IMQS

IRISH MINING & QUARRYING SOCIETY

ANNUAL REVIEW 2023

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Notes from the Editors 2023

CLIMATE ISSUES

Undoubtedly the overriding issue for society this year has to be climate change. The list of extraordinary climate events in 2023 is lengthy; wildfires in Canada leading to air pollution in New York; exceptional air temperatures in southern Europe, China and the USA; droughts followed by floods; record high sea temperatures in the north Atlantic. There is a growing sense that these extraordinary events will be ordinary and usual in the future. Targets in Climate Action Plans (CAPs) in many countries are falling short.

Apart from that cancelled holiday in Rhodes and reports of unpleasant overheated vacations across southern Europe, Ireland has been spared the worst of these events; a wet and windy summer is preferable to +44C heatwaves. Yet Ireland will be affected by climate change; Met Eireann suggests that wetter summers, bigger storms, coastal inundation and localised flooding will happen and that we will get wetter and warmer over the next 30 years. Whether this will be offset by possible cooling of the Gulf Stream is an open question; both trends are cause for concern.

Decarbonisation is at the heart of CAPs. This represents major challenges, as in order to achieve that, we will need more supplies of Critical Raw Materials (CRMs) to support the development of electric power from renewable energy sources. The USA, the UK and the EU recognise the need to source these CRMs from internal and reliable sources. This Review carries features on CRM policies and the dilemmas arising from promoting increased mining within the EU. Fintan O'Toole writing in the Irish Times earlier this year noted the global interconnection of these issues; he reflected on the fact that his laptop and iPhone uses CRMs derived from China and that some of these CRMs (e.g. Lithium) might conceivably be sourced in Co Carlow in the future- something that may be alarming to some. The ability of the mining sector to find and develop CRMs in a manner that is acceptable and sustainable will be tested. The EU CIRAN project featured in this Review addresses some of these issues. Ireland's need for increased supplies of building materials for housing and infrastructure will also be challenging.

Base Metal Mining Challenges; The biggest story for the minerals sector in Ireland this year is the placing in July of the Tara Mines zinc-lead operations near Navan Co Meath on care and maintenance. As a result, over 800 jobs have been lost. The social and economic effects locally and regionally will be significant. A further negative side effect of the Tara closure is Tara's suspension of regional exploration elsewhere in Ireland. While zinc is not on the list of the EU's CRMs, it is in the USA.

> **"THE TARA MINES CLOSURE IS A MAJOR CONCERN; ACCESS TO NEW RESOURCES OF 25MT MUST BE A PRIORITY WHEN OPERATIONS RESUME"**

For the first time since 1965, Ireland will have no base metal mine in operation. The EU relied on Ireland for 15% of its zinc supply, which must now be sourced elsewhere. Several adverse conditions faced Tara; weak metal prices, declining grade of ore, high energy costs, productivity issues and delays in accessing and developing deeper mineral resources have all played a part in heavy losses for the operation. Owned by Sweden's Boliden Mines, the Tara operation was Europe's largest zinc mine. The Government has, via Minister Simon Coveney and his Department of Enterprise Trade and Employment, engaged with Tara and its Unions in assessing how these issues might be addressed. Enterprise Ireland has also been active in this regard. However, it may be some time before conditions will allow for a reopening of the mine.

There are significant mineral resources remaining in and near the Tara Mine; a new zone discovered in 2012 called Tara Deep remains undeveloped; it contains over 25 Million tonnes of better grade material- enough to support another 15 to 20 years of operation. The objective must be to access and develop these resources. This Review carries details of the Tara operations over the last 50 years.

Elsewhere in the Mining Sector; Plans to reopen the Galmoy zinc- lead mine in Co Kilkenny are proceeding. This operation will be relatively small scale but a welcome addition to the economy of the region over an eight-year period. There are no immediate plans by international mining company Glencore to develop the extensive zinc-lead resources outlined near Pallas Green in Co Limerick over the last 20 years, although exploration in the area is continuing, led by junior companies Group 11 and Arkle.

Gypsum Industries continue to operate successfully near Kingscourt, Co Cavan, with expansion plans well advanced. Irish Salt near Carrickfergus in Co Antrim continues to produce 500,00 tonnes per annum of de-icing rock salt.

Galantas Gold plans additional drilling at the Omagh Project site in Co Tyrone. This exploration work will target gaps in areas of the inferred resource. It is anticipated that mining operations will resume in late 2023 or early 2024, utilising contract mining. Drilling has commenced at the Galantas Gold Gairloch Project in Scotland, with esults showing good grades of gold, copper, zinc, cobalt and silver.

The possible development by Dalradian of major gold and copper resources outlined near Curraghinalt in Co Tyrone awaits a Planning Inquiry which is expected to take place in 2024.

Quarry Products Revival; Housing and Infrastructure development continued to support the recovery of the quarrying sector since 2013. Output of aggregates which peaked at c 120 Million tonnes per annum in 2006, had collapsed to 20 Million Tonnes in 2010. Output has recovered steadily since 2013 to c 40 Million tonnes in 2021. Housing completions reflect the quarry output, recovering from 10,00 in 2016 to 27,000 this year. Current housing output does not meet demand as evidenced by house price increases, although SCSI reports that prices are slowing somewhat.

> **"EUROPE'S RELIANCE ON EXTERNAL SOURCES OF CRITICAL RAW MATERIALS IS NOW BEING ADDRESSED BY A COMPREHENSIVE EU ACT."**

Infrastructure development has ambitious targets set out in Project 2040. Lack of investment following the economic crisis of 2008 together with

an increasing population drive these targets. However, delivery of several major projects is delayed. Dublin's Metro, the Eastern Water Supply Scheme, the North South electricity interconnector, the A5 road project are among those which have not yet started. The highly complex planning system along with governance issues in An Bord Pleanala continue to frustrate timely delivery of infrastructure and development projects.

Transport Infrastructure Ireland (TII) in recent evidence to a Joint Oireachtas Committee stated that ten road projects were "interrupted" i.e. delayed by the Department of Transport. These include upgrades to the N4 in Westmeath, the N17 in Mayo, the N22 in Kerry and bypasses for Mallow and Ardee. The M20 Limerick to Cork motorway remains at the design stage. Road Projects that are at or near construction include sections of the N5 (Westport), M28 (Ringaskiddy), N5 (Scramouge) , N22 (Macroom), M8-N25 (Dunkettle), N59 (Moycullen) and N69 (Listowel).

An All-Island Strategic Rail Review published in July has ambitious targets for numerous rail links e.g. Ballina to Rosslare, a line to Donegal and increased fright services. Interestingly, only 1% of freight is currently carried by rail, much of it form Tara Mines from Navan to Dublin Port.

Health and Safety remain a key priority for the IMQS and the Review carries an update form the Health & Safety Authority.

Research and Innovation; Enterprise Ireland has initiated the **Construct Innovate Ireland** project (CI). Its vision is to make Ireland a global leader for sustainable construction and built environment technology. CI is a partnership between Trinity College Dublin, University College Dublin, University College Cork, the Irish Green Building Council and the host institution, University of Galway.

> **"SINCE 2013, OUTPUT OF QUARRY PRODUCTS HAS RECOVERED SIGNIFICANTLY."**

CI's five pillars are Productivity, Affordability & Cost, Quality & Safety, Sustainability, Skills & Training and Collaboration.

The SFI funded Irish Centre for Research in Applied Geoscience (iCRAG) continues to support over 150 post graduate research projects in seven Universities, with a strong focus on the social science aspects. **Geological Survey Ireland** continues to support research; a recently commenced joint project with SEAI is designed to provide a better understanding of geological parameters for geothermal energy. Both iCRAG and GSI are featured in this Review.

Individual companies sponsoring R&D include QME on the conversion of diesel vehicles to electric power; Priority Drilling on deep drilling techniques; Mincon plc and GDGEO on foundations for offshore wind facilities.

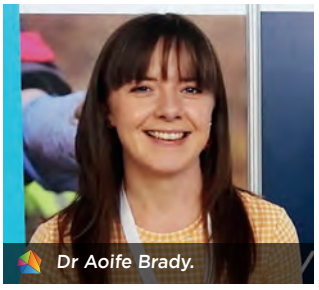
Policy Initiatives; the Department of Environment, Climate & Communications **(DECC) produced several important and well-argued policy documents in the last twelve months.** These include policy statements on Exploration and Mining, Geothermal Energy and a Hydrogen Strategy. A Minerals Advisory Group was established by DECC in late 2022 and involves representatives from environmental NGOs and from geoscience bodies, including the IMQS. The possibility of a new geoscience agency encompassing the GSI and the Geoscience Regulatory Office remains a live possibility with a recent report on possible conflicts of interest commissioned by DECC. IMQS is unconvinced as to this initiative but does recognise that state agencies can successfully combine research and regulatory services e.g. the EPA. As can be seen in the Foreword to this Review, DECC is deeply engaged with the EU CRM initiative.

The thorny problem of redress for defective concrete blocks in construction was dealt with in a Bill passed by the Oireachtas and enacted by the President in July. The construction sector has expressed concerns as to the possible negative effects of the planned levy to part finance the measure.

As with many issues, implementation of these policies will be the challenge. In a still growing economy with significant budgetary resources, cohesive action to meet CAPs and to upgrade stressed infrastructure is required.

It is with regret that we carry obituaries of John Barnett and Jim Walsh, former Presidents of IMQS and Pat O Connor, former President of IoQ (Northern Ireland). We thank all our advertisers, contributors and publishers 4SM for their support. Former President Nicola Nixon took over duties as Executive Secretary of the IMQS this year following Toni Doyle's departure and has been crucial in assisting the Editorial Committee. We hope that the Editorial Committee, now co-chaired by Dr Aoife Brady and Sean Finlay, can continue the fine work led by former Chair Siobhan Tinnelly who filled this post for many years- a hard act to follow!

THE EDITORIAL TEAM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Contents

IMQS ANNUAL REVIEW 2023

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Foreword from the Department of Environment, Climate and Communications

Thanks to the IMQS for the opportunity to contribute once again to the Annual Report. In my comments last year I focused on the reopening of economies across the world in the post-pandemic context where we all looked forward to a break from the perma-crisis. Tragically, the Russian invasion of Ukraine in February 2022 and the largest ground war in Europe since World War II plunged Europe and the world into a renewed crisis.

The direct human toll from Covid and the war in Ukraine will be felt for generations to come. These events have also had massive indirect social, economic and environmental impacts which will take years or even decades to fully alleviate.

STRATEGIC AUTONOMY

The importance of strategic autonomy has been a subject of discussion at EU level for many years as a way of reducing our reliance on other large global economies and to insulate the EU from the effects of global shocks such as Brexit, Covid, or war in Ukraine. We're now seeing that discussion evolve into definitive proposals from the European Commission, first in the European Green Deal in December 2019 which aims to to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. The Green Deal also recognises the need to ensure the supply of sustainable raw materials, especially those materials necessary to support the digital and energy transitions, diversifying supply from both primary and secondary sources.

CRITICAL RAW MATERIALS ACT

In that broader policy context, the European Commission published its legislative proposal for ensuring secure and sustainable supply chains for the EU's green and digital future in March 2023 – the Critical Raw Materials Act (CRMA). The Commission also published its proposal for a Net Zero Industry Act but my comments will focus on the CRMA.

The primary focus of the CRMA is on non-energy, non-agricultural raw materials that are important across the EU economy, particularly where supplies of those materials are subject to a high level of supply risk. These materials are essential inputs to the green and digital transitions that are at the heart of the Green Deal.

They support the shift towards renewable energy and the broader decarbonisation of our energy systems, the digitalisation of our economies, and the supply of essential products and services in the health and defence spheres. While the overall thrust of EU environmental and circular economy policy is on reducing demand for raw materials generally, the shorter term demand for materials that will deliver on climate action and digitalisation will increase.

For example, global demand for lithium used to manufacture batteries for both energy storage and EVs is projected to increase by up to 89-fold by 2050. Demand across the EU for rare earth elements essential for the manufacture of wind turbines and EVs will increase six to seven-fold by 2050. EU demand for gallium, used to manufacture semi-conductors, is expected to grow 17-fold by 2050.

As identified by the Commission, the EU is currently extremely reliant on imports for many critical raw materials that currently come from a small number of third countries, at both the extraction and processing stage. 97% of the EU's magnesium supply comes from China, 63% of heavy rare earth elements are refined exclusively in China. 63% of the world's cobalt is extracted in the Democratic Republic of Congo, while 60% is refined in China. This reliance exposes the EU to significant supply risks and these risks are exacerbated in a volatile geopolitical environment.

The Commission's response – the CRMA – aims to

- Strengthen the different stages of the European critical raw materials value chain;
- Diversify the EU's import of critical raw materials to reduce strategic dependencies;
- Improve EU capacity to monitor and mitigate current and future risks of disruptions to the supply of critical raw materials;
- Ensure the free movement of critical raw materials on the single market while ensuring a high level of environmental protection, by improving their circularity and sustainability.

POLICY PRIORITIES

To achieve these aims the CRMA sets clear priorities for action: In addition to an updated list of critical raw materials, the Act identifies a list of strategic raw materials, which are crucial to technologies important to Europe's green and digital ambitions while being subject to potential supply risks in the future. The Regulation will embed both the critical and strategic raw materials lists in EU law. It also sets clear benchmarks for domestic capacities along the strategic raw material supply chain and to diversify EU supply by 2030, proposing that capacities in Europe would meet:

- At least 10% of the EU's annual consumption for extraction,
- At least 50% of the EU's annual consumption for processing,
- At least 20% of the EU's annual consumption for recycling.

Additionally, it proposes that not

more than 65% of the Union's annual consumption of each strategic raw material at any relevant stage of processing would be sourced from a single third country.

It is intended that the CRMA will simplify permitting procedures and provide finance mechanisms for critical raw materials projects through the designation of Strategic Projects. Member States will have to develop national programmes for exploring geological resources. In terms of the circular economy transition, there will be a new emphasis on improving circularity and sustainability of critical raw materials.

Member States will need to adopt and implement national measures to improve the collection of waste rich in critical raw materials and ensure its recycling into secondary critical raw materials. Member States and private operators will have to investigate the potential for recovery of critical raw materials from extractive waste in current mining activities but also from historical mining waste sites.

Products containing permanent magnets will need to meet new circularity requirements and provide information on the recyclability and recycled content.

The Act also introduces mechanisms for coordinated monitoring of critical raw materials supply chains and measures to mitigate supply risks; lowering the environmental footprint of critical raw materials; cooperation on international Strategic Partnerships; and a European Critical Raw Materials Board.

DECC IS THE LEAD GOVERNMENT DEPARTMENT IN NEGOTIATIONS ON THE CRMA AT EU LEVEL.

The pace of these negotiations has been intense since publication of the CRMA in March and we have consulted widely with stakeholders across Government and externally to best inform Ireland's negotiating position and prepare us for implementation of the Regulation when it enters into force. It will impose a wide range of new obligations on Member States and companies to support the strategic aims identified by the Commission, particularly mining countries like Ireland

The three Geoscience Divisions in DECC – the Geoscience Policy Division, the Geoscience Regulation Office and Geological Survey Ireland – and in the future, the new Geoscience Agency will all take on important new functions.

The CRMA provides a new imperative for the geoscience sector in Ireland.

DECC looks forward to working with industry to maximise the realisation of the objectives of the CRMA across the mineral extraction, processing and recycling sectors, while ensuring sustainability and high environmental standards.

As ever, we will look for input and advice from IMQS members, the geoscience industry and other stakeholders to ensure that the Irish geoscience community is at the heart of our national climate and digital transitions.

An Roinn Comhshaoil, Aeráide agus Cumarsáide
Department of the Environment, Climate and Communications

BY PHILIP NUGENT

ASSISTANT SECRETARY, CIRCULAR ECONOMY, WASTE POLICY AND NATURAL RESOURCES, DEPARTMENT OF THE ENVIRONMENT, CLIMATE AND COMMUNICATIONS

Message from the President

As president of the IMQS I am delighted that you have taken the time to read our Annual Review.

I would like to start by complementing our editorial committee and Four Square Media for the excellent work and cooperation while compiling and publishing this review. Thanks also to all who have contributed articles and advertisements to the publication.

There have been a number of changes to the Council of the IMQS since last year's publication. At our AGM in February 2023, **Liam O'Shea** replaced **Jennifer Craig** as Treasurer. Jennifer has moved to the USA and taken the role of Executive Director of SEG (Society of Economic Geologists) in Denver, Colorado. The transition was seamless as Liam has helped with the society's accounts for many years. **Ciaran Greenan** has a new role as Operational Performance Manager for Tarmac UK. His place on the council was filled by **Tim O'Mahony**, Operations Manager for Roadstone Ltd. **Dr. Aoife Brady**, Industry and Research Programme Manager in UCD, joined the council filling the place vacated by Jennifer Craig. And finally, **Nicola Nixon**, our outgoing president, has taken on the role of IMQS Executive Secretary.

To all of our outgoing officers, thank you for your commitment and to our incoming council members, you are very welcome to the society.

On 14th July 2023, the mining industry in Ireland suffered a severe blow with the temporary closure of **Boliden Tara Mines**, the largest zinc mine in Europe. From that date all staff are on protective notice and the closure has also affected ancillary work and contract mining operations. The mine is in care and maintenance. The hope is that the prevailing economic climate will change for the better and allow the mine to reopen in the near future.

The reopening of the **Galmoy mine** is progressing well with planning permits having been granted by both Kilkenny and Laois County Councils. Infrastructure development and dewatering will commence later this year and mining is expected to commence in late 2024. **Dalradian Gold** is waiting to enter submissions at a Public Inquiry. This process is slow and could take many months. Despite this, regional exploration continued, with five locations considered and completed. In June 2023, Dalradian announced that, from its baseline in 2019, it had secured Carbon Neutral Plus status for the fourth year in a row.

In June 2023, **Galantas Gold** received Permitted Development rights to commence the drilling of eight surface exploration holes at the Omagh Project site. This exploration work will target gaps in areas of the inferred resource at the Joshua vein. A mine plan, targeted for completion mid 2023, will focus on optimising production from targeted areas of the deposit. It is anticipated that mining operations will resume in 2023.

Saint Gobain Gypsum Industries near Kingscourt continue to produce. Plans to expand the mine are progressing well.

Irish Salt Mining & Exploration Co. Ltd continues to produce rock salt for road de-icing and animal lumps in Kilroot, Carrickfergus.

Currently, the quarrying industry is buoyant and demand is steady. Housing, farming capital investment and infrastructural projects result in a high demand for aggregates and associated value added quarry products. But the introduction of a concrete product levy is an issue causing concern. It is certain to add to the already high construction costs putting increased financial pressure on end users.

The quarrying industry in Ireland directly employs more than 6,000 people. This is very significant as many of these jobs are in rural regions and support many rural communities. The announcement of significant offshore renewable projects and the infrastructure to service it, has the potential to add to demand and boost the regional economies close to these sites. The Planning process in Ireland, from the most basic domestic build to large industrial and infrastructural projects, is notoriously cumbersome and flawed. **The Government's Draft Planning and Development Bill proposal is a welcome** move to tackle the many planning issues. If enacted, the bill will bring greater clarity, consistency and certainty to how planning decisions are made. A welcome proposal.

I would like to thank EFEE for selecting Dublin as the venue to hold the 12th World Conference on Explosives and Blasting. Céad míle fáilte - one hundred thousand welcomes - to all the exhibitors, participants and guests.

Finally, I would also like to take the opportunity to thank you, our members, for your continued support. We are a voluntary society and without your support the IMQS could not exist.

BY ALAN DOLAN
President
IMQS

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GSNI collects, interprets and provides geological data, research and advice to central and local government, industry, academia, NGOs, schools and the public. GSNI maintains extensive digital databases and paper archives that are accessible online and through our enquiry service.

The data held by GSNI include:

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- Exploration data and open-file reports
- Historic mines database
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Activities of the Society 2022-2023

The following are the main activities of the society in 2022/2023.

Details of all IMQS activities can be found at **www.imqs.ie**. I would like to take this opportunity to thank you, our members, for your patronage. The society cannot exist without your continued support.

SCAN ME

COUNCIL MEETINGS

2022 September 14th, October 12th, November 2nd & December 7th.

2023 January 10th, February 21st AGM, March 15th, April 19th , May 10th & June 16th.

REPRESENTATIONS IN 2023

- European Federation of Explosives Engineers (EFEE)
- Prospectors and Developers Conference (PDAC)
- Draft Policy Statement for Mineral Exploration and Mining In Ireland - Response
- Mineral Exploration and Mining Advisory Group
- Geo-Drilling Apprenticeship
- Quarry Skills Certification Scheme meetings (QSCS)
- Quarry Safety Partnership (QSP)
- Minerals Information Working Group (MIWG)
- Mining and Minerals Hall Seville. (MMH)
- Department of Environment, Climate and Communications (DECC)
- IMQS Planning & Innovation Seminar

ANNUAL REVIEW 2023

The Annual Review 2022 as well as reviews from previous years can be viewed at **www.imqs.ie** or scan the QR code.

SCAN ME

IMQS SEMINARS

The IMQS hosted two Seminar in 22/23.

Held on the 21st of February 2022 our first seminar focused on, "How can Mining related companies support UN SDGs with O-Pitblast Solutions".

Presented by: Francisco Leite

Content: Francisco analysed some of the UN SDGs and explain how they can be addressed in our industry and how, with O-Pitblast products, the users can contribute to sustainability goals

Our second seminar on "Introduction to Mining" was held on the 25th of May 2023 in Geological Survey Ireland.

Presented by Brendan Morris who has over 40 years' experience in the industry delivered the course providing a general overview of Mining.

ANNUAL DINNER DANCE 2022

The Annual Dinner Dance took place at the Knightsbrook Hotel on the 12th of November 2022.

INSTITUTE OF QUARRYING – NORTHERN IRELAND, STONE CRUSHERS BALL 2022

The Annual Institute of Quarrying (N.I.) Stone Crushers Ball took place in the Europa Hotel, Belfast on the 14th October 2022.

IMQS was represented by then President Nicola Nixon.

CORPORATE MEMBERSHIP

Being a corporate member of the IMQS can have many benefits for your organisation; free advertising on the IMQS web site, free job postings and regular information updates.

Being a corporate member is an excellent investment for any company - large or small.

Scan the QR code for membership details.

SCAN ME

MINE RESCUE 2022

- The IMRC has been very active in the past year, with mutual training sessions held in Boliden Tara, Drummond (Gyproc Saint-Gobain), and Kilroot (Irish Salt Mining and Exploration).
- The annual committee meeting was held on-line in March. Gyproc Saint-Gobain and Galantas were both formally approved as full members of IMRC, joining Boliden Tara Mines, Irish Salt Mining & Exploration, and Dalradian Gold.
- A full summary can be found in the 2023 review.

GEO-DRILLER APPRENTICESHIPS

The IMQS supports the Geo Drilling Apprenticeship delivered by the South Eastern Technological University SETU.

The course continues in 2023 with 8 participants. Brendan Morris and Sean Finlay were involved in setting it up this course. See Apprenticeship.ie

SCAN ME

EVENTS IN 2023/2024

The EFEE Conference scheduled for Dublin from 11 to 14 September is supported by the IMQS. Alan Dolan IMQS President has represented IMQS on the EFEE Council for many years

Two of the Societies' main events, The Annual Dinner and The Annual Field Trip, will take place later in 2023.

ANNUAL FIELD TRIP

The planned Field Trip is to Breedon Cement Plant near Kinnegad Co Westmeath in September will coincide with EFEE.

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BY RUAIRI O CONNOR

IMQS Vice President & Hon Secretary, Area Manager - West, Kemek Ltd.

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Why Minerals Matter: How a Collaborative Industry Project is Future Proofing the Mineral Products Sector

Critical in the past, essential in the present and game-changing for the future; we know the economy could not function, and the transition to an energy-secure, low-carbon economy would not be possible without minerals.

And yet the mineral products sector joins the long line of industries that face ongoing challenges around succession and the skills gap.

In the UK government's Critical Minerals Strategy policy paper, 'Critical Minerals Refresh: Delivering Resilience in a Changing Global Environment' is an acknowledgment of the need for skills and education to form part of Britain's resilience in critical minerals.

So how is the industry supporting the critical minerals agenda? How is it inspiring young people to become the next generation of mineral products professionals? And how is it promoting the positive contribution to the economy and efforts around decarbonisation and the circular economy?

School visit Hillhead 2022.

CROSS-SECTOR APPROACH: MINERALS MATTER

Minerals Matter is a new industry led, collaborative approach which proactively seeks to inform, educate, and inspire young people into a career in the mineral products sector.

In collaboration with leading industry bodies, Mineral Products Qualifications Council, Institute of Quarrying, Mineral Products Association, British Aggregates Association, and national and independent operators, Minerals Matter aims to address the key challenges around succession and the skills gap analysis.

