality commitments agreed as part of the trade, the terms and conditions of a trade and when a trade was agreed.

Market reporters also have designated back-ups in place to ensure continuity of market coverage; reporters are trained to adhere to the published Platts methodology and have a range of in-house documentation available to guide them through the pricing process.

# CRU response to MMTA questions:


**1.** CRU believes the IOSCO principles represent current best practice in price assessment. CRU implemented this standard in July 2014, and it applies to how CRU provides all price assessments. With internal audit programs, CRU ensures its price assessment methodology, data and content controls, and reporting are validated and meet the standards outlined by IOSCO. In this fashion CRU assures its reporting and prices are fair, independent, and transparent; clearly reporting the market rather than seeking to set the market. In this fashion, CRU remains a service to the metal, mining and fertilizer industries.

**2.** Yes, any potential conflict mineral program would have direct implication on trade flows. The potential impact on prices and supply/demand fundamentals could be extensive. Therefore, proper reporting of trend, prices, and market manipulation could highlight the need for future legislation and governmental interventions.

**3,4,5.** CRU understands the balance of providing the market with the necessary forecasting, market intel, and individualized consulting programs, while ensuring customers' budgetary requirements are met. CRU has recently enhanced the flexibility of how we provide our subscriptions. We now offer a broad prices service, and companies can pick and choose which groups of prices they need and the news stories that provide added depth and context. CRU is willing to work with individual subscribers to find a solution to the business intelligence they require while providing company-wide licenses to provide added flexibility.

**6.** CRU monitors the market by engaging in price assessment across end users, traders, agents and producers in the US, Europe, and China. We have broad connections across these markets, which ensure that we capture the majority of transactions. Each transaction in the market is viewed in context with the rest of the global market. One aspect which differentiates CRU is that we only report on validated market transactions. We do not allow inter-trade business and bids and offers to influence the market price, as that could allow manipulation. While quotes and offers are not used for index price assessment, they do provide context for the market movement.

**7.** CRU believes the IOSCO principles represent current best practice in price assessment. CRU implemented this standard in July 2014, and it applies to the CRU prices used in the settlement of financial instruments. With internal and third-party audit programs, CRU ensures its price assessment methodology, data and content controls, and reporting are validated and meet the standards outlined by IOSCO. In this fashion CRU assures its reporting and prices are fair, independent, and transparent; clearly reporting the market rather than seeking to set the market. In this fashion, CRU remains a service to the metal, mining and fertilizer industries.

**8.** This is often the case when market liquidity drops and spot interest fails to materialize. In addition to transaction details, CRU collects market commentary to shed light on the direction of the market in absence of verifiable spot deals. Some price assessment services take into account quotes and bids when market liquidity is not present, but CRU ultimately feels that this could open the market to manipulation. CRU's robust methodology and specifications do not allow manipulation. CRU publishes detailed and comprehensive documents which set out the methodologies used by all of its products to assess prices, and the definition of each of those benchmarks. These are publicly available from www.crugroup.com. These documents define each price and the overall methodology used and the criteria for including and excluding submitted data.

**9.** CRU fully qualifies all transactions prior to including them as index modifiers. Material specifications are one area we highlight and ensure the trades are compliant. CRU believes that it is more important to get the price correct, than so simply move the index to make news. That is why we employ price analysts to perform the market assessment as opposed to reporters.

**10.** Rarely does a single transaction affect a price point. An average is based on two corresponding figures, low and high. Thus a transaction could be reported at the current average; however, if supporting tractions have been placed below the current low or above the current high, the index would potentially move accordingly. Thus it is imperative that a prices assessment process include a vast number of market contacts to ensure all spot business is captured.

**11.** CRU endeavours to highlight in the editorial content the reasoning for prices changes or static trends. That includes the transactions and volumes that have affected potential changes or why prices have not altered. CRU believes that it is more important to get the price correct, than so simply move the index to make news. That is why we employ price analysts to perform the market assessment as opposed to reporters.

**12.** These questions are not limited only to moly or FeTi, as most, if not all ferrous and non-ferrous products have varying transactional needs/ requirements in different regional industries and markets. Consequently, CRU believes it is of utmost importance that subscribers and market players are fully aware of price assessment methodologies and specs in order to validate the basis for each price point. Consequently, CRU has taken a strong stance on specs in order to align all transactions. As a result CRU add/subtracts, when necessary, cost differentials on packaging, logistics and material specifications in order to align prices to a common level.

**13.** CRU believes that it is not only important to train personnel in market fundamentals, but also the IOSCO principles. The IOSCO principles do not define what would constitute possible "material conflicts of interest". CRU defines a conflict of interest in two ways:

- As part of their employment contract, a price assessor must declare employment with companies or organisations in the relevant marketplace – if CRU believes there is a risk of influence over a particular commodity's price in return for financial benefit or career advancement, CRU would prohibit it
- As part of their employment contract, a price assessor is forbidden from actively speculating on commodity price futures because they have a financial interest in a particular commodity's price

In both cases this applies to full time employees or contractors involved in price assessment. This is overseen by CRU's HR function and the specific oversight function provided by the Company Secretary. The IOSCO principles state that price reporting agencies should "ensure…adequate supervision and sign off by authorised or qualified employees prior to releasing benchmark determinations". All CRU prices are authorised by someone other than the original assessor before publication.

# Glacier silicon feeds ocean plankton

Adapted from an article in New Scientist, 29 August 2015

The meltwater beneath Greenland's glaciers is an important source of the silicon that some plankton need to build their glassy skeletons but climate change could alter the input.

Plankton called diatoms use the oxidised form of silicon, silica, as they grow. The plankton mop up significant quantities of atmospheric carbon dioxide as they photosynthesise, which they then take to the bottom of the ocean with them when they die – a natural carbon sink.

But large plankton blooms might become less likely to form without the ready supply of silicon.

The base of glaciers is a hotbed of physical and chemical activity as the ice grinds away at the rock below. For instance, we know that the process frees up hundreds of thousands of tonnes of iron that is then carried to the sea in meltwater, fertilising the ocean and allowing plankton to thrive.

Jon Hawkings at the University of Bristol, UK, and his colleagues wondered what else might be transported in the meltwater. Previous work had suggested that the process frees up silicates, so the researchers have begun assessing how much silicon the meltwater dumps into coastal waters.

"It's early days but our estimates indicate that the ice sheets could be a huge source of silicon to the polar regions," says Hawkings. Most of this comes from silicon attached to the sediments suspended in the meltwater that on reaching the ocean dissolve into the salt water.

Hawkings says the high abundance of diatoms in Greenland's coastal waters could be a direct result of the meltwater's silicon influx. He presented the findings at the Goldschmidt conference in Prague, the Czech Republic, recently, and plans to publish figures detailing the quantities of silicon in meltwater in the next few months.

The worry now is that with climate change affecting glacier melting this process could be changed in unpredictable ways, having an impact on ocean productivity and global carbon fluxes.

"Although more work needs to be done to properly quantify this, we believe it is highly likely these inputs will change in a warming climate," says Hawkings.

The idea makes sense, says Matt Charette at the Woods Hole Oceanographic Institution in Massachusetts. "It's certainly possible that the runoff from the Greenland ice sheet may help recharge the ecosystem during summer when meltwater reaches a maximum," he says.

But the same process might not be as important around Antarctica, where the waters are naturally rich in silica. There, iron is probably the limiting factor on diatom growth, says Charette.

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