Emily Noble, Future Careers Manager - Minerals Matter, explains: "It's imperative that we connect with young people and adults to highlight the variety of career pathways within the mineral products sector. Almost 10 million people in UK employment are over the age of 50, equivalent to more than 30 per cent of the workforce.

"The age profile of people employed in the mineral extractives sector is even more polarised than the wider national picture, with 55 per cent aged over 45 years and only 17 per cent aged 18-34. In future decades, a high proportion of this group will leave work permanently, taking acquired skills and experiences with them."

Minerals Matter has already started to connect with a range of audiences, championing the diverse and inclusive career opportunities within the sector. It is taking the lead for the sector's future skills by developing strategic partnerships, educational resources and developing a team of inspirational industry ambassadors, as well as delivering a programme of school outreach activities.

It is also scrutinising current National Operational Standards, interrogating if they are fit-for-purpose, and driving change where they are not. As technology changes working practices, new standards are being created by working groups of skilled people collaborating within industry. Minerals Matter is both inward thinking and outward reaching at the same time.

Emily continues: "As part of Minerals Matter, we're developing our team of industry ambassadors to support careers activity and experiential learning in all phases of education. We are

partners with STEM Learning UK and have a membership agreement with EngineeringUK; two key collaborations that will help to alleviate our message.

"What's more, we're starting to build a network of educational sites to facilitate school visits, including the National Stone Centre in Derbyshire and the Somerset Earth Science Centre in the Mendips. It's our mission to inspire the next generation; you can't be what you can't see."

GET INVOLVED: BECOME A STEM AMBASSADOR

Research conducted by engineering and professional services firm WSP found that the majority (73 per cent) of current UK students feel uninformed about the green jobs available to them.

The mineral products sector is well placed, with positive stories to tell on net zero targets and making real time interventions that are meaningful for sustainability and biodiversity. The sector is a good match for career aspirations, so long as the word gets out.

As part of the Minerals Matter approach, industry professionals are encouraged to step up and volunteer as a STEM Ambassador; those

School visit to the National Stone Centre, Derbyshire.

with the knowledge and passion to educate and inspire young people about the mineral products sector.

Justin Collis FIQ, isee, Project & Engineering Manager at Hanson Aggregates UK Ltd, is a Minerals Matters STEM Ambassador. He has completed 73 hours of STEM learning activities this year alone, reaching six different locations and 2,000 students.

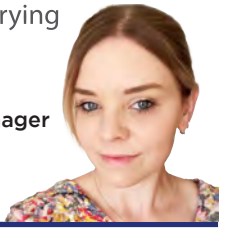
He explains: "Many companies, including Hanson, offer a volunteering day and a STEM Day would be a great use of it. The time invested will be returned to us and may only be an hour out of your day. We must invest time now to invest in our future; engagement with young people can only strengthen our business.

"Take a leap of faith, as the initial thought is the first step. Tools and resources can be provided or go along with another ambassador to ease your own potential anxiety. Once you start to share your own experiences you will find that comfort zone and excel. We are in this together and can assist each other in developing our future industries."

Companies and individuals that want to get involved and support Minerals Matter, including how to register to be a Minerals Matter STEM Ambassador, can visit **https://minerals-matter.co.uk/get-involved**.

IQ The Institute of Quarrying

BY EMILY NOBLE
Future Careers Manager at Minerals Matter



Irish Mine Rescue Committee 2022-2023

The IMRC has been very active in the past year, with mutual training sessions held in Boliden Tara, Drummond (Gyproc Saint-Gobain), and Kilroot (Irish Salt Mining and Exploration).

Also, the annual committee meeting was held on-line in March 2023.

MUTUAL TRAINING

Boliden Tara held the first two mutual training sessions after the pandemic, in May and August 2022.

The first mutual training of 2023 took place on Tuesday 31st January in Gyproc Saint-Gobain's Drummond Mine. Three teams were deployed underground in challenging search and rescue scenarios.

On Wednesday 19th April 2023, Irish Salt Mining and Exploration Ltd. hosted the second mutual training of 2023.

The photographs from the exercise show the detail of the preparation and briefing procedures.

On Wednesday 10th May 2023, Boliden Tara Mines hosted the third mutual training of 2023. The training included a demonstration of the M-20 self-rescue unit, the Care Vent resuscitator, and the PSS 7000 normal air breathing set. The training also introduced mutual assistance partners to the FocusFS and Mobilaris safety positioning systems.

Drummond mine rescue team in action in Drummond Mine.

The annual IMRC committee meeting was held on-line on Friday 31st March 2023.

The highlight of the meeting was that Gyproc Saint-Gobain and Galantas were both formally approved as full members of IMRC.

The support from the Health and Safety Authority in the Republic of Ireland and the Health and Safety Executive in Northern Ireland was also gratefully acknowledged at the meeting.

CARE AND MAINTENANCE AT BOLIDEN TARA MINES

At the time of writing Boliden Tara Mines have gone into an indefinite period of care and maintenance. The effect of this will be significant – Tara have been the guiding light for mine rescue in Ireland for over 40 years.

Irish Mine Rescue Committee

BY
MIKE LOWTHER Chair IMRC
AOIFE TALLON Secretary IMRC
ANTHONY MORAN IMRC

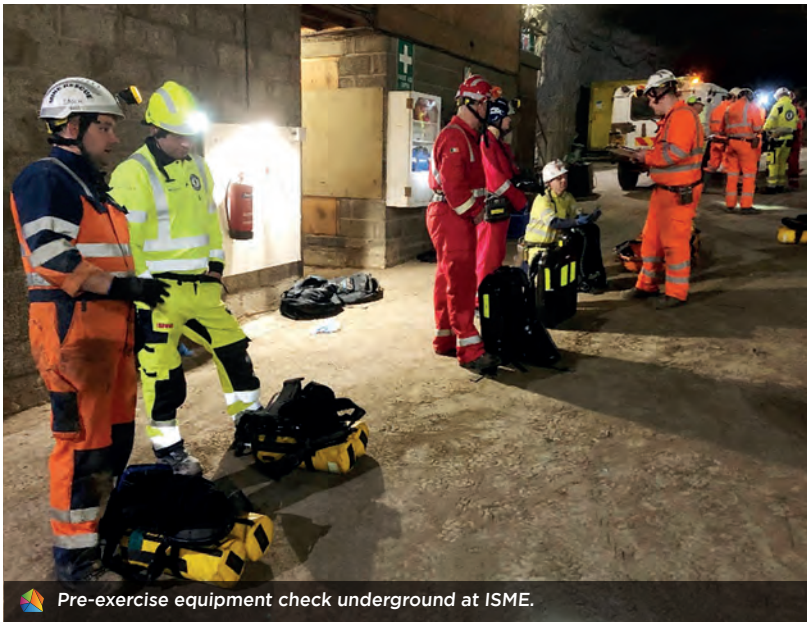
The combined IMRC team at Tara on Wednesday 10th May 2023.

Team captains (Angela Coney, Dalradian and Ben Loverage, Galantas) conferring in the Drummond Mine exercise.

Galantas mine rescue team in action in Drummond Mine.

Status check during the exercise underground at ISME.

Debrief at the FAB (Fresh Air Base) after the exercise underground at ISME.



Pre-exercise equipment check underground at ISME.

Team briefing in the Tara Mine Rescue Station, using the Mobilaris safety positioning system.

Irish Concrete Federation (ICF)

It gives me great pleasure to update readers of the Irish Mining and Quarrying Society (IMQS) Annual Review on the activities of the Irish Concrete Federation (ICF) over the past year and to highlight some of the more notable challenges facing our organisation and its members. I would like to thank IMQS for his invitation to contribute to this publication which is highly regarded throughout the Irish mining and quarrying industries and beyond.

The theme for this year's Annual Review is " Why mineral and quarrying products?." In previous contributions to this publication, I have highlighted the essential nature of the materials which emanate from our industry. This was underlined most clearly during the pandemic when Irish aggregate and concrete suppliers were required to supply essential construction throughout the various periods of lockdown, thereby demonstrating the systemic importance of this industry to Irish society. The increased population of our country, evident from 'Census 2022' will stimulate further demand for materials as the country responds to the need for investment in public infrastructure and I am certain that both IMQS and ICF members will meet the challenge of providing for this societal need in the future.

It goes without saying that the inflationary impact of increased energy and raw material costs has been the single biggest challenge facing ICF members over the past eighteen months. Increased costs of all building materials, including aggregates and concrete products, have undoubtedly impacted upon the level of construction activity, resulting in a moderate reduction in demand for materials since April of last year. While this trend has continued into the current year, the medium to long-term pipeline of future projects is strong, which will benefit our members' businesses in the coming years.

At time of writing, the impending introduction of a **Government levy on ready mixed concrete and concrete blocks** from September 1st of this year **is the key priority for ICF.** The introduction of the levy in 'Budget 2023' in September of last year was received with shock and disappointment throughout our membership. It is abundantly clear that the proposed levy has not been given any comprehensive consideration, has not undergone any regulatory or economic impact analysis and no guidance to industry on how

it will be administered or enforced has been forthcoming. Thanks to the efforts of our membership and the support of many stakeholder organisations, the levy's impact has been negated to some extent due to the subsequent exclusion of precast concrete from its scope and its reduction to 5% of product value.

Notwithstanding this fact, it is inevitable that the levy will increase construction costs in Ireland and will present a significant challenge for concrete manufacturers in border regions arising from increased competition from suppliers based in Northern Ireland. ICF will be doing its utmost to influence the postponement of the levy's introduction pending a robust regulatory and economic impact analysis. To support these efforts, we have recently published a report by KPMG on the levy's impact on the cost of infrastructure delivery across the country which we are circulating to all public representatives throughout the country.

Over the past year ICF has continued to work on behalf of our member businesses throughout the country across a range of policy areas. As ever, the 'work engine' of the organisation is the policy committees which operate across a broad range of disciplines and business areas. Our committees serve the dual purpose of harnessing members' expertise to form policy and equally importantly, facilitating the sharing of knowledge throughout the membership.

Our Health and Safety Committee continues to raise the bar in safety across our member locations. In late 2022 we actively supported the Health and Safety Authority (HSA) on a safety campaign in Irish quarries focused on vehicle and pedestrian safety. This was followed up with a further campaign in May of this year which focused on maintenance and isolation. We are grateful for the support of the HSA who conducted audits across the industry during both campaigns and provided valuable feedback to industry on the findings of the audits. The committee is also monitoring developments arising from the passage of the Construction Safety Licensing Bill through the Oireachtas which will see substantial changes to the training and certification of machinery and plant operators in the industry.

The heatwaves seen across southern Europe this summer are a reminder to us all of our collective responsibility to reduce our impacts on the environment. ICF has developed a sustainability plan for the organisation and is hopefully nearing completion of a recruitment process for a new head of sustainability. We very much look forward to engaging with all stakeholders to effectively communicate the achievements of our sector to date in reducing our industry's environmental impacts and to promoting increased awareness among our membership on the role that they can play in further reducing their carbon footprint, enhancing biodiversity and supporting the circular economy.

In this context, our Planning and Environmental Committee welcomed the publishing of national end of waste criteria for recycled aggregates from waste concrete by the Environmental Protection Agency earlier this year. While the committee is disappointed at the limitations on their applicability for concrete manufacturing, we hope that, once established, the end of waste criteria will be revisited by the Agency to

facilitate the manufacturing of concrete products from recycled aggregates.

The Planning and Environment Committee and the ICF Council is also reviewing a draft policy document highlighting the depletion of authorised aggregate reserves in some regions and the resulting constraints on the delivery of Government strategic infrastructure priorities. ICF is becoming increasingly concerned that, while Ireland has abundant natural reserves of high-quality aggregates and there are no significant capacity constraints currently, scarcities of some aggregate products are already emerging in some regions. Ireland's strategic reserves of aggregates need to be identified, quantified and protected and a robust, effective and efficient planning system for quarries is needed to ensure that the extraction of Ireland's aggregate reserve is enabled in a sustainable manner. We look forward to publishing this policy document in the autumn. ICF is also hopeful that the Government's Planning and Development Bill will underpin the development of a planning system that provides the social, economic and physical infrastructure necessary to meet the needs of our people in a way that protects the many qualities of our natural and built environment.

The ICF Human Resources Forum continues to monitor the ever-increasing raft of employment legislation facing employers and to brief members on the implications for their businesses. Our Technical Committee continues to contribute to the ongoing revision of product standards and the development of new guidance on their application in industry. The Irish Precast Concrete Association, a constituent association within the ICF, is currently focused on identifying ways to drive innovation and boost productivity in construction, including through the adoption of **Modern Methods of Construction (MMC).** It is essential that precast concrete is recognised by Government and the construction sector as the leading MMC solution for today's construction sector. IPCA recently hosted a successful MMC workshop with contributors from Construct Innovate, Enterprise Ireland, Build Digital and Laois Offaly ETB, all of whom are actively promoting initiatives in this area.

The Ground Limestone Producers Association of Ireland is working closely with the Department of Agriculture, Food and the Marine on the development of the National Fertilizer Database while also continuing to promote the association's trademark 'Grolime.' The association welcomed the introduction of a subsidy for lime usage in Ireland in Budget 2023 which has yet to come to fruition at time of writing due to the higher than anticipated level of interest from the farming community.

In conclusion, I hope that this brief account of some of the key activities of the ICF is of interest to you. I would like to congratulate the IMQS in producing their Annual Review and to wish all readers a safe and prosperous remainder of 2023.

BY GERRY FARRELL

Chief Executive, Irish Concrete Federation

An overview of activities by the Institute of Geologists of Ireland (IGI) 2022-2023

The Institute of Geologists of Ireland (IGI) was established in 1999 with the mission of promoting and advancing geoscience and its professional application in all disciplines and to facilitate the exchange of information and ideas throughout the existing community. The IGI is a registered charity and is not a lobbying organisation, and its members are required to uphold, develop and maintain the highest professional standards. To this end all members must undertake CPD recording for approval on an annual basis.

Professional membership of the IGI is open to all practising geoscientists who meet the required standards of qualification and experience. Professional members are intitled to use the Professional Geologist (PGeo) title as well as the European Geologist (EurGeol) title as IGI are a National Licencing Body with the European Federation of Geologists (EFG). The IGI maintain a number of specialist registers of competent persons including:

- Qualified persons in respect of carrying out geological aspects of works related to pyrite described in 398-1 and EN13242 including SR21
- Geoscientists/competent persons: Regulated and Unregulated Waste Disposal/Contaminated Land Assessments following the EPA Code of Practice.

The IGI also maintains a number of Mutual Recognition Agreements with professional bodies in other jurisdictions. These agreements allow professional members from the professional bodies to practice as geoscientists in the other's jurisdiction provided the conditions of the MRAs are met. For information on how to apply to the IGI, please visit www.igi.ie.

The mining and quarrying sectors have always been very well represented within our membership, with almost 30% of our members stating 'Mining Geology and Exploration' as their main area of expertise.

Many of our members are involved in mining through associated fields such as hydrogeology, geochemistry, education, environmental assessment or regulation. The IGI recognise and support the work of IMQS in the responsible development of the minerals industry in Ireland in line with best practice.

The IGI acknowledges the continued support of our sponsoring bodies, the Irish Mining & Quarrying Society (IMQS), Geophysical Association of Ireland (GAI), Geotechnical Society of Ireland (GSI), Irish Association for Economic Geology (IAEG) and the International Association of Hydrogeologists (IAH Irish Group).

IGI ACTIVITIES 2022 - 2023

During the course of 2022-2023, the IGI continued to hold meetings and events online, or following a hybrid model. The IGI endeavours to continue to develop, promote and advance geoscience in all disciplines through facilitating information exchange.

Initiatives such as the IGI's Early Career Network and Mentoring Scheme have huge potential to enable the community to support each other and continue to develop the profession. Early Career members have added a great deal to a number of committees and working groups in recent years and we hope this trend continues into the future.

The membership has grown in 2022 and 2023; twenty-one candidates were approved for Professional Membership, fourteen for Membership-in-Training and 5 new Student Members. This brings our total membership to 373.

MINERALS INFORMATION WORKING GROUP

The Minerals Information Working Group (MIWG) remains the largest working group within the IGI and we are grateful to have the support of IMQS members who actively contribute to the working group.

The IGI, as head of the IGN, were requested to nominate five members for the Department of Environment, Climate and Communications (DECC) Advisory Group on Mineral Exploration and Mining.

The group began its work in 2022 and has 15 members representing the Environmental, Economic and Social Pillars. The inclusion of the IGI and IGN is testament to the relevance of the organisations and the valuable science-based contributions our members can impart to such important groups.

COURSES AND WEBINARS

The IGI continued to deliver a series of events in 2022-2023, mainly online via Zoom, but we are beginning to

IGI WELCOMES NEW PRESIDENT

IGI held its AGM on 28th June 2023 as a hybrid meeting at 63 Merrion Square and online.

At the AGM, EurGeol Eoin Wyse PGeo was elected the 13th President of IGI. Eoin has been an IGI Board member since 2017 and previously served as IGI Secretary and IGI Vice President. He has represented the IGI as a Delegate to the EFG.

He is currently employed as a Senior Engineering Geologist in Arup and has 19 years' professional engineering experience in the design and construction of large building projects, in geo-environmental assessment of contaminated land and the assessment of aggregates for use as unbound fill or in concrete.

He is looking forward to continuing the existing work of IGI and working with the current Board to further the profile of geosciences in Ireland and Europe.

Eoin Wyse and Cian O'Hora.

hold some in-person events. We have aimed to provide regular CPD opportunities throughout the year for our members and, so far, have delivered:

- David Norbury's Geotechnical Soil and Rock Logging to BS5930 course
- John & Trudy Arthurs' Mentor and Mentee Training Webinars
- Brendan Slattery's Recent Environmental Case Law webinar

Further training is planned for the coming months, including a Contaminated Land Series event and some Early Career Geoscientists Network meetings.

GOVERNANCE

The IGI became members of Charities Institute Ireland (CII). Additional training and support was needed to ensure the organisation keeps informed on governance requirements.

All IGI board members will be required to undertake the Certificate in Best Practice for charity trustees. Further information can be found on their website **https://www.charitiesinstituteireland.ie/**.

The IGI has continued to improve on written procedures and policies and this year has updated the following documents:

- Minerals Information Working Group Terms of Reference
- Continual Professional Development Audit Procedure (update underway)
- IGI Awards Procedures (update underway)

REPRESENTATION

This year the IGI maintained its public profile on a number of fronts, in line with the 2019-2024 strategy. We responded to a number of issues concerning geoscience in Ireland through the year via public consultations or direct representations:

- EPA Public Consultation on Regulation 27 of the European Union (Waste Directive) Regulations 2011-2020 - National By-Product Criteria for Greenfield soil and stone used in Developments
- EPA Public Consultation Article 28 End of Waste Consultation
- Dept. of the Environment, Climate and Communications Statement of Strategy 2023-2025
- EU Critical Raw Materials Act Call for Evidence

The IGI were part sponsors of the 10th Anniversary Irish Brownfield Network Conference in September 2022 and part-sponsored the IGRM in Belfast in February 2023.

The IGI continues to facilitate collaboration in the geoscience community, through convening the Heads of Geoscience Groups forum, which met 3 times through the year, and the Irish Geoscience Network meeting which was held in March 2023.

The IGI wishes to thank all participants who have given up their time during the year to make sure that the geoscience community in Ireland is connected and working together.

The IGI continues to be involved at a high level in the European Federation of Geologists (EFG). Members attended the last number of council meetings and have joined a number of key working groups with the EFG.

BY EOIN WYSE
EurGeol, PGeo
President IGI

Mining is Vital to Achieving Climate Change Targets

Many of the actions needed to achieve global net zero targets by the middle of this century, whether it is reducing the use of fossil fuels, building more renewable energy infrastructure or switching to electric vehicles, will place a huge demand on mineral raw materials.

Achieving climate change targets just won't be possible without the global mining sector and the essential minerals it provides.

FIVE-FOLD INCREASE IN METALS NEEDED

It's widely accepted that if the world is to successfully transition to renewable energy and deliver a new Green Industrial Revolution then the supply of metals will have to increase. A recent study by the World Bank titled "Minerals for Climate Action" found that demand for silver is expected to increase by more than 300% and copper by 200% by 2050. Some have suggested that to achieve the Paris Agreement target of just a 1.5°C or lower increase in global temperatures, there will need to be a five-fold increase in the supply of many common metals. Demand for some metals which are integral to renewable technologies is expected to surge.

A key question for government, businesses and consumers is: Where will these metals come from?

Our environmental team carry out extensive monitoring as part of the baseline studies.

UNDERPINNING A GREENER FUTURE

The Institute of Geologists of Ireland (IGI) couldn't be clearer about why we need to think strategically about where we source our minerals: "Currently, Europe has to import more than 75% of almost all metals, and up to 100% of some critical minerals. With that comes certain supply risks, such as higher prices that could have an adverse impact on the economy in the event of a serious trade dispute or disruption."

This statement has already been proven. We just have to look at the long waiting lists for electric cars and the hike in prices. Relying on imports puts us in a vulnerable position. We've been putting our heads in the sand; more should have been done about this issue before now. How can we be content for mining to take place in faraway countries,


Dore Bars produced from our test mining phase in 2016.


Underground at Curraghinalt.

which often have poor environmental standards and working conditions? Not to mention the carbon footprint of importing these raw materials.

The IGI conclude that "More mining in Europe would ensure it takes place under environmentally and socially sound conditions while making the economy more resilient." Europe has rich mineral deposits that could help meet some of the supply chain demands.

OPPORTUNITY IN TYRONE

Since 2009, Dalradian has explored for a broad range of minerals in Northern Ireland under licences issued by the Department of Economy including precious metals, base metals, critical minerals and rare earths.

Based on that work - plus test mining, engineering and environmental studies - the company has developed an environmentally responsible, carbon-neutral project to mine underground for copper, silver and gold.

Dalradian's planned underground mine will help build a new industry to Northern Ireland. It will create 350 direct jobs and a further 650 jobs as a result of mining activity and increased spending. A training programme of £15 million over 3 years, beginning during construction of the project, is aimed at maximizing local employment and will increase skill levels in the region. The annual salary spend will be £21 million with a further £12 million paid annually in labour and corporation taxes.

Overview of our proposed mine site in Tyrone.

Construction of the mine and related infrastructure will cost £108 million. Once in operation, the mine will spend £46 million annually in the supply chain, creating a host of new opportunities for suppliers and contractors. Dalradian has also committed a minimum of £4 million of funding for community projects.

Not only will the mine bring a huge boost to the NI economy and create new opportunities, it will also produce minerals that are vital to modern life and the transition to a green economy.

Over the mine's 20-year lifespan, it will produce 15,000 tonnes of copper, 3.5 million ounces of gold and 850,000 ounces of silver: metals which lend themselves to an array of highly useful purposes, including renewable technologies. We are also assessing the potential for critical minerals in our deposit since minerals often occur in association. A recent report produced by the British Geological Survey identifies our project area as being highly prospective for critical minerals.

For more information visit Dalradian.com

DALRADIAN

MPANI Regional Director's Report

One of the highlights of last year was the new 2022/23 MPANI Industry Journal that was launched on Tuesday 22nd November by DfI Permanent Secretary, Julie Harrison. The launch took place at the developing Belfast Transport Hub currently being constructed at Weavers Cross, the bulk of construction materials for the project's construction is being supplied by MPANI members.

As the strap line states 'WE ARE ESSENTIAL! REALISE IT, COMMUNIATE IT' and we hope that everyone who reads the Journal, (download and view it from our website at MPANI Launch 9th Industry Journal | MPA NI), will have a greater appreciation of the contribution our Industry makes to the local economy and the quality of life of every citizen of Northern Ireland. We circulated the booklet widely and in particular to local MPs, MLAs and Councillors. It was encouraging to get a number of emails from the political representatives thanking us for sending them a copy of the Journal.

As in previous years our Executive Committee, ably led by Paul Brogan and Paddy Mohan, has set the direction and focus for me and our hard-working sub committees. The year started with intensive lobbying of UK Government to get them to reverse the decision to remove the red diesel rebate. Locally we published a joint press release with Manufacturing NI, CEF and the Federation of Master Builders, and we travelled to London for a Westminster Hall debate in the Houses of Parliament. Alas, it was not to be and the Government went ahead and did the cash grab removing the rebate.

Our Health and Safety Committee continues to be very active with a clear focus on maintaining standards as we came out of the Covid period. Mental health and wellbeing is a high priority issue and it was great to see many members get involved and deliver a number of initiatives within their companies throughout the year. The Transport Safety Initiative held by HSENI was very well received by the Industry and HSENI feedback on industry engagement and improving standards was good to hear.

Our Young Leaders Group continues to meet and grow and its great to see the engagement and relationship building among the young managers who are the future of our Industry.

We recently took the very important

Department for Infrastructure Permanent Secretary, Julie Harrison, joined MPANI Chairman, Paul Brogan for the official launch of the MPANI 2022/23 Industry Journal.

MPANI are also a supporter of the "Not just for Boys" initiative led by Womenstec in Northern Ireland.

step of setting up our **MPANI Women in Minerals Group**. We had a great attendance at our "internal" launch in April. This group is organised and driven by women in our Industry to improve diversity and change the culture for the better and one in which women of all ages feel comfortable working in and can make a valued contribution.

In recent times we have all been shocked and alarmed, maybe many of you not so surprised, as we have witnessed unprecedented weather events and extreme temperatures on land and in the oceans. I therefore felt it appropriate to focus on the challenges and opportunities that we as a Minerals Industry face over the next number of decades. I decided to entitle this short report for your IMQS Journal **"Managing and adapting to the new Industrial Revolution"**.

As we all know Minerals are essential for our economy and our way of life, now and in the future. New homes, schools, hospitals, workplaces, roads and railways, as well as the infrastructure that provides us with clean water, sanitation and low-carbon energy, all depend on the industry's products and create the demand for them. Our industry also takes its environmental obligations extremely seriously and is committed to being part of a net zero carbon society. We support the ambition to decarbonise as soon as practically and economically possible and are working hard every day to achieve it.

MPANI believe, and have advocated strongly that Carbon Reduction Targets must be based on sound scientific and economic based advice. They must consider local evidence and local characteristics such as diversity of

energy supply, greater economic reliance on agriculture, more dispersed rural communities therefore creating a greater dependence on transport and greater use of home heating oil in our housing stock.

The success of our journey to Net Zero will be dependant how Government and each industry sector work in close collaboration, to build a shared understanding and pathway to net zero, one where policy, financial and infrastructure enablers are coordinated to support each sector's decarbonisation and to manage a just transition.

There is a need for long term support for hard-to-abate sectors from Government similar in scale to the policy and financial support that has driven renewables development and deployment. As renewable energy has become much more cost competitive there should be scope to refocus Government support for essential energy intensive industries like minerals, where deep decarbonisation, and the parallel investment in enabling infrastructure, currently presents unmanageable competitive or financial risk.

As a major consumer of mineral products, Government can also help to promote locally produced construction materials, support local economies and exercise precautionary climate change adaptation. The setting and achieving of carbon reduction targets should be supported by Government incentives through grants, preferential procurement mechanisms and fast track planning.

For example, **fast track planning for lower / zero carbon emission homes, lower / zero carbon infrastructure** such as hydrogen production, geo thermal energy supply and the province wide introduction of electric charging stations for private cars.

MPANI members have a strong interest in facilitating generation of renewable or low carbon electricity for society. The location, extent and the availability of natural resource (eg wind) at our members sites means that we are well placed to facilitate lower carbon technology rollout and innovation.

MPANI is currently working with a number of organisations in the public / educational / private sectors as we embark on the energy transition journey. We are committed as an Industry to do our bit to achieve zero carbon emissions by 2050.

The ever-increasing speed of change of technology means we are at the beginning of a new Industrial Revolution driven by energy transition that will undoubtedly transform many traditional industries such as minerals and the manufacture of construction materials.

Our meeting last year at Conexpos Ballygowan Quarry and since then the Group has been hosted by Mannok and CDE for very informative site visits to their manufacturing facilities in Fermanagh and Antrim respectively.

The technology is now available and developing that will mean many industrial operations, including quarrying, can become energy independent and carbon neutral by using renewable wind not only to power its day time operations but then to use the that wind energy at night to manufacture and store its own hydrogen energy by having an electrolyser on site. This on site produced energy can then be used to not only fuel other on site operations and mobile plant but also any transport fleet used to supply materials to customers.

Four leading Mid-Ulster companies have established a collaborative cluster with the aid of Queens University Belfast and facilitated by Centre for Competitiveness / Smart Grid Ireland. The purpose of this pilot project is to unleash the Net-Zero innovation potential of their businesses and achieve their Environmental, Social and Governance objectives.

The Mid Ulster partnership has been formed between Tobermore Concrete, CemCor, Dale Farm and RSC Group. This novel approach was enabled by the Centre for Advanced Sustainable Energy (CASE) at QUB, which indicated that farming wastes could decarbonise our existing gas grid with profound repercussions for Northern Ireland's capacity to reach Net Zero. For more information click https://www.cforc.org/news/mid-ulster-companies-collaborate-to-eliminate-use-of-fossil-fuels.

MPANI are working with Professor David Rooney and his colleagues at the Centre for Advanced Sustainable Energy Research in Queens University to expand this collaborative working using agriculture waste as a product to reduce the carbon footprint of construction materials. One such initiative is a collaborative network between our cement companies in Ireland investigating the use of Biochar in concrete and cement.

Biochar is the lightweight black residue, made of carbon and ashes, remaining after the pyrolysis of biomass. According to CASE this material can be a lower carbon alternative to be used by the Industry. Agreement on the collaborative network approach has been reached and work is underway to progress this very exciting work.

MPANI are excited about the positive aspects the use of biochar can bring to reducing the carbon footprints of concrete products in NI. Given that NI Agriculture produces enough food to feed 8 million people and we only have 2 million people we have enough biochar and bio methane from the biomass process to meet the needs of the NI Concrete Industry.

As an Industry we recognise that we must commit to the most efficient use of all resources, embracing the principles of the Circular Economy. Our Industry is already walking the walk of resource efficiency and decarbonisation. Recycling and circular economy solutions can play a role towards improving quarry resource utilisation and extending the life of high value assets around the country and the world. **We do need to move away from the traditional linear model in quarry products**.

Moving to a circular economy means understanding and optimising the life cycle of our products. Whether it's in the vertical or the horizontal built environment, it is important to have a very clear understanding of the product life cycle of all quarry materials, and the influence that our industry can have on the circular economy through the sustainable management of these materials. A long-term view of the ongoing reuse, recycle, repurpose of construction materials is critically important for long-term resource management. Government, and in our sectors case, construction clients, need to work closely with us to learn and become more aware of what is available and what is possible in the future in relation to decarbonising and resource efficiency in the built environment.

One thing is for certain, Net Zero is not a destination, it is a journey. It is not a canvas, but more a large jig saw puzzle with multiple pieces all of which will have its part to play in achieving decarbonisation and cleaning our air. Our Minerals Industry has a vital role to play in achieving wider society's goals and aspirations but we can only achieve this by working in partnership, both within our industry and with all our external stakeholders.

May I wish IMQS and all its members well over the coming months and we look forward to sustaining our valued and important relationship through what are challenging times for everyone on this island.

Best wishes and Stay Safe

mpa Northern Ireland
essential materials
sustainable solutions

BY GORDON BEST
Regional Director,
MPANI

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Tara Mines

Tara Mines was very much in the news this year as the operation was placed on care and maintenance in July 2023. Over 620 persons were laid off by Tara and over 150 laid off by companies supplying goods and services to the mine. Weak metal prices, high energy cost and declining grades of mined material were contributing factors. Delays in securing renewals of exploration licences to evaluate new high-grade resources were said to be an additional factor, as was a water ingress near new, deeper lying resources.

The mine has had fluctuating fortunes since its discovery in 1970. Commodity and currency price variations, production challenges and legal battles with governments and with a neighbouring company have all featured.

It has enjoyed short periods of exceptional profits (e.g. 1984, 2005, 2019) but the current combination of negative factors has led to the difficult decision to suspend operations.

GEOSCIENCE IRELAND
Exploring Developing Sustaining

BY SEAN FINLAY
Director,
Geoscience Ireland

TARA MINES TIME LINES

1970
The Navan zinc-lead orebody was discovered by Tara Exploration and Development Ltd, a sister company to Northgate Exploration, an Irish Canadian company which discovered and developed the Tynagh zinc-lead Mine in Galway and the Gortdrum copper Mine in Tipperary in the 1960's.

1971
Bula Ltd., an Irish company, acquires lands over the northern portion of the orebody, leading to decades of litigation, finally resolved in Tara's favour in 2002. International mining companies Noranda, Cominco and Charter acquire interests in Tara.

1971-1972
Ore reserves of 69.9 Million tonnes (Mt) at 12.7% combined zinc plus lead announced. Planning permission involving one of Ireland's earliest Environmental Impact Statement secured.

1973
Mine development commenced, initially using Canadian contract miners. 3,000 employed during construction. Capital Cost $120 M, one of the largest industrial investments in Ireland at the time.

1977-1982
Production commenced in 1977; the following years were challenging financially and technically.

1982
Mine closed for 8 months due to a labour dispute.

1984-1985
Record production and profits following 7 years of operational losses, enabling repayment of all loans and of first dividend.

1986
Tara acquired by Finnish company Outokumpu.

1986-1996
1986-1996 and 2003-2013; Average Annual Production rates of over 2.5 Mt achieved, ranking Tara as one of the largest European zinc producers.

1990-1996
Consistent exploration programmes in the vicinity of the mine led to the discovery of a new zone c 2km south west of the Main Orebody - the SWEX zone (South West Extension).

1997
Production commenced in SWEX zone at depths of 700m+; Capital Cost €58M. Additional resources SWEX-B identified in 1999-2000. By 2001 the new mineral resources were estimated at 18.8Mt @10.6% zinc + lead.

2001
Mine placed on Care and Maintenance for 10 months due to low metal prices (development of new areas was undertaken during C&M).

2002
Tara secure ownership of the northern portion of the main orebody from the receiver of Bula Ltd for €35M, enabling the development of more than 10 Mt of higher-grade material, which commenced in 2004.

2004
Tara sold to Sweden's Boliden.

2012
"Tara Deep" discovered using innovative seismic and drilling methods; these new resources are at c 2km depth and 3km south east of the mine. Approximate Inferred Resources in Tara Deep outlined by 2022 were 27Mt @ 10% zinc + lead.

2016-2022
Production declined from 2.6Mt to 2.0 Mt per annum; grades decreased from c .7% to 6% zinc + lead.

2022
A total of 100 Mt mined since 1977.

July 2023
Operations placed on Care & Maintenance. Exploration and development of Tara Deep suspended.

Paula McCaul CEO of County Meath Chamber in a statement following the announcement of the pending closure described the position as a seismic event for Co Meath and expressed concern for the financial and emotional impacts for the families concerned. She went on to say the Tara Mines is across generational institution intertwined with its community and much loved and respected. IMQS concurs with these views and looks forward to an early reopening of the operation.

Reference; 2018; Ashton JH et al; "Discovery of the Tara Deep…"; in Society of Economic Geologists Special Publication no 21 pp365-381.

Geoscience Ireland

Geoscience Ireland, the business network of 35 companies focussed on winning business in international markets enjoyed continued success in 2022 but experienced significant challenges in H2 of 2023 arising from the suspension of operations at Boliden Tara Mines near Navan Co Meath.

Turnover and Jobs; In 2022, the 35 GI members turnover was €1.17Bn, an increase of 13% compared to 2021, while the number employed in 2022 was 4,481, an increase of 365 new jobs, up 9% compared to 2021. Approximately 38% of turnover derived from operations outside Ireland.

However, the suspension of the Tara Mines operations in Ireland had a significant impact on several GI member companies who supply goods and services to Tara. 150 jobs have been lost in this supply chain. While these companies also generate income from projects in Sweden, Portugal and the UK, it will be challenging to develop business to reinstate these jobs. In this regard, GI members continue to engage vigorously with Enterprise Ireland in identifying opportunities and accessing markets.

International Activities; In March this year, GI and nine of its members attended PDAC in Toronto, the world's largest gathering for the minerals industry, sharing an Ireland Pavilion with iCRAG and Enterprise Ireland. Also in March GI attended a UN Procurement Conference in Copenhagen. Six UN agencies took part in outlining tendering opportunities for infrastructure, water and construction. Enterprise Ireland was co-organiser of this event; Dara Calleary, Minister of State at the Department of Enterprise Trade and Employment was a keynote speaker, while GI participated in a Panel discussion.

GI and two of its members attended an Enterprise Ireland event in Paris related to the Celtic Interconnector (November 2022) at which then Taoiseach Michael Martin, then Tánaiste Leo Varadkar and Minister Eamonn Ryan took part.

In October 2022, **GI members participated in a two- day Conference in Dublin involving five International Development Banks** briefings on procurement processes. GI and Enterprise Ireland co-hosted the World Bank, the European Bank for Reconstruction and Development, the Asian Development Bank, the European Investment Bank and the African Development Bank at UCD as part of this event. In June of this year, GI participated in a Seminar on Tendering hosted by Enterprise Ireland.

GI members continue to enjoy success in international tendering. A notable success this year is the role as Technical Advisor in the Project Management Unit of the Lesotho Highlands Water Project; secured by **JB Barry and Partners,** this is a major infrastructure development for South Africa. Other successes include **N O Dwyer's** role in water supply projects for the Neom City in KSA; **GDGEO's** advances in Offshore Wind projects in the USA and the Far East; **Mincon plc's** continued inroads in advanced foundation drilling in the Far East and in the USA; **Aurum Exploration's** projects in Africa, **FLI** and **QME** at the Neves Corvo Mine in Portugal, **Geodrilling Solutions** geothermal drilling in Northern Ireland and **BRG** and **Fehilly Timoney** on mineral exploration and wind energy projects respectively in Scotland. **PMS** continues to grow its surveying business for airfields and roads in the USA.

International and National actions involved Geothermal Energy; GI along with GSI concluded its role in the EU Geo Energy Europe Project (GEE2) late last year. Joe Mongan led the international Market Study Visits element of GEE2 on behalf of GI. A National Geothermal Summit in TU Dublin at which GI co-chaired, was addressed by Oisin Smyth, Minister of State at the Department of Environment, Climate and Communications; this was followed in July this year by the launch of a Geothermal Policy which was welcomed by GI.

Certificates awarded to Geo Drilling Graduates at SETU.

Renewable Energy; GI members are at the forefront of providing geotechnical design and planning advice for onshore and offshore wind and in contributing to policy studies for development of ports and of regulatory arrangements for these sectors. **Tech Works Marine** provides essential metocean data for offshore projects. GI members **Tobin** and **Entrust** are involved in solar energy and battery storage projects.

Awards; GI members continue to impress at the Association of Consulting Engineers of Ireland (ACEI) Awards. In the ACEI Civil Engineering Categories, **ARUP** won the Large Project Award for the North Runway at Dublin Airport, while **JB Barry** won the Medium Project Award for the Lee Road WWTP. **Nicholas O' Dwyer** won the Sustainability Natural Environment Award for Clifden WWTP. **Byrne Looby** was ranked in the Top 10 geotechnical consultants in the UK; was highly commended in the Infrastructure Category by the Irish Concrete Society, and was involved as contractor's designer in several categories in the Institution of Civil Engineers Awards.

Drilling Apprenticeship; South Eastern Technological University (SETU) provides an Apprenticeship in Geo Drilling. GI and the IMQS serve on the Steering Committee. Commenced in 2019, the graduates from the first two years received their Certificates in January 2023. In November 2022, IMQS President Nicola Nixon presented silver medals to four leading apprentices at a ceremony attended by then Minister of State Damien English.

At the UN Procurement Seminar in Copenhagen; Sean Finlay (GI), Minister Dara Calleary and Paul Maguire (Enterprise Ireland).

Joe Mongan of GI is the principal contact for the apprenticeship, working closely with SETU, drilling companies, SOLAS and students. Tara Mines has been a key supporter of the course, sponsoring four students each year. Due to the temporary closure of Tara, numbers for the Geo Drilling course will probably be reduced. It is hoped that some or all existing Tara apprentices will be accommodated by other companies.

Dermot Reidy was Enterprise Ireland's long standing **Development Adviser** to GI. Dermot retired earlier this year and was replaced by **Jim Fox** of Enterprise Ireland's High- Tech Construction and Housing Division. Division. Jim was joined on GI's Advisory Board by **Trevor O'Regan**. Formerly of PM Group, Trevor is currently managing an EU project in Vietnam, having delivered projects for the ADB and the World Bank.

GEOSCIENCE IRELAND
Exploring Developing Sustaining

BY DERMOT DUFF
Director Geoscience Ireland

Critical Raw Material Extraction In Environmentally Protected Areas (CIRAN)

Critical Raw Materials (CRMs) play a crucial role in our contemporary economy, as they are essential in the advancement of increased digitalisation and are essential to the green transition. The Critical Raw Materials Extraction in Environmentally Protected Areas (CIRAN) project, funded by the European Union under Horizon Europe (grant agreement no. 101091483), aims to reconcile somewhat conflicting objectives: the protection of environmentally sensitive areas with the improvement of our socio-economic resilience. Meeting our ever-increasing demand for CRMs and stimulating domestic sourcing within the EU are central to the new Critical Raw Materials Act.

CRMs are substances essential to various industries, including renewable energy, electric vehicles, and digital technologies. These materials, such as rare earth elements, lithium, cobalt, and platinum group metals, are vital for the development of innovative technologies and the transition to a greener and more sustainable future. CRMs are particularly vulnerable to supply chain disruptions, be it due to geopolitical reasons, force majeur events, or price fluctuations. It would therefore seem reasonable that a shorter European supply chain, in full respect of human rights, would allow the Union to be much less exposed to external pressures.

However, the extraction and processing of CRMs can be environmentally challenging. Many of these materials are found in environmentally sensitive areas or in, under or near Natura 2000 sites. The EU has one of the most robust regulatory frameworks for environmental protection. This double edge sword can be a significant challenge to overcome when resources are scarce and when public opposition can be rife.

The EU's heavy reliance on imports for the growing demand of these materials creates inefficiencies in costs and environmental impacts, as

CIRAN consortium kick off project meeting in Brussels in January 2023.

well as a reliance on access to these external sources. By linking land use planning and raw materials policies, the project aims to find sustainable solutions and meet EU objectives in domestic sources of these CRMs.

Project Ireland 2040 – the National Planning Framework (NPF) incorporates National Policy Objective (NPO) 23 that promotes extractive industries. This policy acknowledges the crucial role of the planning process in unlocking the potential of the extractive sector. It emphasises the identification and protection of significant reserves of aggregates and minerals from any development that could hinder their use.

The Irish Government's Policy Statement 'Mineral Exploration and Mining - Critical Raw Materials for the Circular Economy Transition' aims to establish a stable, transparent regulatory framework that supports environmentally sustainable mineral exploration and mining. It seeks to maximise the contribution of these activities to society, economic development, and the transition to a net-zero emissions economy by providing the necessary raw materials for sustainable development.

Europe's increasing reliance on critical raw materials and the increasing global demand driven by decarbonisation pose supply disruption risks, highlighting the need for action to protect the EU's economy and industries, with a view to achieve climate and digital objectives. The EU has put forward the Critical Raw Materials Act to stimulate the steady, secure, and sustainable supply of critical raw materials. This aligns with European climate and digital goals for 2030, specifically the Green Deal Industrial Plan and the Net Zero Industry Act. The act sets out the following criteria:

- at least 10% of the EU's annual consumption for extraction
- at least 40% of the EU's annual consumption for processing
- at least 15% of the EU's annual consumption for recycling
- no more than 65% of the EU's annual consumption from a single third country

There is growing recognition of rare earth minerals and resources in strategic projects, but also of the importance of their efficient and sustainable management as evidenced with the signature of the Dublin Declaration in March 2023 by the Geological Surveys of Europe in Dublin.

The primary goal of the CIRAN project is to achieve systematic policy-making that balances environmental protection with societal demand for raw materials. Mining must take place where mineral resources are found and cannot be displaced. Ignoring the origin of the materials and their socio-environmental costs is no longer an option.

We need to aim for a green transition, but also a just one. **Public acceptance is** paramount to any successful large-scale development and **particularly challenging for projects like mining.** At a time where misinformation and social media have as much, if not more, sway than scientific information, it can be difficult to gain support for such projects, even if those are environmentally sound.

CIRAN brings together experts, geologists, planners, social scientists, policymakers, and stakeholders from 13 partner organisations across Europe. By linking environmental consideration, land use planning, and raw materials policies, the project aims to find sustainable solutions to allow for the exploration and extraction of critical raw materials. The project emphasises the need for strategic planning to ensure the protection of environmentally sensitive areas while allowing for the sustainable extraction of raw materials.

As part of the project, the consortium partners will collaborate and share knowledge exchange together and with stakeholders. Geologists, planners, policymakers, and decision-makers work together to provide recommendations for efficient policy-making.

The CIRAN project will do this by **collating information on CRM occurrences and protected areas to understand where conflict areas may be,** identify relevant policy and legislation of concern and provide sustainable solutions to barriers CRM exploration activities.

Through case studies and analysis of successful initiatives, CIRAN identifies lessons learnt from successful and less successful raw material exploration and extraction projects. It explores innovative options for systemic risk and impact assessment throughout the entire life cycle of a mine, from exploration to post-closure maintenance. .The project uses the Driver-Pressure-State-Impact-Response (DPSIR) Framework for mitigating policy-driven externalities and socio-economic vulnerabilities. It shows the key factors that affect the environment and the consequences of decisions made by policymakers.

This framework allows for feedback on environmental quality and helps policymakers make better choices for the future. This aims to frame drivers behind extraction proposals with a view to better communicate the need to stakeholders and to better balance the conflicting interests. The project also places a strong emphasis on the development of modern social contract models within the EU.

These models aims to delineate the rights, obligations and responsibilities of governments at both national and regional levels, as well as communities impacted by mining activities. Such a paradigm shift would prioritise the value of coupled social-ecological systems and acknowledge the potential dramatic transformations resulting from climate change.

By promoting these best practices, CIRAN aims to contribute to the enhancement of sustainable extraction practices and the minimisation of environmental impacts and while safeguarding access to critical raw materials.

MacCabe Durney Barnes forms part of the CIRAN Consortium led by INTRAW – the International Raw Materials Observatory – and supported by 11 European partners. CIRAN is funded under the EU's Horizon Europe research programme. It began in January 2023 and will run for a period of three years.

You can visit the project website: **https://ciranproject.eu/** and sign up for the project newsletter using the QR code.

MDB MacCabe Durney Barnes
Planning Environment Economics

BY DARRAGH FRIEL AND SYBIL BERNE
MacCabe Durney Barnes

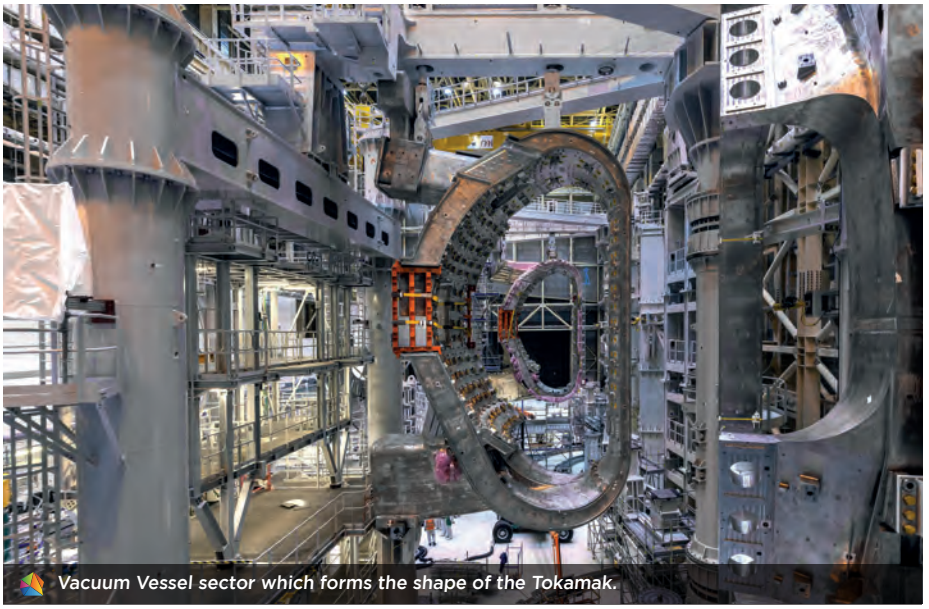
Update on The International Thermonuclear Experimental Reactor

The project is known as ITER, the International Thermonuclear Experimental Reactor. I wrote a short article for the 2021 Review – here's an update.

A REMINDER ON THE ITER PROJECT

This is an international project to prove that power from fusion - the same energy source that powers the Sun, will operate successfully on Earth. The ITER facility is being built by a scientific partnership that includes the European Union, China, India, Japan, Korea, Russia and the United States. The cost of project construction will be in the range of €20 billion and is funded by all of the nations involved.

The primary goal of ITER is to demonstrate the feasibility of fusion power on a commercial scale. Fusion is the process that powers the sun and stars, where light atomic nuclei, typically isotopes of hydrogen, fuse together to form heavier elements, releasing a tremendous amount of energy in the process. On the sun, due to the strong gravity, hydrogen atoms fuse at 15 million °C. On Earth, however, because of the weaker gravitational forces, they need to be heated to temperatures as high as 150 million °C in order to collide. Handling these temperatures on Earth is challenging!



Vacuum Vessel sector which forms the shape of the Tokamak.

If successfully harnessed on Earth, fusion energy could provide an almost limitless and environmentally clean source of electricity, without producing greenhouse gases or long-lived radioactive waste.

The supply of fusion fuel is abundant, to the point where it is practically unlimited.

Night view over the site.

SO WHAT HAS HAPPENED IN THE LAST TWO YEARS?

The site work continued throughout the pandemic, due to rigorous controls for all personnel with testing and tracing early on. More recently, global conflicts affected progress but only in a limited way – the ITER project is not subject to the global sanctions.

I recently took a full tour of the construction site and was happily surprised with the progress since last year. The main buildings are now complete and some secondary buildings that were not critical earlier are getting completed. The installation of equipment in the buildings is also progressing with some areas very well advanced such as the cryo-plant and electrical systems. Many elements are also installed in the main tokamak building. In fact, some of these areas will soon be occupied by the testing teams.

However, a recent problem that came to light during the assembly process brought some challenges that will need to be addressed. The solutions

The site mid-summer 2022.

are achievable, but the size of the components mean any adjustments or modifications take a lot of planning and other items get blocked as they need to be done in order.

The issues are related to the thermal shields. These vacuum vessel thermal shields and the cryostat thermal shields are actively cooled silver-plated elements, 20 and 10 mm thick respectively, that contribute to thermally insulating the superconducting magnet system operating at 4K, or minus 269 °C from the hot vacuum vessel (>200C).

In each of the nine vacuum vessel modules — one of which is already installed in the machine assembly pit — thermal shield panels are positioned to complete the heat barrier protecting the superconducting magnetic system.

Tests detected leaks on an element of the vacuum vessel thermal shield that was delivered a year and a half earlier. The installed module must be lifted out completely and disassembled in order to proceed with the repairs. This is underway right now, and will cause a delay. However, it was good that this problem was detected so early as it would be immeasurably more difficult to solve later.

Despite the recent setback, overall, the progress has been very impressive.

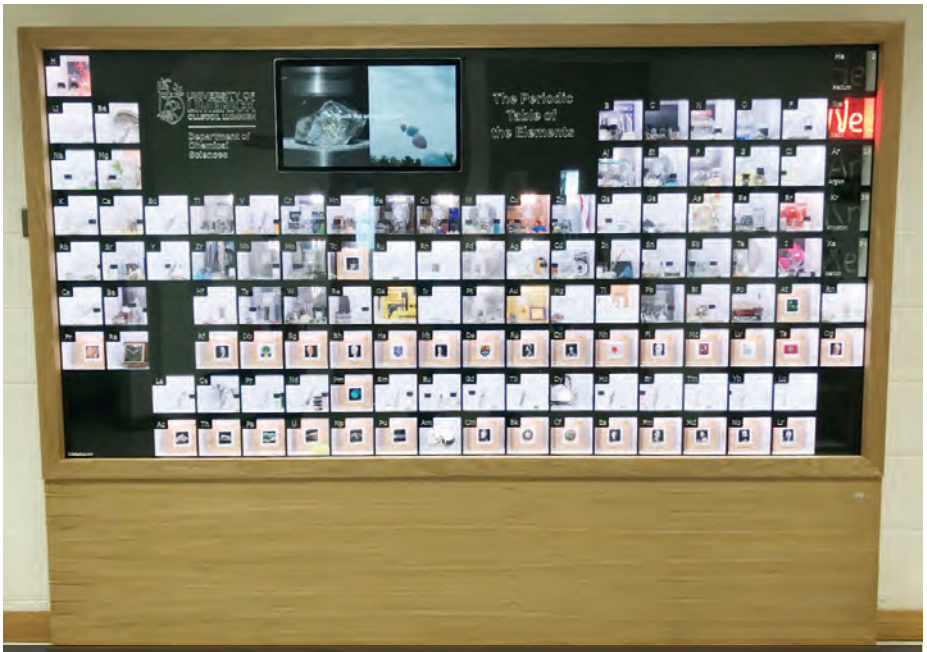
The adventure continues...

BY MICHAEL KEANE
Principal, M. Keane Consulting

University of Limerick

In April 2023, University of Limerick's Chemical Sciences Department launched its new large-scale, interactive periodic table display – the first of its kind in any third-level institution in Ireland.

The Periodic Table of the Elements is an organised way of arranging and presenting the different fundamental substances (known as 'elements') used to make everything in our Universe. Students usually encounter the periodic table during science class as a two-dimensional grid of squares printed on a page, where each element's unique chemical symbol is displayed inside its designated square ('O' or oxygen, 'H' for hydrogen, 'Zn' for zinc, and so on). Among other things, the table helps scientists to predict a given element's chemical and physical behaviour depending on its position on the grid.



Limerick's Chemical Sciences Department large-scale periodic table display.

UL's new display measures a striking 2.4 metres wide by 2 metres tall and contains an impressive array of pure element samples (solids, gases and liquids) plus related minerals, ores, artefacts and everyday items, all housed securely within individually lit, encased, 120mm-sided cubes. It also contains five glass tubes blown in the shape of the chemical symbols of the first five noble gases: helium, neon, argon, xenon and krypton; each glass tube is filled with the corresponding gas to demonstrate its distinctive colour and intensity when illuminated electronically.

An inbuilt interactive touchscreen displays many interesting facts about each element, plus descriptions of the contents of each element's cube and videos of experiments involving the elements.

The large-scale display was custom-made and installed with great attention-to-detail by a specialist company based in Madrid, Spain. A fundraiser helped cover the cost of the display whereby people donated to 'adopt' an element and have a short personalised inscription laser-engraved on the inside wall of their adopted element's cube. Many donors used their inscriptions to acknowledge family members, classmates, friends, work colleagues or mentors, or to remember those who have passed on. **IMQS was among a number of organisations that also contributed as corporate sponsors,** with IMQS's logo laser-printed on the display's left-hand side panel. The fundraiser co-ordinator was Peter Davern, Course Director for the BSc in Environmental Science: "I've been fascinated by the Periodic Table of the Elements for quite some time. Apart from the rich history of its origins back in the 1800s and its evolution since then, it really is a 'go to' resource for all scientists, and not just those involved in chemistry. It's a truly elegant construct that organises and arranges in a very deliberate way all of the known fundamental substances used to make everything in our Universe; it really is a thing of beauty."

The display will serve as a permanent, high-impact attraction to better promote science among UL's undergraduate students and among secondary and primary school-goers in the Mid-West region and beyond. Recent visitors to the display were Chemistry Teacher Samantha Prior and her class from Coláiste Nano Nagle, Limerick. "The girls really enjoyed visiting the interactive periodic table. It was a great opportunity for them to put into practice what they learn in class about each of the elements and the periodic table. They couldn't believe their eyes; they kept asking if they were real" explained Ms Prior.

The display is open for the public to visit free of charge on weekdays, 9am to 5pm; just email peter.davern@ul.ie for directions and other details.

UNIVERSITY OF LIMERICK OLLSCOIL LUIMNIGH | Department of Chemical Sciences

BY PETER DAVERN
Department of Chemical Sciences,
School of Natural Sciences

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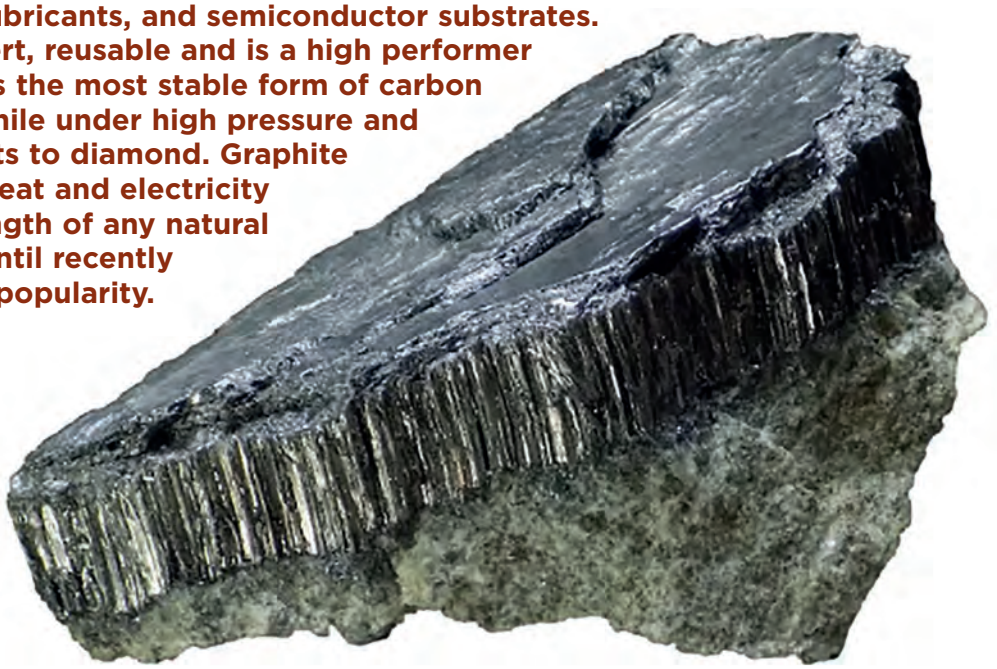
Graphite: Natural, Stable, Inert, Reusable and a High Performer

Graphite is essential in the green economy and is a naturally occurring form of carbon that is used in a wide range of industrial applications, including in synthetic diamonds, EV Li-ion batteries, pencils, lubricants, and semiconductor substrates. Graphite is natural, stable, inert, reusable and is a high performer electrically and thermally. It is the most stable form of carbon under standard conditions, while under high pressure and temperature, graphite converts to diamond. Graphite is an excellent conductor of heat and electricity and also has the highest strength of any natural material. However, it wasn't until recently that the metal began to gain popularity.



Graphite.

Graphite is used in renewable energy technologies, such as solar panels, because it is resistant to extreme heat, ideal for crucibles and moulds used to cast the silicon in solar panels and also works as a heat shield and thermal insulator.

Interest in graphite mining is also increasing because lithium-ion batteries are becoming more common for use in everything from phones to electric vehicles (EVs), and graphite is one of their key raw materials. As lithium-ion battery demand grows, graphite demand is also expected to rise from nations around the world.

In 2023 graphite was included on the list of UK Critical Minerals in the document Resilience for the Future: The UK's Critical Minerals Strategy.

NATURAL GRAPHITE

Graphite is used in two forms, natural graphite and synthetic graphite. The main types of natural graphite are

- Amorphous graphite, which is very fine flake graphite
- Crystalline flake graphite, which occurs as isolated, flat, plate-like particles
- Lump (Vein) graphite, which occurs in

Solar Panels.

Pencils.

veins or fractures and fibrous growths
- Highly ordered pyrolytic graphite is graphite with an angular spread between the graphite sheets of less than 1°.

Graphite occurs in metamorphic rocks as a result of the reduction of sedimentary carbon compounds during metamorphism.

It also occurs in igneous rocks and in meteorites. Minerals associated with graphite include quartz, calcite, micas and tourmaline.

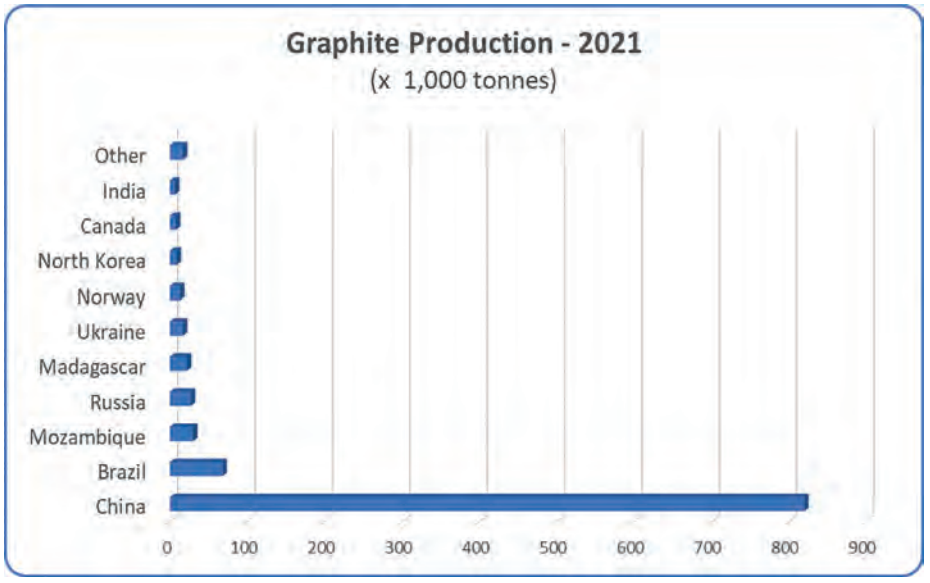
SYNTHETIC GRAPHITE

In the 1890s there was competition for the discovery of artificial graphite and there were two separate notable discoveries, but in 1896, the Acheson process was patented and in 1897 commercial production was started.

The process involved overheating carborundum (silicon carbide) to around 4,150 °C, at which time the silicon vaporizes, and graphitic carbon is left behind. Although synthetic graphite can be manufactured from any number of precursor materials the primary material used to manufacture it is petroleum coke.

Synthetic graphite is used in many applications including friction, foundry, electrical carbons, fuel cell bi-polar plates, coatings, electrolytic processes, corrosion products, conductive fillers, rubber and plastic compounds, and drilling applications.

Natural graphite anode has the advantages of lower cost, high capacity and lower energy consumption compared with the corresponding synthetic anode. However, synthetic graphite performs much better in electrolyte compatibility, fast-charge turnaround and battery longevity and is therefore ideal for EV Li-ion batteries.

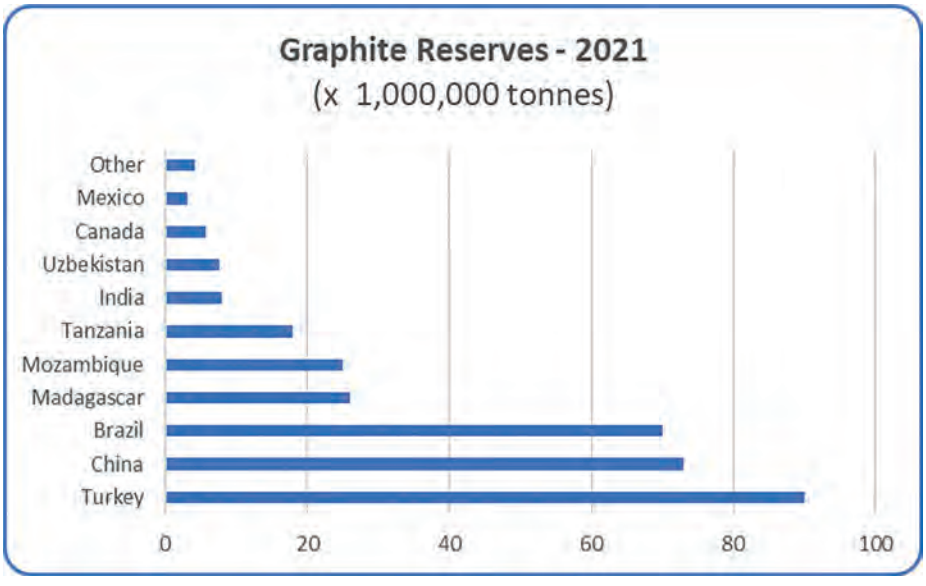


Global Graphite Production 2021.

GRAPHITE USAGE

Graphite is used in pencils, lubricants, crucibles, foundry facings and several other areas of technology. In the green energy sector graphite is used in renewable energy technologies, such as solar panels, because it is resistant to extreme heat, perfect for the crucibles and moulds used to cast the silicon in solar panels and works as a heat shield and thermal insulator.

In the new green economy, graphite is a key component in the manufacturing of Electric Vehicle (EV) batteries, where it represents almost 50% by weight of the materials. On average a standard EV has 70kg of graphite in the battery and 10kg in a hybrid car. Battery grade graphite can be sourced naturally or synthetically. Only high-grade flake graphite can be used in batteries.



Global Graphite Reserves 2021.

In our normal lives we are familiar with pencils which have graphite 'lead'. There are many grades of pencil as shown in the graphic below, generally ranging from 9B to 11H, with h referring to hardness.

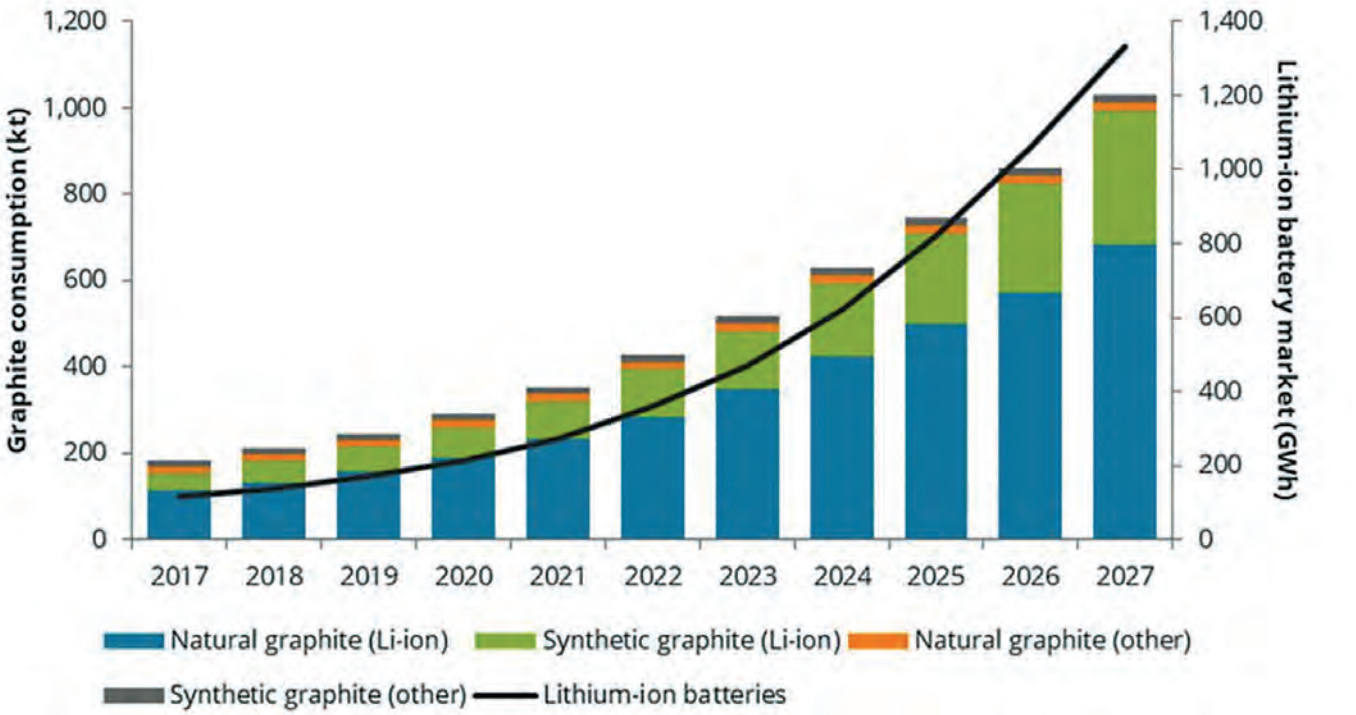
GRAPHITE PRODUCTION

China is the major producer of natural graphite with approximately 79% of the total global production in 2021, followed by Brazil, Mozambique and Russia. Other producers include Madagascar, Ukraine and Norway. A total of 1,036,000 tonnes were produced.

There are three main types of graphite produced for industrial purposes.

- **Amorphous Graphite** is the lowest quality but most abundant form of natural graphite and accounts for approximately 50% of all production. While not suitable for all applications, it is used for crucibles, moulds, ladles, and troughs and also for pencil leads.
- **Flake Graphite** is formed when carbon materials are subjected to high temperatures and high pressures, mostly in metamorphic rock. Flake size is a key factor in the grading process and this type of graphite is most commonly used in lithium-ion batteries. Flake graphite is also used in vanadium redox batteries and nuclear reactors.
- **Crystalline Vein Graphite** is a high-quality graphite, with 94-99% graphitic content and mostly found in Sri Lanka. Vein graphite can be used in any of the areas where Flake Graphite is used but will provide a higher performance.

Graphite is mined from both open pit and underground mines in many countries across the globe. The process generally follows the normal mining system of drilling, blasting, crushing, grinding, flotation and filtering into a final product.



High Grade Graphite Forecast (Li-ion grade).

To be suitable for the battery market graphite flakes must be refined to 99.5% purity and ground into a specialised form known as spherical graphite. This process presents two major challenges for producers.

Firstly, grinding the flakes into the tiny balls requires a lot of electrical power and secondly, the current process for removing the last of the impurities includes using hydrofluoric acid, which requires careful management.

Spherical graphite (SpG), also known as battery-grade graphite, is the product that is consumed as an anode in lithium-ion batteries. Flake graphite concentrate is processed to an ultra-high purity level with particle sizes ranging from 10 micron to 25 micron and these are then used as a battery anode material.

GRAPHITE RESERVES AND RESOURCES

Worldwide reserves of graphite were estimated in 2021 at more than 330 million tonnes, with Turkey holding the largest quantity (27%), followed by China (22%) and Brazil (21%).

A ***Mineral Resource*** is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. A ***Mineral Reserve*** is the economically mineable part of a Mineral Resource

GRAPHITE PRICE

The market price for natural graphite is not readily available because natural and synthetic graphite transactions are based mostly on direct negotiations between buyers and sellers. Natural graphite prices are determined by a range of factors such as graphite content, flake size, mesh size and impurity level.

However, in 2023 high grade flake graphite typically sells for $2,000-$2,200 per tonne, down by more than 40% year on year compared to mid-2022. Low grade graphite can sell for around $500 per tonne, with a range of prices in between low and high grade.

Synthetic graphite can be produced to very high grades and the high grade Coated Spherical Graphite (CSPG) which is used in Li-ion batteries sells for approximately $20,000 per tonne, while similar quality natural graphite can sell for approximately $8,000-$11,000 per tonne. Due to cost and performance efficiencies, many battery manufacturers are transitioning to natural graphite.

GRAPHITE MINES

The Syrah Resources Balama Mine in Mozambique is thought to be the largest graphite in the world. Balama mine has a mineable reserve of 110Mt and a resource estimate of 1,036Mt with a life of mine of 50 years. Current plant capacity is 2Mt per annum yielding ~350kpa of graphite at 94% to 98% fixed carbon graphite concentrate.

China produces most of the worlds graphite followed by Brazil and Mozambique. In the UK, graphite has been found in Cumbria and recently at Galantas Gold at their Omagh Project in Northern Ireland.

INTERESTING FACTS ABOUT GRAPHITE

- Graphite is an important part of the green economy
- Graphite can conduct electricity
- Graphite and diamonds have the same chemical composition but different crystal structures
- Graphite bricks are used in nuclear reactors in a crucial safety function
- Graphite recycling is becoming more important
- Graphite is found in pencils
- The name graphite stems from graphein, meaning to write/draw in Ancient Greek.

SUMMARY

Graphite is becoming more important as a part of the green economy and is the largest constituent in Electric Vehicle Li-ion batteries. China is by far the largest producer of graphite at approximately 70% of all production. Natural graphite and synthetic graphite compete for use in the modern world, while the latter can be produced at higher quality, but at a higher cost.

BY BRENDAN MORRIS
Managing Director, LTMS Limited and COO, Galantas Gold.

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‘Hard work brings its own reward’...

Metso distributor McHale Plant Sales discovers

For those who subscribe to the belief that ‘hard work brings its own reward’, the January 2023 announcement by the Finnish crushers and screens manufacturer Metso stating that they had appointed their Irish distributor, McHale Plant Sales to take over the distribution of their mobile crushers range in the UK was one received with great acclaim, with one observer calling it ‘an unexpected and welcome development’.

For Metso owners in Ireland, the relationship built-up between Metso and McHale Plant Sales over the years since 2015 - when the Birdhill and Rathcoole -based distributor was first appointed to handle Metso - is described by one as “an outcome that bodes well for every Metso owner in terms of the influence and ‘strength of voice’ that they can now rely upon in their on-going relationship with Metso.”

Initially appointed to handle sales of their Lokotrack mobile units in Ireland, their success at ‘the rockface of sales and marketing’ soon saw McHale being granted an extension to their remit to include Northern Ireland and an expansion of their product offering to include the full Metso range of mobile and fixed units.

Allowing three months for preparation, McHale’s first key objective was to secure suitable premises from which to service what was suddenly a sales and service territory stretching from Anglesey to East Anglia and from Land’s End to John O’Groats and the Orkneys and Shetland islands beyond.

Asked if the company was daunted by the prospect of servicing markets as geographically spread as Scotland, England and Wales are, McHale Plant Sales’ Business Development Manager, Darragh O’Driscoll said: “Truthfully ‘no’. Naturally, we gave the possibility great thought before committing ourselves. However, when we thought about it, the customers we will meet in the UK are made from the same stock as those we are accustomed to working with in Ireland – quarry owners, aggregates producers and civil works contractors. We know what

Metso LT106 - one of the most popular models in the Metso range at McHales Flagship Dublin depot.

Denis McGrath - Sales Director, Darragh O Driscoll - Business Development Director and Anthony Ryan - AfterSales Director, pictured outside the new McHale depot in Tamworth.

their needs are, and we know the pressure points and the demands that will be placed upon us,"

"The critical requirements that will present relate to the availability and distribution of parts and the provision of back-up technical support, in-house and on-site. In these and in all other matters, we can draw upon our own experience and resources, and the resources of Metso" he added.

Their search to acquire a suitable premises from which to service UK customers led them to the Lichfield Road Industrial Estate in the Staffordshire town of Tamworth. South-east of Birmingham, close to the M1 and M6 motorways and other key links, it has all the space needed to house offices, machine storage, parts warehouse and a repair and maintenance workshop.

Founded during the 1950s, McHale Plant Sales has grown to become one of Ireland's leading equipment distributors with a significant presence in construction, civil works, forestry, agriculture and environmental sectors.

Driving that growth has been their work as distributor for the Komatsu range of construction equipment, a relationship that has developed and prospered since the 1970s, enhanced by Komatsu in the recent past by the addition of their timber harvesters and forwarders range – an award that brought McHale into the burgeoning forestry sector.

Other complementary equipment lines distributed by McHale include the distinctively green Merlo telehandlers, the versatile Prinoth range of tracked vehicles, the MDS range of trommels and the Jonsson range of crushing equipment – all supported by a full complement of tools, parts and ancillary attachments.

Summing up their entry to the UK market, McHale sales director Denis McGrath said: "In Tamworth we will implement an approach to customer service proven in Ireland and Northern Ireland where sales, service and parts operate in lockstep."

"In that connection, three mobile service technicians have been recruited alongside a crusher-savvy sales person and a spare parts specialist – all with hands-on experience of Metso and its products range and known to the Metso customer base" he added.

McHALE
Plant Sales Limited

McHale aftersales team on site comissioning some new Metso Lokotrack units.

Kemek Unveils Exciting Rebranding Initiative

Irish Industrial Explosives Ltd. and Ulster Industrial Explosives Ltd. are among the most well-known companies serving the mining, quarrying and civil engineering industries on the island of Ireland. Better known to their customers as IIE and UIE, both have been to the fore in supplying commercial explosives and technical services for over 50 years.

During this period many of the key infrastructural projects undertaken on the island have involved IIE or UIE. Whether it's a mine, major road or harbour development, it is very likely that IIE or UIE will have played an integral part in delivering the project. Both are synonymous with quality products and personal service.

To build on this history and reputation our business has decided that now is the right time to rebrand under a single identity... **KEMEK**. The Kemek name will be familiar to some as the holding company for IIE and UIE.

While the name choice / change was relatively straightforward, the decision to rebrand was not taken lightly and it is the first rebrand for either company.

The business' stakeholders, including the employees, were eager to ensure that the move to the new **KEMEK** brand recognised and retained the many positive attributes of what went before, whilst reflecting the expertise and quality standards that are demonstrated across our business today.

Mr. Sean O'Sullivan, Mr. Ray Lyons, Mr. W.R. Cullen, George Colley TD Minister of Industry & Commerce, Mr. Terry Boylan, Mr. Pierre Vennet & Mr. John Higgins at the official opening of the Irish Industrial Explosives Factory on the 27th November 1967.

The development of the new brand was a thoughtful and reflective process. The new icon denotes accuracy and precision and is representative of a blast, fired in a controlled format.

It also takes its cue from the drone images captured by the Technical Service team when surveying the blast area. The back-to-back K is an acknowledgement of the company's history and the earlier Kemek logo and is a play on **KEMEK** as a palindrome.

Construction of the Ulster Industrial Explosives Ltd manufacturing facility at Loughmourne, Co. Antrim, 1988.

Kemek Technical Services Team on site.

The explanation for the tagline **'BLAST EXPERTISE**' is simple... it is who we are and what we do.

kemek

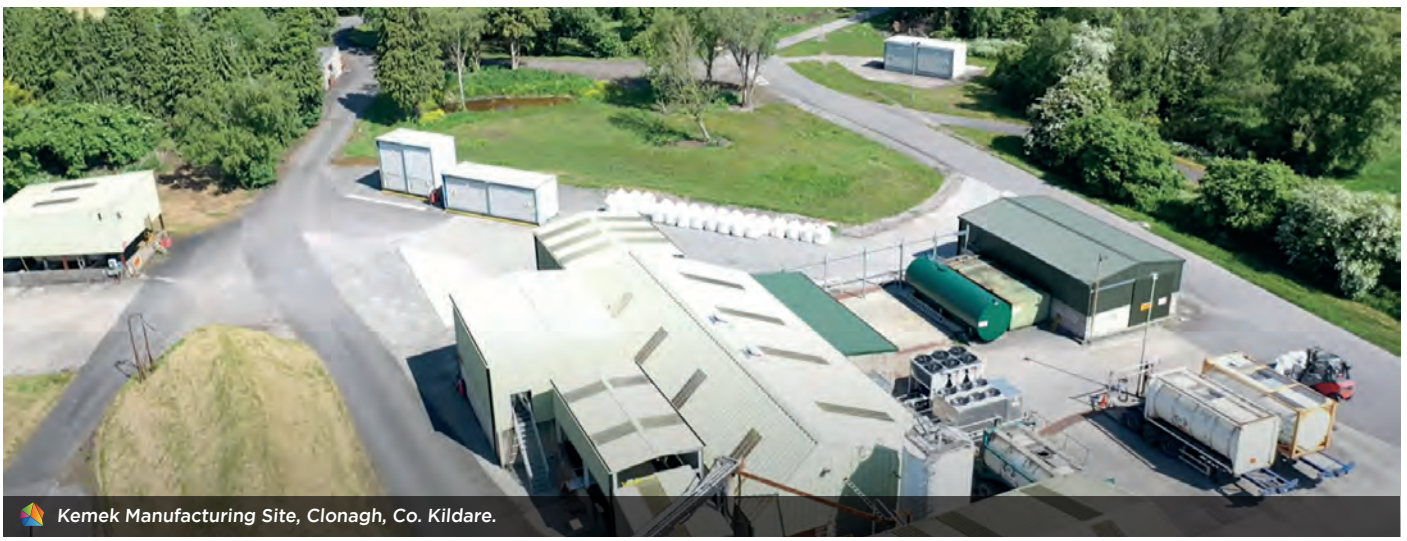
BLAST EXPERTISE

Our renewed brand promise is to continue to bring global standards and technical expertise to your operations using the very latest in blasting technology and to ensure your operation's potential is unlocked, extracted and delivered, safely and securely, every time.

Everyone in Kemek is committed to maximising the potential of our team and of your operations. We look forward to the new **KEMEK** brand continuing to be the standard bearer for quality and service now and for a long time into the future.

kemek
BLAST EXPERTISE

BY EOIN BARTLEY
Managing Director, Kemek Ltd.



Kemek Manufacturing Site, Clonagh, Co. Kildare.

Recent HSA Campaign Findings on Machinery Guarding and Maintenance

A recent inspection campaign by the Health and Safety Authority on Machinery Guarding and Maintenance has highlighted key safety issues, including inadequate machine guarding, no risk assessments for planned and unplanned maintenance activities and lack of training in Permit to Work and Lock Out Tag Out systems.

Over the last ten years, individual companies, stakeholders and the HSA have worked together to increase awareness of the hazards and implement appropriate control measures in the mining and quarrying industry and associated manufacturing sites. As a result, we have seen a reduction in the number of reportable incidents.

Over the 5 year period from 2018-2022, there have been 341 non fatal incidents reported in this sector. Three people have also died in work related incidents in the same five-year period. This has a devastating impact primarily on families and loved ones but also on work colleagues and friends.

Incidents on unguarded machinery and during maintenance procedures continues to be a focus for the HSA and as a result, a recent two week inspection campaign was completed in May.

In advance of the campaign, an online briefing to over 120 participants was given to members of the Irish Concrete Federation.

During the campaign a questionnaire was used on inspections, which consisted of 32 questions, grouped into three headings: Risk Assessments and Training, Guarding and Estops and Maintenance and Isolation.

Over the 2 week campaign, 158 inspections were carried out resulting in 180 enforcement actions. Enforcement can vary from a Report of Inspection requiring improvement to an Improvement Notice or Prohibition Notice.

There appeared to be good overall compliance in the areas of safety induction and planned preventative maintenance programmes. In 94% of workplaces inspected, safety induction was carried out for employees and contractors and 90% of sites had a planned preventative maintenance programme.

Pull chords and emergency stops were provided and operational in over 90% of inspections although in over 20% of cases, routine checks are not documented.

In 16% of inspections, training had not been provided to relevant personnel in Permit to Work (PTW) and/or Lock Out (LOTO) systems.

The areas of most concern to the HSA is that 18% of workplaces did not have appropriate guards in place to

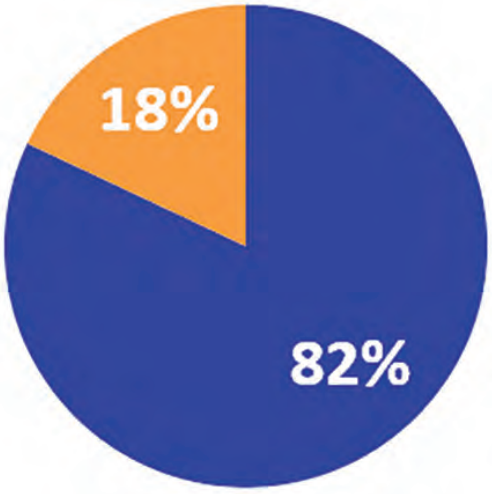


Fig. 1 - 18% of sites inspected as part of the campaign, did not have appropriate guards in place.

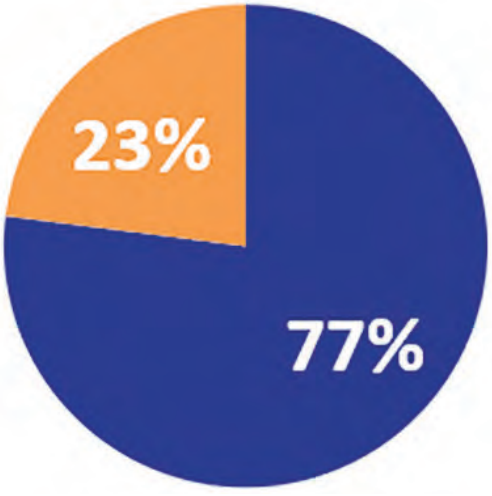


Fig. 2 - 23% of sites inspected as part of the campaign, did not have specific risk assessments for planned maintenance activities.

prevent contact with moving parts of machinery where such contact could lead to a serious or fatal injury.

Twenty five Improvement Notices and 23 Prohibition Notices were issued over the campaign, with the majority of the Prohibition Notices relating to guarding issues.

Whilst the majority of quarries and associated manufacturing sites had a planned preventative maintenance programme in place, almost a quarter had no risk assessments in place for planned maintenance activities and the figure was higher for unplanned maintenance activities.

Identifying the key areas of concern in mines and quarries during this campaign, **machine guarding and specific risk assessments and procedures for planned and unplanned maintenance activities is an area where the HSA would like to see an improvement.** The quarry environment is harsh and guarding regularly gets damaged or is removed to clear debris and is not replaced.

The high number of Prohibition Notices issued during this campaign highlights that Inspectors consider unguarded moving parts of machinery to pose a serious risk of personal injury. A lack of specific risk assessments and procedures for maintenance activities also requires attention so that relevant isolation procedures and permits to work can be documented and appropriate controls implemented.

It's also important to stress the importance of good downwards and upwards communication within all companies. There is a huge value in promoting a culture which supports the reporting of incidents and encourages good consultation and communication between workers and management. Practicing safe behaviours is essential to ensure that employees and contractors go home safe at the end of each day. The role of the safety representative is also an important one in each workplace.

A second two week inspection campaign will commence on the 18th September focusing on the same topics.

Currently a database is being compiled within the HSA of smaller independent quarries to ensure information on seminars, campaigns and guidance can be disseminated to them in future. Employers and operators can call HSA on 0818 289389 or contactus@hsa.ie

Further information and guidance on manufacturing, mines and quarries can be found on www.hsa.ie

BY HILARY BYRNE
Senior Inspector, Health and Safety Authority.

Hilary Byrne is a Health and Safety professional with over 20 years experience as a Senior Inspector in the Health and Safety Authority. Previously serving as Regional Manager in the North West managing inspections and investigations across all sectors, she is now the Senior Inspector with responsibility for the development of policy and regulatory inspection and enforcement across the three sectors of manufacturing, mines and quarries. She also represents the Authority at National, Cross Border, UK & EU meetings in relation to same.

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Northern Ireland Department for the Economy – supporting minerals research

The drive for minerals critical to the energy transition continues to present challenges for countries across Europe. The EU and UK continue to monitor critical needs and updates to critical mineral lists are made to reflect changes in local and global supply conditions and developing technologies. Negative attitudes to mining remain in wider public opinion, despite the desire to move away from petroleum-based energy systems to renewable sources.

Northern Ireland remains one of the most active regions of the UK in terms of mineral exploration. Focussed activity in Devon and Cornwall continues to be driven by the lithium potential of the region. Northern Scotland is also becoming more recognised for its potential, this partly driven by the known prospectivity of the rocks along strike in Northern Ireland. Each of these areas has been highlighted in a recent report published by the UK Critical Mineral Intelligence Centre.

The specific potential for Northern Ireland to be a source of minerals on the UK list is being investigated further by the Department for the Economy. Studies include a preliminary assessment of the potential critical minerals associated with gold deposits in County Tyrone. Additional academic research is looking at the PGM potential of the Antrim lava and other opportunities are being considered to investigate sources of graphite in the Dalradian aged rocks of western Northern Ireland and antimony in Co Armagh.

In an effort to gain insights into public opinion, Queen's University Belfast Management School, commissioned by the Department, has gathered information to study attitudes to responsible (re)sourcing of critical raw materials. This research draws on results from two workshops and a wide range of 1to1 interviews with stakeholders from across industry, government and community groups to gather information to try and understand concerns surrounding mineral development and the complexities of the mineral supply chain. The findings will inform the future development of mineral policy in Northern Ireland.

Mineral and quarry products continue to be vital to national interests for the energy transition and the infrastructure required to deliver meaningful change. If material is available from local sources, the impacts of overseas extraction and transportation for local consumption can be reduced as can uncertainties associated with supply chains. Local production does come with local issues; hence ongoing research is needed, both into the location and viability of potential deposits, but also understanding the attitudes of those most impacted by such development. The Department for the Economy, which is responsible for licensing exploration and mining in Northern Ireland, is working to address these questions through commissioned research and the continued support of academic studies.

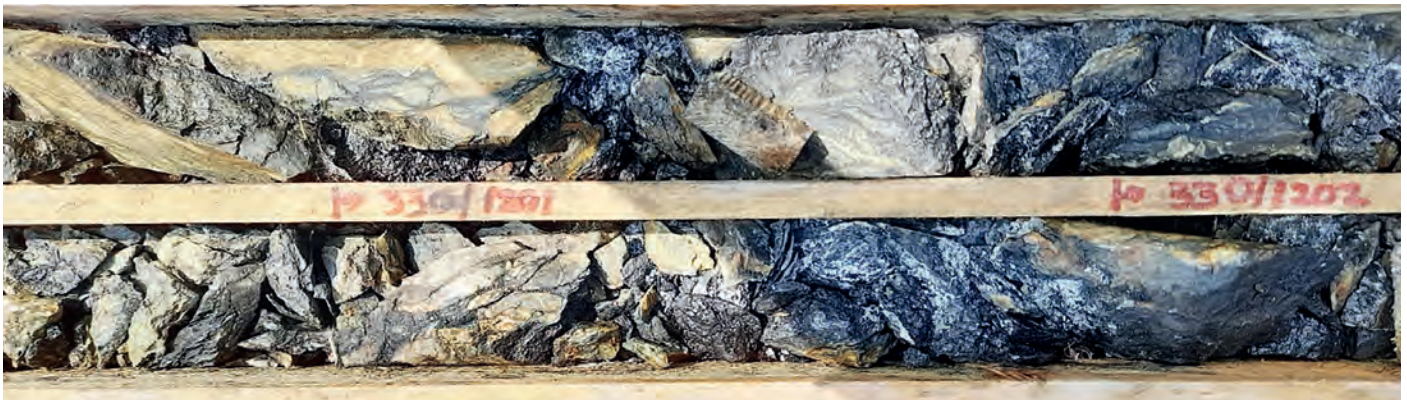
Department for the Economy
www.economy-ni.gov.uk

GSNI Geological Survey of Northern Ireland
www.bgs.ac.uk/gsni

BY MARK PATTON
Minerals Geologist, Geological Survey of Northern Ireland

AND

LORRAINE FLEMING
Head of Policy Development, Minerals and Petroleum Branch, Northern Ireland Department for the Economy.



As Good as its Going to Get: The Windsor Framework

After three years, three UK Prime Ministers and three Taoisigh (Varadkar-Martin-Varadkar again), February of this year saw the long-awaited publication of the new post-Brexit arrangements for Northern Ireland commonly known as the 'Windsor Framework' replacing the Northern Ireland Protocol.

It's important to point out that this breakthrough is a political and diplomatic triumph and credit should be given to the wide range of stakeholders who engaged with this process. As someone who attended more briefings than I care to remember, very few people thought we would achieve the scale of progress that this Agreement has brought about.

When I first presented in front of the House of Commons Northern Ireland Committee after the original Protocol was negotiated, I articulated on behalf of the Chamber's members the following criteria needed to be reached for the Protocol to work beyond theory but in practice for businesses that had to engage within it on a daily basis.

- Firstly, the "at risk" approach needed to be inverted so that goods clearly destined for Northern Ireland should be treated differently to goods that have a genuine and verifiable risk of entering the Single Market.
- Secondly, that a distinction was needed between agri-food goods destined for a supermarket and those that could potentially contaminate the supply chain in the single market.
- Thirdly, that the relationship between Stormont and the European Commission (the Commission) needed to be augmented to address the democratic deficit felt by the people of Northern Ireland.

In my view, the Windsor Framework alleviates the greatest trade impositions between Northern Ireland and Great Britain. Goods coming into Northern Ireland from Great Britain will now be divided into two separate trading lanes. A Green Lane is being established for goods moving from Great Britain to Northern Ireland only and a Red Lane for goods that will move beyond Northern Ireland or at risk of doing so. Goods that go through the Red Lane will have to adhere to full customs procedures.

In Agri-food, the EU has agreed that UK public health and safety standards will apply to retail food and drink within Northern Ireland. This means if the product is available in Great Britain, then it will be available in supermarkets in Northern Ireland. The bureaucratic burden has significantly been reduced with the use of a single certificate with physical checks to fall to 5% by 2025 when labelling requirements are fully in place. In return, the UK is constructing operational Sanitary and Phytosanitary (SPS) Inspection facilities and will provide EU representatives with access to relevant UK IT databases.

In terms of addressing the democratic deficit, the "Stormont Brake" means that should 30 MLAs from two or more parties vote to block the application of a law, the matter will be referred to the UK and the EU for further talks.

State Aid Rules, while still in place, are now subject to a stringent set of tests before they are referred to the Commission. Based on past trends only 2% of subsidies would be required to be referred to the Commission.

The role of the ECJ has been maintained under the Windsor Framework, however the UK Government has highlighted that with the new Green-Lane/Red-Lane approach, the number of EU laws that apply in Northern Ireland are far less than before.

Common sense solutions have been found for VAT, Excise, Medicines and Pet Passports.

The Framework passed the House of Commons with 515 votes in favour and 29 votes against. The DUP continues to be against the Agreement, arguing it fails to pass its '7 Tests'. As a form of Protest, they continue to boycott the Executive of Northern Ireland – resulting in the UK Government imposing a budget on the North directly. The implementation of the Framework does however continue at pace in their absence.

Regardless of the DUP's viewpoint, the UK Government and the Northern Ireland Office continue to promote Northern Ireland's unique position as the only place in the world with unique access to the EU Single Market and the UK's internal market. This unique position will be showcased at the Investment Conference sponsored by Joe Kennedy, President Biden's Economic Envoy to Northern Ireland in September.

With the Brexit impasse in the rear-view mirror at long last, the focus of the Chamber is now firmly on sustaining and growing UK – Ireland trade and investment. A trade now worth in excess of €90bn per annum sustaining 600,000 jobs directly across the UK and Ireland, making Ireland the UK's 5th biggest trading partner and the UK our 2nd.

Building on this trade will be the focus of the Chamber's annual Conference taking place on Thursday 12 October at the Dublin Royal Convention Centre (**www.britishirishchamber.com**).

British Irish Chamber of Commerce

BY PAUL LYNAM
Deputy Director, BICC

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WHAT IT MEANS TO BE AN IMQS CORPORATE MEMBER

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"Irish Drilling is a firm believer in relationships and the IMQS provides access to, and updates from, all parts of Ireland's mining and quarrying sector. We were delighted with the role they played, and for engaging with Irish Drilling and the industry, in delivering the Geo-Drilling Apprenticeship, the first of its kind for the drilling profession."

KILKENNY LIMESTONE

"The IMQS provides relevant information and Guidance, and their representation and promotion of Irelands natural resources is very important to Companies who operate in this sector. Kilkenny Limestone Quarries appreciate the importance and value of being members of this Organization."

"As a newly established business formed in 2016, IMQS has offered a platform for broadening our network, attending seminars and having access to valuable information.

LTMS LISHEEN TECHNICAL & MINING SERVICES

The IMQS has a great history of being able to connect people and businesses in Ireland and abroad."

"The value that Sandvik sees from IMQS membership is being part of the Irish mining and quarrying community as well as building awareness of our presence, offering and service to the Irish customer base. It also builds a clearer picture for ourselves of that customer base in Ireland, where we share our experiences and knowledge to make a safer and more sustainable industry for all."

SANDVIK

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"We are very pleased to have joined the IMQS in 2019 and have already found it to be a great resource for up-to-date industry information, networking opportunities and relevant fieldtrips and events."

IMQS

Twitter: @IMQS_IE

LinkedIn: Irish Mining and Quarrying Society (IMQS)

NEW BOLIDEN
Tara Mines

"Boliden Tara Mines have been long term members of the IMQS and we value the work that the Society does on behalf of the Mining and Quarrying industry in Ireland. The IMQS, among other things, provides an excellent network for people in the industry and is important in promoting the industry at a national and international level."

SEE WWW.IMQS.IE AND LINKEDIN (IRISH MINING AND QUARRYING SOCIETY (IMQS)) FOR ALL THE LATEST INDUSTRY NEWS.

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EFEE (European Federation of Explosives Engineers)

As the President of EFEE, it is with the greatest of pleasure that I write this excerpt for the IMQS Annual Review 2023.

EFEE's primary event is the bi-annual world conference. A number of locations entered the competition to host this event for 2023. Dublin was chosen for its renowned hospitality and ease of access both internationally and locally. In addition, the supports offered by Dublin Convention Bureau and Failte Ireland were contributing factors.

I would like to acknowledge the cooperation and help given by the IMQS, Dublin Convention Bureau and Failte Ireland when organising the Dublin conference. I would also like to thank Tyler Events for acting as the PCO.

EFEE was founded in 1988 and has 26 National Associations. Its purpose is to provide a European forum for professionals working in the field of commercial explosives.

The founding principles of the association still apply to this day

- The promotion of standardisation and harmonisation of explosives training in Europe.
- The promotion of explosives technology in all fields related to this technology.
- SHE and security in the field of explosives technology.
- To foster the image of the profession as well as good relations and co-operation with related associations.
- Collaboration on the development of laws and regulations within the EFEE field of activities.

One of EFEE's primary projects has been PECCS (Pan-European Competency Certificate for Shot Firers / Blast Designers). In Europe, there is no minimum training standard to be a shotfirer/blast designer. Each country has its own training requirement and standards which makes working in more than one European country difficult and quite often prohibitive. To remedy this, EFEE has created PECCS.

This project facilitates the transfer of shotfiring and blast design skills within European member states. The PECCS course was launched in August 2019. EFEE are looking for training authorities in each EU country to administer the training. For more information on this innovative project visit www.shotfirer.eu.

This year we have an exciting event being added to the programme – The Emerging Professionals Reception. The Emerging Professionals is a new EFEE initiative, aimed toward anyone with less than 10 years of involvement in EFEE but it is open to all professionals, young and experienced alike. Attendance will be free of charge and available to book with conference registration. If you are interested in sponsoring or becoming involved with the Emerging Professionals, please contact sponsorship@efeeworldconference.com

Wishing you all an enjoyable conference - 'Täname'.

EFEE

BY VIIVE TUUNE
President EFEE

EFEE council members who attended the 70th AGM in Berlin in May 2023.

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From Marine Animal to Mineral, a 340 Million year journey.

We all know the importance of quarries and mines and the essential minerals and other resources that they provide for our modern developed economy. We know too that the minerals required to make cement and concrete come from limestone quarries. Limestone is an abundant rock here in Ireland, but have you ever wondered how the limestone was made?

In the case of the Irish Cement limestone quarry in Platin it is a journey that takes us from warm tropical seas near the equator through tectonic activity, continental drift topped off with a quick blast from the last ice age.

By examining in detail the rocks we see around us today, Geologists can find clues that help them to recreate past environments and discover how the rocks were formed. They can look back through time and see how environments and climates have evolved. They have classified the sequence of rocks right back through geological time, giving each distinct geological period its own name.

Irish Cement began quarrying limestone in Platin in the early 1970's. The location for the Platin cement factory was chosen because of the large limestone reserve. The rocks at Platin Quarry were deposited during the Lower Carboniferous period, around 340 Million years ago.

When the Platin rocks were deposited, Ireland was located just north of the equator in an area of shallow warm tropical seas and islands; think of a modern-day Caribbean. This area of shallow water and islands known today in Geological terms as the Drogheda Block, was thought to have much deeper water to the west and northwest. The areas to the north and south of Platin were probably areas of land made up of much older sandstones, slates and volcanic rocks.

The rocks in the Platin quarry are composed of bedded pale-grey, coarse-grained limestones made from the broken-up remains of the calcite shells and skeletons of animals. So, what can the Geologists tell about the organisms that existed when Platin last enjoyed a tropical climate? The fossils that can be identified are mostly the remains of crinoids, also known as 'sea lilies', and brachiopods, a type of 'bivalve' shellfish.

Crinoids, despite the name 'sea lilies', are in fact animals not plants. They belong to the same family as starfish and could be considered as upside-down starfish attached to the seabed by a long flexible segmented stem. They are filter feeders with their feathery arms catching tiny food items from the sea water and transferring it to their central and dorsally located mouths. The individual rings or ossicles which make up the 'stalk' can often be seen as little white circles fossilised in rocks.

Crinoids were a dominant life form at the time, and it is believed that they once covered the seabed in vast aggregations. Their abundance and hard structure meant that they were very significant contributors of calcite to marine sediments, and subsequently limestone formation. Only a small number of species of crinoids still exist today, confined to deeper parts of the ocean.

Similarly, Brachiopods were very abundant, it is estimated that up to 30,000 species once existed. As hard-shelled creatures, they too were an important source of calcite in limestone formation. They are also filter feeders fixed to the seabed, but

Limestone face in the Platin quarry. Credit: Ted Keane

today they are relatively rare and only inhabit the sea floor in polar regions.

During the Carboniferous period, many other marine creatures existed and can be seen today as fossils in other rocks; these included corals, sea anemones, molluscs with hard shells, amphibians, fish, sharks and trilobites, which were segmented marine animals that look a lot like present-day woodlice, only much bigger.

Within the Platin limestone, it is also possible to detect ball-bearing shaped grains called ooids which are formed by calcite sand being rolled back and forth on the sea floor and being coated with concentric layers of calcite formed by algae living on the outside of the grain. The process of rock formation takes a considerable time and the opportunity for larger intact fossils to be preserved in the limestone requires a specific set of circumstances where the intact organism gets deposited and engulfed in fine sediment, which then remains undisturbed over a long period of time as more and more sediment layers build up above. In time, the weight of the material above solidifies the sediments and the hard parts of the organism and in some rare cases even the soft tissues of the organism can become mineralised and preserved as a fossil. The presence of the ooids in the Platin Limestone suggest a more active environment which was not conducive to preserving large intact fossils, because to date well preserved or intact fossils are rarely observed.

Elsewhere during the Carboniferous, other well-preserved fossils reveal how marine creatures began moving gradually out of the water. They became adapted to life on land and evolved into the ancestors of today's terrestrial animals. Much of the earth's vegetation during this period was dominated by vast swamp forests of towering trees, tree ferns and giant horsetails. It is believed the warm moist conditions suited this extensive growth of vegetation, which in turn sequestered large quantities of carbon dioxide from the atmosphere, increasing the percentage of oxygen in the air to a peak of 35%. Over millions of years, this abundant vegetation decayed and became buried to give rise to extensive Carboniferous coal deposits which are still being burned by humans today.

The abundance of oxygen in the Earth's atmosphere at the time, is believed to have been a major factor in the evolution of some of the largest insects to ever exist on the planet, with centipedes reaching nearly 2 metres in length and dragonfly's as large as magpies!

Back underwater the remains of sea creatures continued to build and form successive layers that Geologists can see in Platin's limestone sequence. But other external forces have played a part in the appearance of the Platin quarry rocks today. The movement of the earths plates, which led to the formation of some of Europe's mountain ranges, also caused the rock sequence at Platin to be uplifted from the sea bed and also to be tilted. So now, instead of lying horizontally as when it was originally deposited, the limestone sequence dips to the northwest at an angle of between 15 and 25 degrees. The slow drift of the plates has also gradually moved Ireland to lie between 50o to 60o North of the equator.

Fragmented fossils in the Platin quarry. Credit: Niall Walsh

Fast forward to the last glacial period in Ireland which commenced some 120,000 years ago, with the final melt period ending about 12,000 years ago. Glaciation has had a profound effect on our landscape in Ireland. In Platin, the limestone and other rocks in the area would have been scoured by the ice over thousands of years. Then as the glaciers retreated and meltwater flowed over the area, glacial deposits or 'overburden' was laid down on top of the limestone. These sediments are largely composed of glacial tills or boulder clays, with some interspersed sands and gravels. One particular feature of interest to Geologists, is the presence within the glacial deposits of pockets of varved clays and silts, that were deposited in pairs of alternating layers. These were deposited in a glacial lake, with the silt layers forming in summer and the clay layers forming in winter.

Often overburden is seen as a nuisance material that has to be stripped off the rock and stored on site. However **Irish Cement has initiated a successful project to assess, screen and utilise suitable portions of the overburden,** mainly the boulder clays **as a shale replacement material** and a source of silica for the cement manufacturing process. This reduces the need to bring in external sources of silica and allows Irish Cement to source over 95% of its mineral requirements on site.

Originally manufactured by marine animals 340 million years ago, the calcium carbonate that is the key ingredient in our cement and hence in the concrete we see around us, is a valuable natural resource. Human ingenuity has found a way to transform this natural mineral into an essential component that allows us to shape the world around us. Following back this amazing journey from marine animals to modern day minerals, demonstrates how deeply dependent we are on the natural world around us. We have a responsibility to deepen our understanding and appreciation of the natural systems and cycles, that we influence and, that in turn can impact us. Our future progress as a species is intrinsically linked to the health of our planet.

Irish Cement
A CRH COMPANY

BY JAMES WEIR
Environmental Manager
Platin

Irish businesses look to growth

Close Brothers recent Business Barometer research, which surveys more than 900 senior business decision, highlights an increased confidence in SMEs across Ireland in future growth of the economy. After facing some challenging conditions following Brexit and the pandemic, 55% were confident in the economic outlook in the coming months.

SMEs also highlighted confidence in their own performance, with 40% of businesses expecting expansion and three in four seeking new funding in the coming 12 months.

FINANCING GROWTH

It is important for firms planning to expand to have a clear structure in place to support scaling up appropriately, in partnership with the right financial provider.

Flexibility is important as SMEs often need to respond quickly to consumer demands. Looking at funding products such as asset finance, invoice finance or asset based lending can support dynamic businesses when pursuing growth.

Gavin Smith, Head of Sales at Close Brothers Commercial Finance, said:

"We are seeing expansion across many sectors in Ireland as customers are looking to invest in additional assets and access funding. Our team is well placed to support businesses in understanding what type of finance is suitable for growth plans.

Some may require asset finance to secure equipment to increase production.

An invoice finance solution can inject working capital by releasing funds from unpaid customer invoices. Those with larger requirements could benefit from an asset based lending facility to secure additional lending against property, plant, machinery or stock.

Whether you are pursuing innovation, expansion or efficiency we are passionate about helping reach your corporate goals."

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The organisation first opened its doors in Ireland during the 2008 financial crisis and offers bespoke products including asset finance, invoice finance and asset-based lending.

As advocates for Irish businesses, and their development, Close Brothers have built teams with strong industry expertise. Creating longstanding relationships across the country, and expanding its products, services and businesses.

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Geological Survey Ireland

Geological Survey Ireland is a line division of the Department of the Environment, Climate and Communications. The Survey is Ireland's public earth science knowledge centre and works to provide free, open and accurate data and maps on Ireland's subsurface to landowners, the public, industry, and all other stakeholders, within Ireland and internationally.

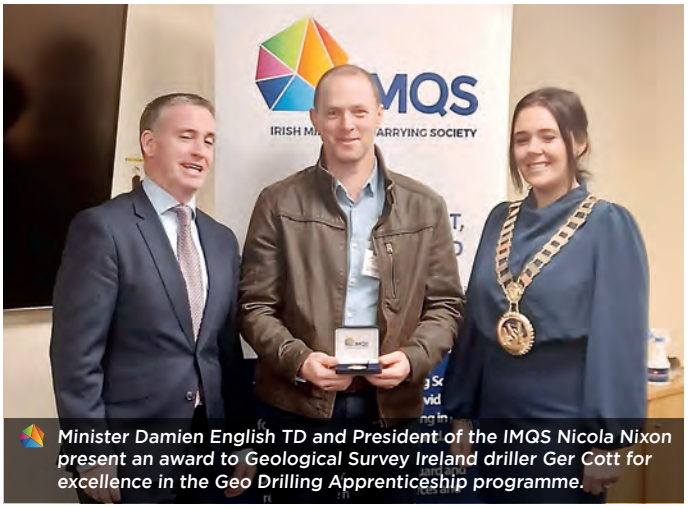
Geological Survey Ireland has faced several challenging years however the organisation is committed to providing state of the art scientific data and technical knowledge to policy makers, government and all stakeholders. The Survey's core programmes continue to operate and the expanded core libraries in Birr and Sandyford are always open and ready for industry visitors and to accept samples for archival. The summer of 2023 has again focused the world's attention on the challenges of climate change and the Survey's activities are strongly linked to this overarching societal issue. The marine and coastal unit is mapping coastal vulnerability with the support of mapping geologists, the groundwater and geothermal unit is addressing groundwater vulnerability and response to climate change along with developing a geothermal gradient database which will be the key data point for this nascent industry while the minerals and Tellus programmes are strongly focused on gathering baseline data and ensuring that the raw materials required for the green transition will be available over the coming decades.

Minister Eamonn Ryan TD opened the EuroGeoSurveys Directors' meeting in Dublin in April 2023 and addressed the delegates on the importance of geoscience for the green transition.

At the heart of Geological Survey Ireland is education and outreach and in 2023 the Survey has exhibited at PDAC in Toronto, the BT Young Scientist Competition and the National Ploughing Championships where the importance of geoscience data and the geoscience industry has been communicated to attendees. The Down to Earth Geology exhibition at Collins Barracks has been a significant success with engagement across a wide spectrum of society on such topics as the minerals requirements for everyday life.

MINERALS

The Minerals programme within Geological Survey Ireland has continued responding to stakeholder needs across the entire minerals and quarrying sector. With the recent issues seen across the country in quarrying products, the Survey has provided technical support to the Department of Housing and the relevant national and local market surveillance authorities to ensure that fit for purpose aggregates are available in the construction market. To support



Minister Damien English TD and President of the IMQS Nicola Nixon present an award to Geological Survey Ireland driller Ger Cott for excellence in the Geo Drilling Apprenticeship programme.

Directors of the European Geological Surveys attended a meeting and workshop in Dublin to sign the Dublin Declaration on Sustainable Management of Earth Resources.

the defective concrete blocks scheme and the revision of relevant national standards, the Survey is managing multiple research projects including a large international consortium evaluating damage mechanisms occurring within defective concrete products. This has involved engaging with multiple stakeholders, from homeowners to quarry operators to ensure that decisions can be taken based on state of the art scientific research. The Survey has also appeared in front of Joint Oireachtas Committee hearings to assist in presenting technical information to our elected representatives.

2023 has also been a hugely significant year regarding the future of metal exploration and mining across Europe with the publication of the Critical Raw Materials Act (CRMA) as outlined in the foreword by Philip Nugent. The Geoscience Policy Division (GSPD) has taken the lead on DECC's behalf in responding to this proposal and Geological Survey Ireland has been assisting in providing technical input to the negotiations around the final text.

A particular focus within the Survey and its sister European geological survey organisations (GSOs) has been the development of national exploration programmes. This was a key discussion point when Geological Survey Ireland hosted a meeting of the directors of the European surveys in Dublin in March. The meeting was opened by Minister Eamon Ryan TD where he outlined the need for raw materials critical to the green transition and highlighted the crucial role of GSOs in providing the baseline data, information and materials to show how we can use our resources sustainably and effectively.

In support of this, the Geoscience Policy Division commissioned research from Geological Survey Ireland to support a key Implementation Action from the Government's Minerals Policy Statement. A comprehensive report was produced outlining the raw material requirements for the energy and electromobility sectors as laid out in the Climate Action Plan. This report provides the first robust assessment of the large volume of metals required to implement the green transition in Ireland and will be a key data point moving forwards.

RESEARCH

Geological Survey Ireland's research programme has been active across multiple funded and supported projects in the minerals and quarrying space. The Irish Construction Materials Project within the Survey has been supported with funded projects focusing on topics as varied as dimension stone and the relationship between pyrite reactivity and diagenesis. In addition to the research for specific policy development, the Survey is also a partner in several pan European projects, including the Geological Service for Europe (GSEU) network, where current focus is on raw materials and the assessment of mine waste and its resource potential. A targeted research call was launched in July 2023 which includes the development of natural resource tools for the utilisation of hyperspectral core data while 2023 will also see the commencement of multiple Research Masters' projects funded by the Survey.

Visitors enjoying the Down to Earth museum exhibit at the National Museum of Ireland Collins Barracks.

TELLUS

The Tellus programme is moving ahead with a large sampling campaign to extend the geochemical soil coverage across Ireland. A large team of field technicians and geologists has been hard at work to deliver the next phase of this world leading project while work on the available data has focused on supporting prospectivity studies across the Northwest Carbonate Province and methodologies for mineral potential mapping in support of the CRMA.

GEOTHERMAL

The National Geothermal Database Project has entered a new phase in 2023, and will focus on the development and delivery of new national maps of geothermal resources. After the success of the first National Geothermal Energy Summit in November 2022, Geological Survey Ireland will host this event on an annual basis. Groundwater and Geothermal Unit continue to work closely with TU Dublin and other stakeholders to assess the feasibility of deep geothermal heat in Dublin city centre. This includes drilling deep boreholes to accurately measure the temperature gradient at depths down to 1 kilometre. The programme is also currently working on the PEACEPLUS proposal which is due to finish in 2023. This is a 3 year geothermal demonstration, including a policy and awareness programme to support cross border prosperity.

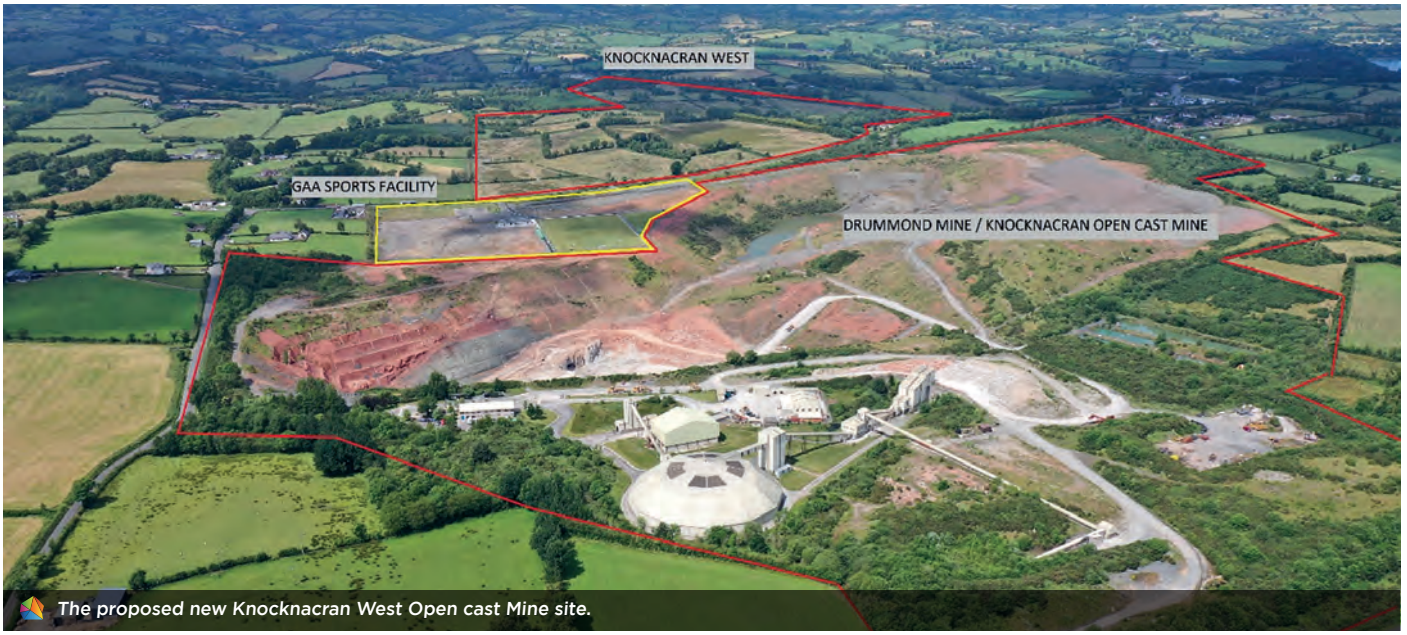
To date 2023 has been a successful year for Geological Survey Ireland but there remains a significant volume of work to be done in support of the forthcoming societal changes. Further education and research into the raw material requirements of the green transition will be essential along with increasing Ireland's circularity commitments through evaluating mine waste prospectivity. Work on Ireland's aggregates will continue to expand and the Survey will continue to work with many IMQS members to ensure that Ireland is well placed to meet the challenges of this century going forward.

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

BY EOIN MCGRATH
Head of Minerals at Geological Survey Ireland

Drummond Mine/Knocknacran Open Cast Mine: Saint-Gobain Mining (Ireland) Ltd 2023 Update

Drummond Mine and Knocknacran Open Cast Mine continue to supply the Irish Construction market demand for both plaster board and bagged plaster as the industry continues to grow post covid era.



The proposed new Knocknacran West Open cast Mine site.

2022 saw Saint Gobain Mining Ireland Ltd. applying for planning permission for Knocknacran West Open Cast Mine - a proposed new mine situated approximately 1 km north from the current Open Cast Mine site. The plan is to secure planning permission soon and commence construction of the new development thereafter.

We continue to support the local community with the construction of a new GAA sports facility, of which, Phase 1 was successfully opened in August 2022, and the aim is to open Phase 2 in 2024 in tandem with the Knocknacran West planning application. GAA football pitch & Changing rooms (Phase 1) before and after pictures below.

We also are supporting the construction of the new Community Centre complex in Drumgoosat village which began in May this year.

SAINT-GOBAIN
BY FINTAN SMYTH
Building Physics Manager
Saint-Gobain


GAA sports facility - Ground works May 2021.


GAA sports facility – Phase 1 completion 2023.

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Blasting Operations can Improve Practices to Reduce the Environmental Impact

Environmentally minded buzzwords have become ubiquitous in the mining and quarrying industries. Terms such as sustainable, environmentally responsible, carbon neutral, and clean energy transition permeate news headlines, social media posts and technical conference presentation titles. Most articles that discuss reducing environmental impacts focus on new technology, such as artificial intelligence. But what about easy, simple, low-to-zero cost practices that almost any operation can implement to reduce their impact?

There is a need for increased explosive usage in the EU due to the increased desire to produce minerals within the EU (European Commission's Critical Raw Materials Act of March 2023). Risks of explosive usage include volatile pricing and environmental concerns. In a small part, the risks can be addressed through best practices and operational improvements. Most of these improvements can help reduce explosive waste, which will reduce the overall explosive usage, cost, and impact on the environment.

Drilling is the first aspect of the blasting process that an operation might consider. Cost and Environmental impacts may be improved through improving accuracy and quality control. Accuracy can be addressed through improving collaring location, alignment, depth control, and downhole deviation, not to mention proper drill operator training.

After drilling, an operation needs to ensure the chosen bulk explosive, booster, and initiation system are optimal for their application. The chosen explosive can impact the overall cost of an operation or the chance that an explosive does not perform adequately. It is best not to assume what the correct explosive is for an operation without evaluating all of the options.

Explosive loading practices could be an area of significant explosives wastage, leading to high costs and environmental impacts. Important practices to review include pre-priming the loading hose prior to charging and emptying the hose post-charging, how an operation accounts for caves and cavities, fractures, and water, and other aspects of charging (there are many).

Stemming length and stemming material are both important to ensure the explosive is properly confined to break and move the rock. Without adequate stemming, energy is lost to the air as noise (airblast). Uncontrolled flyrock is also possible.

Inspecting a drillhole for cavities.

Sometimes **geology can impact an operation's environmental impact.** For example, weak/soft geology can provide inadequate confinement, which leads to inadequate explosive detonation, and/or joints can cause column shift, meaning some of the explosive column loses contact with the primed column. Geologic influences can many times be addressed through changing the layout of a mine, the geometry of a blast, or the timing direction, timing sequence, and/or delays used in a blast.

Explosives performance is also important. Performance factors that could lead to wasted explosives include poor detonation velocity due to poor product selection, poor product quality (i.e. crystalized emulsion or damp ANFO), underpriming or incorrect placement of the primer, presence of water, poor geology, misfires, deadpressing, poor stemming selection and application, etc. Explosive performance and quality control can be measured using tools that are commonly available in the industry. Useful tools include seismographs, detonation velocity recorders, weight scales, cameras, and others.

The points above are valid for any blasting operation but **the most important factor is planning.** Gathering and analyzing information from the preparation and drilling cycle, taking into account information from previous blasts, having an area ready and serviced for the blast to take place. The maxim "fail to prepare and prepare to fail" is more common than you may think.

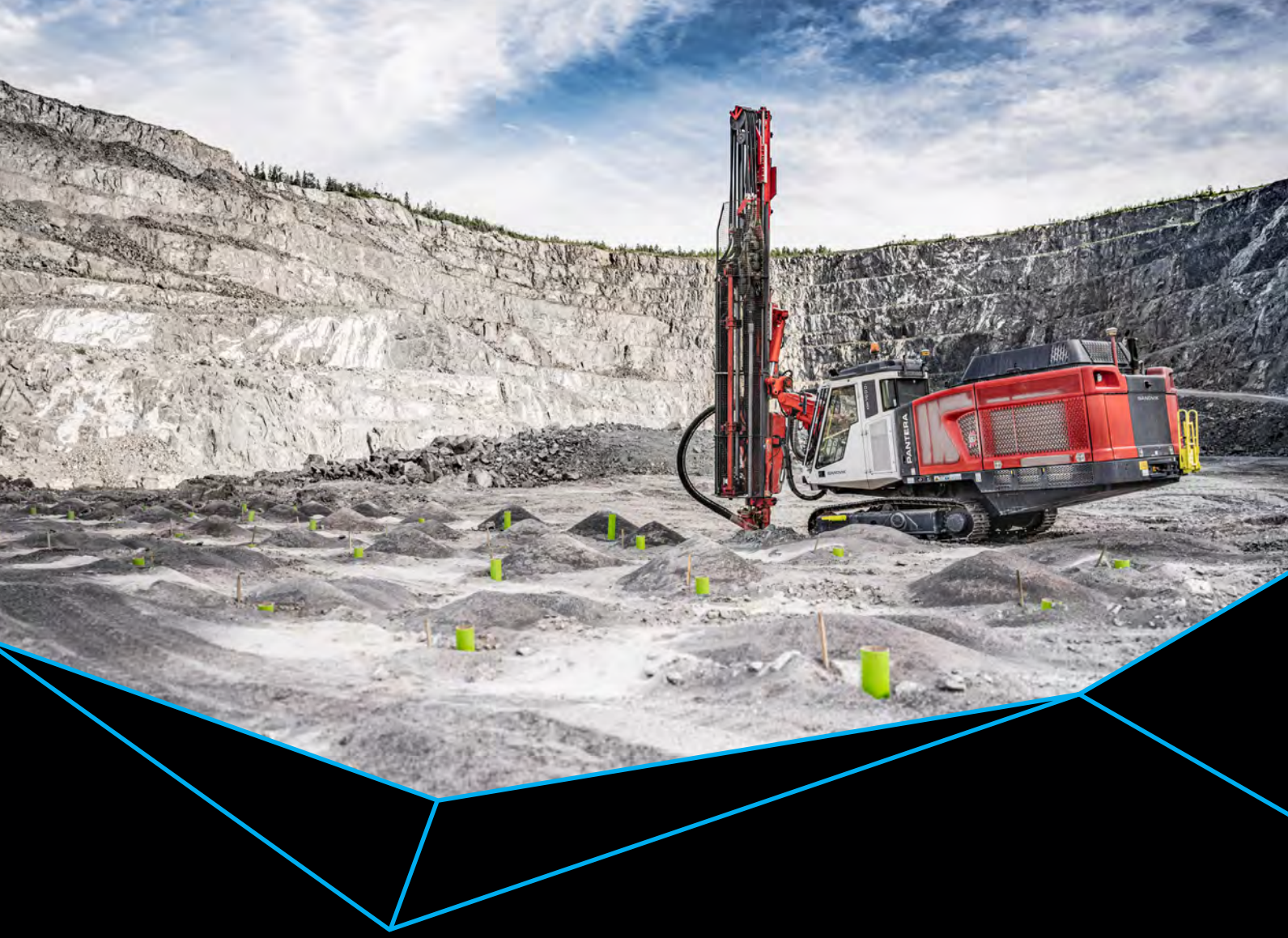
All the factors discussed can impact an operation's overall cost and have the potential to impact the environment. There are a number of best practices an operation can evaluate and use to potentially improve blast performance, reduce overall operational costs, and improve the operation's impact on the environment. Many of these options are practical and have zero-to-no cost.

Nathan Rouse PE PhD, is President of Thoroughbred Drill and Blast Consultants. His career has been focused on drill and blast engineering and consulting. He has managed drill and blast projects for surface, underground and quarrying operations globally.

Website - https://tbredblast.com/

THOROUGHBRED DRILL AND BLAST CONSULTANTS

BY NATHAN ROUSE
President of Thoroughbred Drill and Blast Consultants



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ROCKTECHNOLOGY.SANDVIK

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Remote Monitoring Services – Sandvik's Data-Mining

According to an article written by Petroc Taylor in September 2022, the amount of data created consumed and stored in a 10-year period from 2010 – 2020 increased 32-fold from 2 zettabytes in 2010 to 64 zettabytes in 2020. It's forecasted to continue this steep trajectory and hit ~180 zettabytes in 2025. Given the trajectory, by 2030, this number is too much of an unknown. Until I wrote this article, I didn't know what a zettabyte was but after some research online and for those of us who don't know, 1 zettabyte is 1 trillion gigabytes.

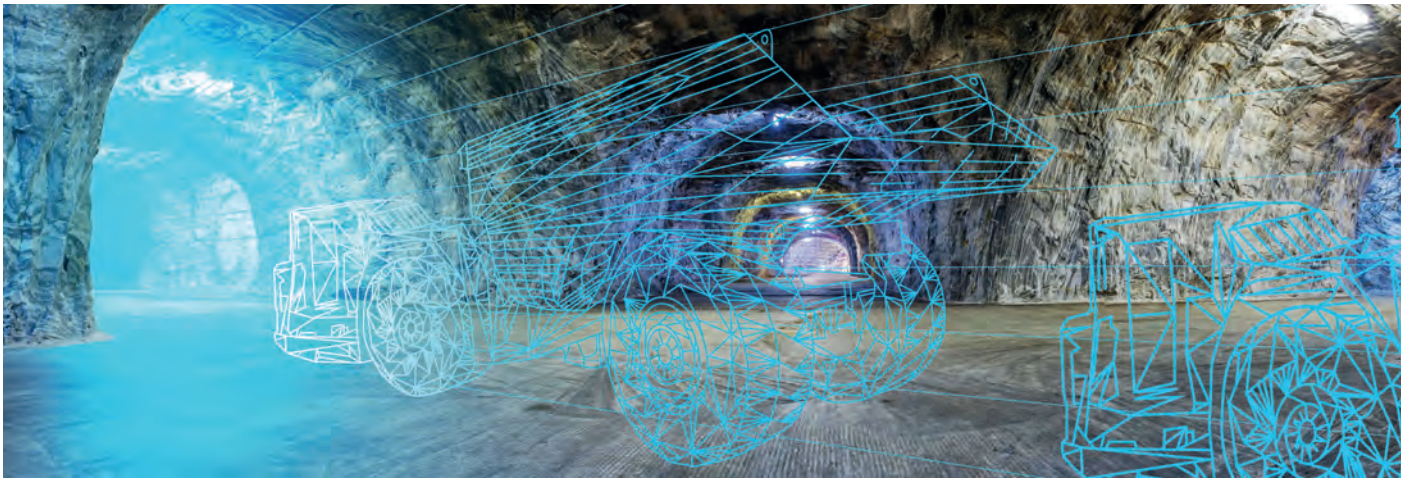
With today's complexity and telemetry data collection capabilities on every piece of modern machinery, using and making sense of the vast amounts of data can be an enormous task in itself. Making rational timely decisions on your equipment's maintenance needs is key to success for any maintenance and production operation. Once an operation can grasp and use this data, it can pay enormous dividends in cost savings, maintenance management and predictive maintenance. Sandvik have seen such benefits and potential with this data telemetry and technology, embraced it and delivered Sandvik Remote Monitoring Service (RMS) to their surface and underground customers around the world. Now various pilot projects are starting in different locations and mines sites in Europe.

Remote Monitoring Service is an assisted service in which Sandvik monitors and analyses telemetry data acquired from the mine or quarry vehicle fleet and identify root causes for abnormalities in order to develop predictive solutions to increase equipment uptime and utilization. Sandvik's digital expertise, along with access to our comprehensive global pool of reference data and combined with our in-depth analytic skills – make this service truly unique and reliable.

Remote Monitoring Services – Equipment Analysis.

From a sustainability point of view, **Remote Monitoring Service** can help the customer to achieve larger tonnage output with less emissions while increasing the life of the equipment and its components. Remote Monitoring Service is fully mature advanced analytics service without heavy investments from the customer to IT-infra or associated services. By translating the huge amount of monitoring and status data acquired from underground or surface mining vehicles into actionable recommendations for the continuous improvement of the customers mining or quarrying operation.

The benefit from Sandvik's complex knowledge and experience only available from the Original Equipment Manufacturer (OEM), where we know our machines and features thoroughly and can turn this knowledge into tangible actions to identify failures before they occur. Also, by increasing the efficiency through continuous analysing of real-time data all year round, Remote Monitoring



Remote Monitoring Services – Support Centre.

Services makes fleet utilization even more efficient and helps customers to increase uptime and plan maintenance, instead of facing unexpected maintenance events which cost time and resources.

Given the large focus on fuel costs, sustainability and emission, clear insights into fuel consumption and excessive idling times can drastically reduce underground emissions and by optimising component lives, we cut back scrap metal. Finally, and most importantly, monitory and analysing this data leads to better operator safety by providing alerts on speeding, brake violations, freewheeling in neutral etc. this helps to keep your operators safe.

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Remote Monitoring Services – Component Analysis.

SANDVIK

BY BRIAN CARROLL

PARTS & SERVICES BUSINESS LINE MANAGER – SALES AREA, NORTH EUROPE

"Starting as a apprentice plant fitter with Sandvik Tamrock in 1999 at Arcon's Galmoy Mines in Kilkenny, Brian has held various technical, supervisor and managerial roles within Sandvik Ireland and Sandvik Europe where he is now Sandvik's Business Line Manager for Parts & Services the sales area of North Europe. His responsibility is all profit and loss in the Sandvik's Parts and Service division for the entire sales area which includes Ireland, Finland, Sweden, Norway, Germany, UK, Bulgaria and Poland."

The European Union's Critical Raw Materials Act to date

As discussed in the last edition of the IMQS's Annual Review, the European Union announced that it was moving ahead with its plans for securing critical raw materials (CRMs) as the EU President, Ursula von der Leyen, outlined the Commission's strategy to put in place a European Critical Raw Materials Act (the Act).

The Act focuses on raw materials that are essential for the EU's economy and the development of key industries. It aims to ensure a reliable supply chain, promote sustainable sourcing and production practices, foster innovation and investment, and enhance resource security. The Act categorizes critical raw materials based on their economic importance and supply risk, and it encourages responsible mining, recycling, and the development of alternative materials. The act also promotes international cooperation to ensure a diversified supply chain and reduce trade dependencies.

The Commission adopted the proposal for the Act on 16 March 2023. The general objective of the proposed regulation would be to ensure the EU's access to a secure and sustainable supply of CRMs by pursuing four specific objectives:

- To strengthen the EU's capacities along the different stages of the value chain. The aim would be to ensure that by 2030:
  - The EU extraction capacity covers at least 10% of the EU's annual consumption of strategic raw materials.
  - The EU processing capacity covers at least 40% of the EU's annual consumption of strategic raw materials.
  - The EU recycling capacity covers at least 15% of the EU's annual consumption of strategic raw materials.
- To diversify the EU's imports of raw materials: no third country should provide more than 65% of the EU's annual consumption (for each strategic raw material).
- to improve monitoring and risk mitigation capacities and
- to ensure a well-functioning single market while improving the sustainability and circularity of CRMs (https://www.europarl.europa.eu/legislative-train/theme-a-europe-fit-for-the-digital-age/file-european-critical-raw-material-act).

The Act is now due to undergo review by the EU Council and Parliament since public comment closed on June 30. The EU has identified that it must foster greater cooperation between Member States to increase the resilience of its critical mineral supply chains and reduce dependence on third countries. However, in its current form, the Act provides little detail on how its targets will be met. It is expected that the legislative review process will help address these concerns.

The Act faces some criticisms, but overall, it strives to strengthen the EU's raw materials sector, protect the environment, and drive sustainable economic growth.

CRITICAL ASSESSMENT OF THE ACT.

The Act faces several problematic areas that may hinder its effectiveness and could limit its ability to achieve its intended goals. Some of these problematic areas include:

- Limited Scope and Definition: One of the key concerns surrounding the Act is its limited scope and definition of critical raw materials. The Act primarily focuses on raw materials essential for the EU's economy, such as rare earth elements and certain metals, but it fails to consider emerging critical materials or those with potential future significance. This narrow focus may result in overlooking potential supply risks and impede the EU's ability to adapt to changing market dynamics. However, in saying this, the EU has updated its list of CRMs consistently and this can only improve in the future under the Act.
- Lack of Holistic Approach: The Act falls short in adopting a holistic approach toward addressing raw material challenges. While it emphasizes resource security, it neglects to address other important aspects, such as improving material efficiency, recycling, and waste reduction. A comprehensive approach

should include strategies for reducing material demand, enhancing resource efficiency, and promoting circular economy principles to minimize the EU's reliance on raw material extraction. Exploration is noticeable by its lack of inclusion in the value chain. We cannot expect to extract more materials if we do not know where to find them. Greater emphasis must be placed on exploration if the Act is to achieve its goals.

- Insufficient Support for Alternative Materials: While the Act acknowledges the need to develop alternative materials, it lacks concrete measures and support to facilitate their widespread adoption. The Act could have provided stronger incentives for research and development in the field of alternative materials, promoting their integration into various industries. This limitation hampers the EU's transition towards more sustainable and resource-efficient practices.
- Implementation and Enforcement Challenges: Effective implementation and enforcement of the Act pose significant challenges. It heavily relies on voluntary commitments and cooperation from industry stakeholders, which may not guarantee the desired outcomes. Moreover, monitoring and enforcing compliance with the Act's provisions, especially in the case of international supply chains, can be complex and difficult to oversee. Strengthening oversight mechanisms and enforcement procedures is crucial for the successful implementation of the Act.
- Potential Trade Implications: The Act may have unintended trade implications, particularly if the EU's approach to critical raw materials is seen as protectionist. Imposing stringent regulations or export restrictions could lead to trade disputes and hinder the EU's ability to secure critical raw materials from global markets. Many European companies are tied into long-term supply contracts which may be affected by such restrictions and regulations. Balancing the objectives of resource security with international trade considerations is essential to avoid disruptions and maintain cooperative relationships with key trading partners.
- Lack of Integration with Other Policies: The Act's effectiveness could be enhanced by better integration with other EU policies and initiatives. Collaboration with existing frameworks on sustainable development, climate action, and circular economy principles would provide a more cohesive and coordinated approach. Greater synergies and alignment with broader EU strategies would help address the interconnected challenges of resource security and sustainability more effectively.
- Such areas will need to be addressed for the legislation to achieve its intended objectives. Expanding the scope, supporting alternative materials, adopting a circular economy approach, improving implementation and enforcement, managing trade implications, and integrating with other relevant policies are critical steps toward a more robust and comprehensive framework for addressing raw material challenges.

THE ACT'S LICENSING PROCESS.

The licensing process of the Act raises several concerns and warrants greater examination due to the following reasons:

- Lack of Transparency: The licensing process under the Act suffers from a lack of transparency, which undermines accountability and public trust. The criteria for granting licenses and the decision-making process are not adequately disclosed to the public. To mitigate the complex licensing procedures for extractive projects, the Act requires Member States to designate a single national authority to oversee applications and reduce the permitting deadlines for new extractive and processing projects to 24 and 12 months, respectively. This is likely to disrupt current licensing procedures, and it is not clear how effective these proposals will be, particularly in view of likely opposition from the green lobby (The New Arms Race - EU CRITICAL RAW MATERIALS ACT highlights intensifying Global competition - Lexology
- Limited Stakeholder Engagement: The intended 2-year licensing process will require stakeholder engagement of exceptional standards. The licensing process under the Act must engage key stakeholders, including industry representatives, local communities, and environmental groups, in a meaningful and inclusive manner. The absence of comprehensive consultations deprives these stakeholders of the opportunity to provide valuable insights, expertise, and feedback
- Inadequate Environmental and Social Safeguards: The Act's licensing process falls short in adequately considering and integrating environmental and social safeguards. The Act should include strict criteria and standards to assess the environmental impact of raw material extraction and the potential social consequences on local communities. Without robust safeguards, the licensing process may contribute to environmental degradation, human rights violations, and the displacement of indigenous populations in certain regions.
- Limited Consideration of Alternatives: The licensing process often neglects the exploration of viable alternatives to raw material extraction. It should prioritize examining options for reducing material demand, increasing resource efficiency, and promoting recycling and substitution practices. By failing to explore and prioritize alternative approaches, the licensing process may perpetuate a reliance on conventional extraction methods and hinder progress toward a more sustainable and circular economy.
- Inconsistent Application: The licensing process may suffer from inconsistent application across different member states of the European Union. Varying interpretations and enforcement of licensing requirements can create discrepancies, leading to an uneven playing field for industry participants. Such inconsistencies can generate uncertainty and hinder fair competition while compromising the overall effectiveness of the Act.
- Insufficient Monitoring and Enforcement: The monitoring and enforcement mechanisms related to the licensing process may be inadequate. Without robust oversight, compliance verification, and enforcement mechanisms, there is a risk of non-compliance, illegal practices, and violations of licensing conditions. Strengthening monitoring and enforcement efforts is crucial to ensure that licensed entities adhere to environmental, social, and operational standards.

The licensing process of the Act faces significant criticism due to its lack of transparency, limited stakeholder engagement, inadequate environmental and social safeguards, neglect of alternatives, inconsistent application, and insufficient monitoring and enforcement. Addressing these shortcomings is essential to strengthen the legitimacy, effectiveness, and sustainability of the licensing process and promote responsible and sustainable raw material extraction practices within the European Union.

THE MAIN CRITICS OF THE ACT?

The main critics of the Act are diverse and include various stakeholders, such as:

- Industry Associations: Some industry associations representing sectors heavily reliant on critical raw materials might criticize the Act for potentially imposing stricter regulations or higher costs on their operations. They may argue that the Act could adversely affect their competitiveness and global market position.
- Environmental Groups: Environmental organizations might criticize the Act for not going far enough in addressing environmental concerns related to raw material extraction and processing.

They could advocate for stronger sustainability measures and more stringent environmental safeguards.

- Human Rights and Social Justice Advocates: Critics from human rights and social justice groups may highlight concerns about the potential social impacts of raw material extraction, such as the displacement of indigenous communities, labour rights violations, or adverse effects on local communities throughout the supply chain.
- Research and Innovation Communities: Some researchers and innovators might argue that the Act lacks sufficient incentives or funding to drive significant breakthroughs in alternative materials or resource-efficient technologies.
- Trade Partners and Non-EU Countries: Countries that are major suppliers of critical raw materials to the EU might criticize the Act for potentially imposing export restrictions or interfering with the global market dynamics. They could perceive the act as protectionist and detrimental to their economic interests.
- Economists and Free Market Advocates: Critics from this group might question the necessity of government intervention in the raw materials market, arguing that market forces should determine resource allocation and supply chains.
- Small and Medium-sized Enterprises (SMEs): SMEs may voice concerns about the administrative burden and compliance costs associated with the Act, which could disproportionately affect smaller businesses with limited resources.

It's important to note that while the Act faces criticism from various perspectives, it also has support from stakeholders who see it as a necessary step towards securing critical raw materials, promoting sustainability, and stimulating innovation within the EU. The Act's effectiveness and future modifications will likely be shaped by ongoing dialogue and engagement with these diverse stakeholders.

THE ACT FROM AN IRISH PERSPECTIVE.

From an Irish perspective, the Act holds both opportunities and challenges for the country's economy and industrial development. As a member state of the EU, Ireland is affected by the Act's provisions, and its implementation has implications for various sectors within the nation.

Opportunities:

- Enhanced Resource Security: The Act's focus on identifying and securing critical raw materials is beneficial for Ireland's industrial sectors that heavily rely on these materials. Ensuring a stable supply chain for essential resources can bolster Ireland's competitiveness and safeguard against potential disruptions in the global market.
- Investment and Innovation: The act's emphasis on research, development, and investment in the raw materials sector presents opportunities for Ireland to engage in innovative practices and technologies. This can lead to the emergence of new industries and the development of sustainable alternatives to critical raw materials.
- Environmental Protection: By promoting responsible mining and sustainable sourcing practices, the Act aligns with Ireland's commitment to environmental protection and sustainability. This can support Ireland's efforts to meet climate targets and reduce the environmental impact of resource extraction.
- International Collaboration: The Act encourages cooperation with other EU member states and key trading partners to address raw material challenges collectively. Such collaboration can provide Ireland with access to expertise, resources, and markets for its raw materials and products. Ireland, in turn, can provide its expertise and know-how to EU partners and countries further afield.

There may be certain challenges from an Irish perspective regarding the Act also:

- Limited Influence on Critical Material Selection: The Act's definition of critical raw materials is determined at the EU level, which might not fully reflect Ireland's unique raw material needs and priorities. This could lead to potential discrepancies between the EU's critical material list and Ireland's specific requirements.
- Industrial Impact: Ireland's industries that heavily rely on critical raw materials might face challenges in adjusting to new regulations and sustainability standards. Complying with stringent requirements could increase production costs and affect competitiveness, particularly if other global competitors do not have similar constraints.
- Environmental Concerns: While the Act promotes responsible mining and sustainable practices, there might still be concerns about the potential environmental impacts of raw material extraction. Balancing the need for resource security with environmental protection remains a complex challenge.
- Trade Dependencies: The act's emphasis on reducing trade dependencies could affect Ireland's access to certain raw materials from global markets. This may require careful navigation of trade agreements and negotiations to maintain a reliable supply chain.

For Ireland, the Act presents a mixed perspective, with both opportunities and challenges. Embracing the Act's focus on resource security, innovation, and sustainability can drive positive changes in the Irish economy and align with the nation's commitment to environmental protection. However, addressing challenges related to critical material selection, industrial impact, environmental concerns, and trade dependencies requires careful consideration and strategic planning to ensure a balanced approach that benefits Ireland's long-term development.

We have already seen how market prices, energy costs and decisions outside Ireland's jurisdiction have resulted in the closure of Europe's largest zinc mine which would appear to fly in the face of the proposals of the Act. A level playing field is required for all operators in the extractive sector regardless of whether they provide CRMs.

CONCLUSION.

Without doubt the European Union's Critical Raw Materials Act will create much debate before it is fully enacted. The legislative process of the proposal has moved through a number of stages to date. A public hearing on the proposal took place on 22 May. In the European Parliament, the proposal has been referred to the Committee on Industry, Research and Energy (ITRE), a draft report was released on 15 May.

It includes 107 amendments to the proposal, including many mentioned in this article. These aim to promote substitution and innovation in the CRM value chains; streamline permitting procedures, monitoring and governance at EU and national level; reduce the administrative burden for companies; set up incentives to attract the industries of the future to the EU; and foster strategic partnerships. The vote in ITRE is planned for September 2023.

The Act is vital for the European Green Deal, so let us see how this pans out, as the saying goes, the devil is in the details and we do not yet know the full details.

TAL TECH

BY TONY HAND, PHD

Sustainable Mining Project Manager, Division of Mining and Mineral Technology, Department of Geology, Tallinn University of Technology – TalTech, Estonia.

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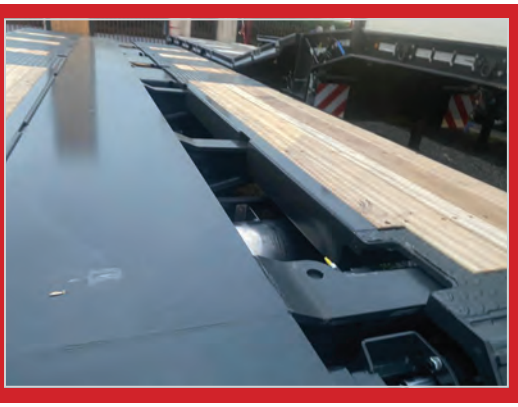

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iCRAG Update 2023

With the COVID-19 pandemic restrictions lifting during 2022, it was a return to business as usual for iCRAG, the SFI Research Centre in Applied Geosciences. Hosted by University College Dublin, and with a 150 strong research team based in eight Irish research institutions, the Centre's research activities cover a broad range of disciplines across Earth System Change, Earth Resources and Earth Science in Society.

iCRAG's raw materials research programme is focussed on four key areas: (i) securing a sustainable and efficient supply of mineral resources, (ii) raw materials to enable the energy transition, (iii) safe and sustainable geomaterials for Ireland's construction industry and transport infrastructure, and (iv) social accessibility and responsible decision making. Key highlights in the raw materials space include expanding our international networks, bringing new industry partners into iCRAG and advancing our communications activities.

Our Irish Orefield research continues to focus on improving regional geological interpretations to aid targeting and a key part of this is to get more from existing geological data. Our geochemical vectoring work analysing pyrite and chert associated with mineral deposits is yielding some interesting and potentially useful initial findings. Working with industry partners we have initiated new geophysical research projects that will utilise existing geophysical surveys combined with newly acquired petrophysical data to better understand geophysical responses and produce more accurate regional geological interpretations. A major geophysical project entitled "Subsurface geological characterisation using multiphysics geophysical inversions and petrophysics in Limerick Basin" led by PI Dr Aline Melo (UCD) was initiated early in 2023 and has industry partners Boliden, BHP, Glencore, KoBold Metals, SGL, and South 32. This project utilises the new petrophysical laboratory established by Dr Melo in 2022.

iCRAG have also commenced a project that will characterise the various scales and structural geometries of inversion related faults and the geochemistry of associated veins. These structures post-date mineralisation and complicate geological interpretation. Their recognition in drill-core during exploration is therefore important for generating a more accurate geological assessment and for further targeting.

iCRAG is a partner in VECTOR, a three-year, €7.5M project, awarded in July 2022, **under the European Union's Horizon Europe and the UK' Research and Innovation funding programmes.** As Europe sets out its goals for decarbonization in the EU Green Deal, achieving these targets will require more responsible use of, and a sharp increase in, the supply of critical raw materials.

To meet its demand in raw materials, the EU is currently reliant on imports and is therefore vulnerable to changes in the geopolitical landscape and supply chain interruptions. Complex social, environmental, and technical challenges need to be understood to explore the potential domestic sourcing of metals and minerals in the EU.

The VECTOR project seeks to explore these challenges by bringing geosciences and social sciences together to develop human-centred solutions for a socially acceptable, responsible, and sustainable supply of critical raw materials in Europe and thus contribute to achieving the Green Deal.

iCRAG continues to work internationally. Africa continues to be our main focus where we have a number of research projects underway in the Central African Copperbelt in both Zambia and the DRC. We have also just initiated work on the Kalahari Copperbelt with industry partner Sandfire Resources. iCRAG is also examining sedimentary rock hosted copper systems in the

iCRAG and Geoscience Ireland Pavilion at PDAC 2023.

eastern Andes with Japan Oil, Gas and Metals National Corporation (JOGMEC) and Hannah Metals Ltd. During 2022 we undertook research in two areas of Greenland and we are initiating new projects in the Iberian Pyrite Belt and the Chu-Sarysu basin of Kazakhstan with corporate partners.

Continuing to expand our national and international network iCRAG exhibited and presented at numerous international conferences (both online and in person) including the **AME** Roundup in Vancouver, Prospectors & Developers Association of Canada **(PDAC)** in Toronto, Society of Economic Geologists **(SEG)** in Denver, **Environment Ireland** in Dublin, the in-person Ireland-Canada trade conference held in Dublin, Geoscience Ireland (GI) stakeholder events, the **Global Energy Show,** the European Association of Geoscientists and Engineers **(EAGE)** Annual Conference, and the EAGE Geoscience and Engineering Energy Transition Conference and had numerous researchers presenting at a variety of conferences including the Society for Geology Applied to Mineral Deposits (SGA) Annual Conference, AGU, EGU and the 2022 Gordon Research Conference in Inorganic Geochemistry

In 2022 iCRAG organised a number of stakeholder and industry events with links to raw materials. In March iCRAG welcomed stakeholders in the offshore renewable energy sector to a workshop on **De-risking Ireland's Offshore Wind Potential** at the National Maritime Museum of Ireland, Dún Laoghaire. iCRAG is focused on the crucial role of research in supporting the offshore wind industry, which is pivotal to Ireland's climate goals and net-zero targets.

The event presented iCRAG's capabilities, expertise and current research in this area and offered consultants, developers and other stakeholders an opportunity to meet with our researchers, foster collaborative links and discuss how upcoming research projects can address the most pertinent challenges faced by the industry as Ireland targets 5 GW of wind by 2030.

The iCRAG2022 conference, held under the theme **"Making a Difference",** in December in Croke Park, brought together more than 220 members of the academic geoscience community as well as stakeholders from industry and government to deliver insights into how the geoscience research sector can play a leading role in addressing the Climate Action Plan and Ireland's commitments to the UN Sustainable Development Goals. Posters from the event can be viewed here.

iCRAG's raw materials Business Development team welcomes enquiries from prospective industry partners:

Emer Caslin, iCRAG Business Development Manager
emer.caslin@icrag-centre.org

Dr Aoife Brady, iCRAG COO
aoife.brady@icrag-centre.org

John Güven, iCRAG Raw Materials Manager
john.guven@icrag-centre.org

iCRAG
SFI RESEARCH CENTRE IN APPLIED GEOSCIENCES

BY EMER CASLIN AND JOHN GÜVEN

Lhoist choose Epiroc SmartROC Mk II for Istein quarry

When global limestone producer Lhoist Group were looking to improve the output and sustainability of the operation at their Istein quarry in south west Germany, they turned to Epiroc for advice and a long term solution. Having been impressed by the results achieved by a drilling contractor using an Epiroc down-the-hole hammer, the limestone quarry chose a SmartROC D50 Mk II – the first of these innovative, highly automated drill rigs to be sold in Germany.

With headquarters in Belgium, the family owned Lhoist Group is a world leading producer of lime, dolime and minerals with some 200 quarries globally. Having a long history of operating quarries, Lhoist Germany acquired Istein, a limestone quarry in south west Germany, back in 2015.

Having relied upon two small 15 bar down-the-hole drill rigs for many years, the Istein limestone quarry was keen to replace them with a single, fuel efficient and more productive drill rig. Following guidance from the purchasing team in Belgium, each quarry is able to decide the best equipment for their operation. Epiroc is a trusted business partner of Lhoist globally, supplying and supporting them with both underground and surface drilling equipment.

In addition to meeting demands for durability and cost efficiency, the quarry had demanding operational requirements including a drive for innovation and

Thanks to a new advanced intelligent system to control the compressor load and engine rpm, the SmartROC D50 Mk II significantly reduces fuel consumption.

All three operators at the quarry have been trained how to use the SmartROC D50 Mk II and, more importantly how to get the most out of the machine.

high standards of sustainability for the new drill rig. As products are becoming increasingly complex, it was also important for the successful supplier of the new drill rig to be able to provide training and proven service support.

Mr Frank Kammüller from Lhoist explained "The move towards increased automation and digitalisation means that products are becoming increasingly complex so we have to have reliable and competent partners at our side who can advise and support us, Epiroc, and the SmartROC D50 Mk II in particular, meet these requirements."

The SmartROC D50 Mk II offers smart features such as automated drilling and rod handling. Thanks to a new advanced intelligent system to control the compressor load and engine rpm, the SmartROC D50 Mk II significantly reduces fuel consumption.

The Mk II drill rig also benefits from a redesigned hydraulic system, which not only reduces fuel burn, but also uses hundreds of litres less hydraulic oil than previous versions of these machines. As well as reducing running costs, Lhoist's commitment to reducing their environmental foot print meant that fuel consumption of the new rig was a key factor.

The automation-ready platform can also be fitted with the new option Auto Feed Fold. Using just a single action, the Auto Feed Fold enables the operator to dump the feed for tramming or position it ready for drilling.

Inside the cabin a lot of thought has been given to the layout of controls to provide an ergonomically designed and comfortable working environment for the operators. The rig has multifunction joysticks and adjustable tramming speed to further improve the operator's comfort and make trailer loading safer and easier. The cabin also includes a brand new touch screen-based Rig Control System.

Julian Schumacher, Epiroc's Area Sales Manager explained "The SmartROC's system is both intuitive and easy to learn – and presents live information to the operator. The new screen will give the operator total control of the rig. All three operators at the quarry have been trained how to use the SmartROC D50 Mk II and, more importantly how to get the most out of the machine".

Like all SmartROC rigs, as other new features and improvements are released, they can easily be installed via software upgrades to keep the machine up-to-date at all times.

Mr Frank Kammüller continued "Our drillers have found the SmartROC D50 Mk II easy to operate and really appreciate the comfortable cabin. With the D50's 25 Bar compressor achieving a much higher percussion rate we have seen a significant increase in productivity in the quarry, combined with a reduction in fuel consumption.

We really appreciate the continuing support the Epiroc team are providing to ensure that we really get the most out of the many automated features on this innovative machine.".

Epiroc

BY ATTILA BAKI
Key Account Manager

Recent Activities of the IAEG

The IAEG are delighted as always to contribute to the IMQS Annual Review. The IAEG and IMQS have a long-standing relationship and we look forward to continuing to work with each other in the future.

2022
ANNUAL LECTURE SERIES

Our first in-person event was held in March at the Pillo Hotel in Ashbourne with John Clifford presenting "Copper in Europe: Production, Demand, Potential and Challenges"

In September, the winners of the Frank Arnott - Next Generation Explorers Award (NGEA™): Innovation Award, TeamGetAI, presented their talk - 'Exploring for Irish-type Deposits with Data Driven Domaining'.

ANNUAL CONFERENCE

Our Annual Conference was held in May in Athlone. "IAEG 2022: Getting Back to Business" saw 13 speakers presenting to 80+ attendees on industry and academic developments of the past two years, plus a look to the future as we emerged from the pandemic and the role our industry has to play.

A summary of all IAEG events and articles from industry, academia and government are provided in the 2022 IAEG Annual Review which is available to members by emailing president@iaeg.ie

2023
50TH ANNIVERSARY CONFERENCE

2023 is an important year for the IAEG in which we will be celebrating 50 years since the Association's formation in 1973. In celebration of the 50th Anniversary, the IAEG will be hosting a major international conference: 'IAEG 50 – 50 Years of Irish-type Zn-Pb Deposits'. The term 'Irish-type' – in global usage today in the world of economic geology - was in fact first coined at an IAEG meeting in 1977 and so the 50th Anniversary is the perfect opportunity to recognise this.

The Conference will be taking place 8th – 10th September 2023 at the Galway Bay Hotel. As well as 30+ speakers across the 3 days there will also be trade displays and a core-shack display area with drill core from nearly all Irish deposits, all in the same place for the first time.

The conference will also yield a major seminal publication comprising 38 papers from many of the world's leading authorities on Irish type Zn-Pb deposits with a full colour, richly illustrated 850 page volume.

Included are new papers on the deposits in Ireland and their typomorphs in many countries around the world. This publication becomes the fifth major conference volume from the IAEG, dating back to 1986.

A full list of speakers and papers can be viewed at iaeg.ie/IAEG-50 – copies of the published volume can be ordered or purchased (for non-members) via president@iaeg.ie.

LOGGING COURSE

In October we will be hosting our bi-annual Student Logging Course, returning after a 3 year hiatus.

This course, aimed at Earth Science students and early-career geologists, provides hands-on experience with diamond drill core logging, plus presentations on best practices and QAQC. This year, the course is being kindly hosted at the Lisheen Core Store.

IAEG

BY ALLY BARROW
President, Irish Association for Economic Geology

Paving the way to Decarbonisation

As the construction sector increases its pace to meet net zero, the mineral products industry has an important role to play in helping it to decarbonise. Mick Knight, Industry Manager – Quarry and Aggregates, from Finning UK & Ireland – the world's largest dealer of Cat® machines and equipment - looks at some of the solutions available today that are helping companies operate more efficiently, and crucially support more sustainable practice.

The last few years has seen a lot of progress in the aggregates sector, with operators increasingly implementing new systems and approaches to improve efficiencies that reduce fuel use and carbon emissions. Better use of telemetry, for example, can help operators to make significant gains to provide greater productivity, efficiencies and ensure operator safety.

Telemetry can improve site productivity and play a pivotal role in ensuring machine performance and health, which in turn improves efficiencies. Technology such as VisionLink Productivity can provide valuable insights for the operator on the performance of equipment. It can also uncover potential site set-up issues and pinch points, as well as highlighting operator performance issues. It can also be used to reduce machine idle time, fuel consumption and exhaust pipe carbon emissions.

Caterpillar® has a clear, long-term strategy around electrification. Our focus in the short to medium term is therefore on helping customers to better utilise the technology features that are built into the latest generation of Cat machines to increase efficiencies, and drive productivity. To address this, we've created a dedicated 'eco-drive' training programme aimed specifically at operators to hone and develop their skills and so they can make the most of the technology features available. More recently, we also introduced an 'eco-training advanced' scheme which is aimed at managers involved in planning operational logistics and educates customers on using data insights to pinpoint opportunities for efficiency improvements across sites. We're also helping our customers to understand more about the autonomous features that some of the machines now have – which again improve performance and productivity.

New machines today are designed to be more efficient than previous models, so customers have the option to go down a class in machine size and power to achieve the same performance. As such, we're seeing the larger excavators with the Next Gen technology features built in are proving very popular, not only because of the ease-of-use functions that they offer, but also the breakout force, digging power and fuel efficiency. Fuel efficient machines are an important consideration to help reduce operational costs.

A Certified Powertrain & Hydraulic Rebuild of Arkil's Cat 775F by Finning.

We're also running technology day events for some of our aggregates customers to help them to understand how to the get the best out of their fleets and to demonstrate the ever-changing range of new technology hardware and software available – this includes the Cat Command system and Cat VisionLink. As part of this we're also starting to deploy drone technology to help map out earthworks required on site. We have a division, called Finning Managed Solutions, which can then use the data to plan out the schedule of earthworks required in the most efficient, safe and cost-effective manner – reducing emissions and costs.

All our customers also have the chance to use a proprietary platform that we've developed called, **CUBIQ Sustainability, which allows them to monitor all their assets.** It gathers data on a wide range of metrics from fuel consumption and machine utilisation to emissions per site, project or by individual machine, and can even predict cost savings based on reducing factors such as idle time.

Sustainability continues to drive other operational decisions in the aggregates sector. This is evidenced by the increase in the volume of machine rebuilds that Finning is conducting for companies

A Certified Powertrain & Hydraulic Rebuild of Arkil's Cat 775F by Finning.

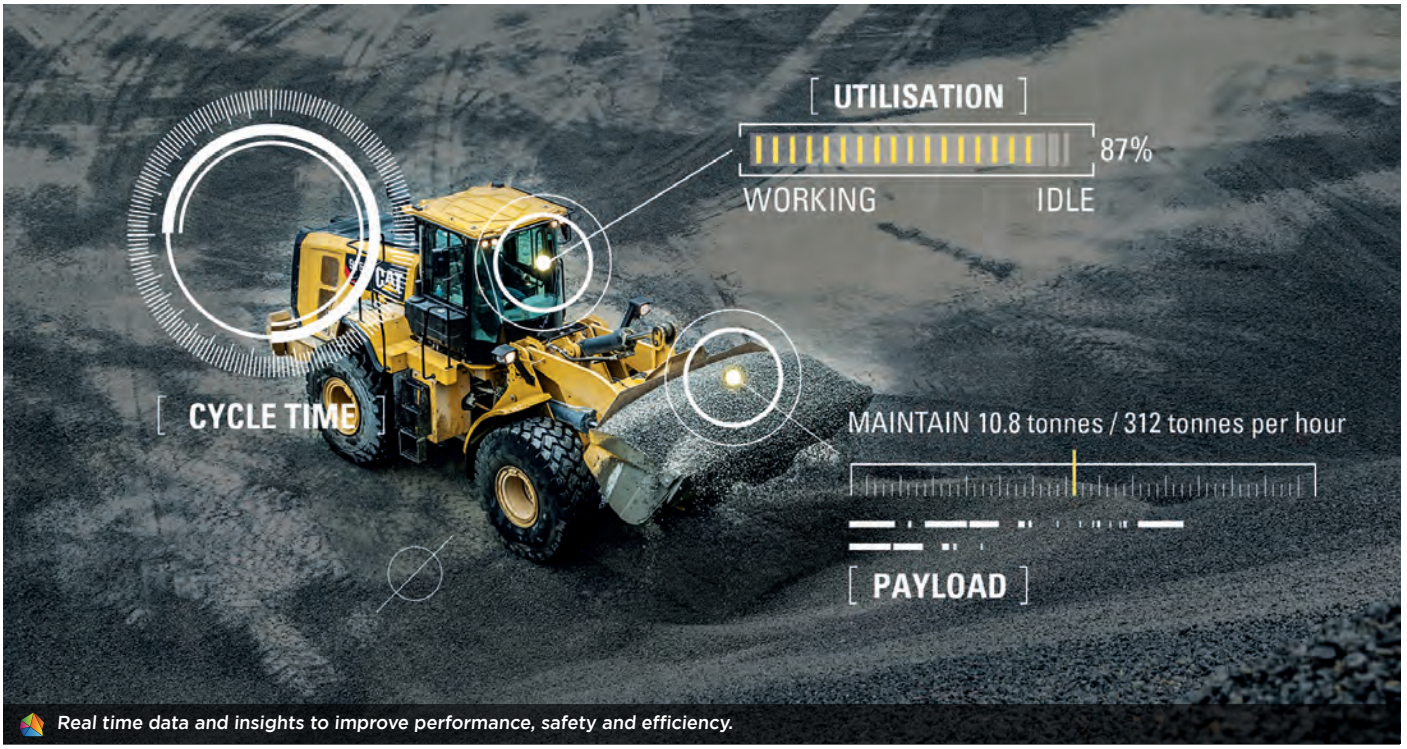
in the sector, including Arkil. Rebuilds also offer other significant benefits for aggregate firms - financially with firms typically saving around 55 – 60 per cent when compared with the cost of a new machine.

We've seen an underinvestment in fleets over recent years and are now working closely with several quarry customers to optimise their fleet with reduced capital costs, increased productivity and better fuel efficiency. Interestingly this can include them buying into a combination of new machines, rebuilds, used and rental equipment. A used medium sized wheel loader as an example, offers a commercially viable alternative to buying a new machine and can be rebuilt to Cat certified standard within 12 weeks.

Although official figures show the industry is contracting, our customers are still busy and demand for machines remains high in the aggregates sector.

FINNING CAT

BY MICK KNIGHT
Industry Manager – Quarry and Aggregates, Finning UK & Ireland



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In order to support construction professionals Roadstone has developed Roadstone LEARN, an innovative online seminar platform specifically designed to enable learning and Continuous Professional Development.

Roadstone Learn offers a range of up to date CPD presentations on the most important aspects of the Building Regulations and Technical Specification regarding products.

Presentations are delivered through the website by technical managers from Roadstone.

Topics range from Sustainable urban Drainage Systems, Part L compliance, and Floor Screed design to the specification of concrete.

The platform features 11 presentations and are offered as an on demand service. Once you enrol on any of the courses the participant will be presented with a video format, which can be paused or rewatched at a future date.

All of the presentations will offer a downloadable CPD certificate at the end of the presentation.

By accessing these specialized seminars, participants can gain in-depth knowledge and insights that will enhance their expertise and contribute to their professional growth.

Following the presentations support from technical staff is available on specific queries, contact information will be offered on completion of the course.

The platform is free to enrol and all seminars can be taken at any time.

Register today to view the full suite of courses available through cpd.roadstone.ie

BY RICHIE MCCARTHY
Head of Marketing & Communications

Roadstone has enhanced its fleet of heavy commercial vehicles with the recent addition of a new Mercedes-Benz Econic 3235L truck, the first of its kind in Ireland. The Econic low entry unit offers a new level of safety for operating a mixer truck in a city environment with an ideal driving position for an eye level view of pedestrians, cyclists and other road users.

Think legal. Think Serus Legal

Peter Finan, Managing Principal of Serus Legal, tells us about his mining experience and his firm's involvement in mining.

Peter, tell us about yourself and your involvement in mining?

I qualified as a lawyer in Ireland before leaving for foreign shores. in 2006. I spent 7-years in Australia, cutting my teeth in the mining sector, before relocating to the UAE and then Morocco. While I still work in other sectors, I particularly enjoy working in the mining sector which I see as essential to human progress.

TELL US ABOUT SERUS LEGAL?

Big law firms come with big overheads and inflexibility. So, in 2019 I opened the doors to Serus Legal, a modern flexible law firm that recruits senior lawyers, working remotely, with experience from top firms and companies. Using our own technology, we eliminate unnecessary overheads, allowing us to provide services at affordable rates. Our team is based internationally and includes Irish and UK lawyers.

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No, it's not! We have some pretty unique fee arrangements too, like our pack-of-hours model, which basically gives clients their own virtual legal counsel for a set number of hours. A nice facility to have when you need the support across different matters.

ANY INTERESTING FILES TO TELL US ABOUT?

For sure. Recently we've helped clients with deals in Ireland, Argentina, the US, and Africa. Some of these involved the acquisition of new projects, requiring due diligence, and the preparation of joint-venture, royalty, and earn-in agreements.

Examples include OOKAMI's acquisition of a lithium project in Mali, or Sage Management's acquisition of the Kisenge Manganese Project in the DRC. We've also been helping with some promising exploration activities in Nigeria.

DO YOU HAVE IRISH AND UK CLIENTS?

Absolutely. Our UK clients tend to be more on the investment side and are focused strongly on battery mineral projects. Amongst our Irish clients, AURUM Discoveries sticks out. Active in Ireland for many years, they've been expanding to a more international role and are a great example of how Irish mining can lead to global opportunities.

SERUS LEGAL

BY PETER FINAN
Managing Principal,
Serus Legal

IMQS

IRISH MINING & QUARRYING SOCIETY

ANNUAL DINNER DANCE 2023

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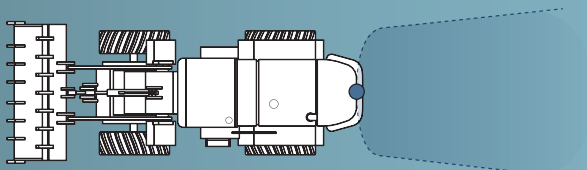

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The Versatile Applications of High Purity Calcium Carbonate

Calcium carbonate (CaCO3) is a naturally occurring mineral abundant in chalk, limestone, and marble quarries worldwide. While deposits of calcium carbonate are widespread, those with high purity, cleanliness, and accessibility are rare. Additionally, a deposit must be economically viable throughout its lifespan to enable successful quarrying operations. This article explores the multifaceted applications of high purity calcium carbonate, examining its physical and chemical properties and how they influence its usage in various industries.

Calcium Carbonate has played a very important role for numerous industries. Paper, plastics, paints, and pharmaceuticals are very rarely associated with the term 'stone' or 'rock' and most people are therefore very surprised to learn that many of these products contain a high amount of high purity calcium carbonate not only for technical uses but also for ecological and economic reasons. After quarrying from a reserve of chalk, limestone or marble, treatment is required to process the calcium carbonate for further use.

Typically, the process includes washing, sorting of undesirable contaminants, grinding, size classification of particles and drying. Surface treatment of calcium carbonate can also be undertaken to add value such as the addition of coatings to match the surface tension of the products they are commonly mixed with such as thermoplastics. The chemical formula as such remains unchanged.

Fillers or extenders are very important elements to produce paper, plastics and paints and if the chemical purity is sufficiently high they are also used in food, pharmaceuticals or cosmetics.

CHEMICAL & PHYSICAL PROPERTIES AND THEIR IMPACT:

The quality of Calcium Carbonates is generally defined by brightness, fineness, particle distribution and absence of impurities.

Key Properties of Calcium Carbonate:

The properties of calcium carbonate are important for determining its suitability for different applications; the quality of Calcium Carbonate is generally defined by brightness,

fineness, particle distribution and absence of heavy metals. The most important properties of

Calcium Carbonate include:

1. Particle Size Distribution: The particle size distribution of calcium carbonate from quarries significantly impacts its applications. Finely ground particles are desirable for industries like paper and paints, where high surface area and uniformity are essential. On the other hand, coarser particles are preferred for construction materials, as they contribute to improved mechanical properties and reduced production costs. Ground calcium carbonate (GCC) can generally be divided into 3 categories based on their particle size: Coarse GCC with a d50 of 25 – 100 microns, fine GCC with a d50 of 5 – 25 microns, and Ultra Fine GCC with a d50 of 2.5 – 5 microns.
2. Purity and Whiteness: The chemical composition of the deposit significantly impacts the characteristics of the derived calcium carbonate. Aside from calcium carbonate, limestone may contain impurities such as magnesium carbonate, iron oxides, silica, and other minerals. The presence of these impurities can affect the purity and performance of the calcium carbonate in specific applications. High Purity Calcium Carbonate is categorised has having a CaCO3 content of >98%. Whiteness/Colour is particularly crucial in industries like paints, coatings, and plastics, as it influences the color and opacity of the final products.
3. Specific Surface Area: The specific surface area determines the reactivity of calcium carbonate in chemical processes. Higher specific surface area allows for more efficient reactions, making it valuable in applications such as water treatment and pharmaceuticals.
4. Crystal Structure and Morphology: The crystal structure and morphology of calcium carbonate particles influence their behaviour during

processing and end-use. Crystal structure and morphology will vary from deposit to deposit.

5. Surface Modification and Functionalization: The ability to modify the surface of calcium carbonate particles enhances its performance and extends its applications. Surface functionalization allows for improved dispersion in polymers, better compatibility with certain coatings, and increased binding capacity in pharmaceutical formulations.

THE IMPORTANCE OF HIGH PURITY CALCIUM CARBONATE IN VARIOUS INDUSTRIES

Construction and Building Materials

In the construction industry, high purity calcium carbonate is a fundamental component in the production of cement, mortar, and concrete. The calcium carbonate acts as a filler material, enhancing the mechanical properties of these materials, including compressive strength, durability, and workability. Its fine particle size promotes better bonding between aggregates, resulting in more robust and reliable construction materials.

Paper and Pulp Industry

High purity calcium carbonate is an indispensable filler in the paper and pulp industry. Its addition to paper increases opacity, brightness, and printability, enhancing the overall quality of the paper product. Furthermore, calcium carbonate helps reduce the use of traditional pulp fibers, contributing to more sustainable paper production practices.

Plastics and Polymers

The plastics and polymers industry extensively relies on high purity calcium carbonate as a filler and reinforcing agent. When incorporated into polymers, calcium carbonate enhances mechanical properties, thermal stability, and impact resistance.

Its presence also reduces the consumption of more expensive polymers, making plastic production more cost-effective and eco-friendly.

Pharmaceuticals and Nutraceuticals

In the pharmaceutical and nutraceutical sectors, high purity calcium carbonate is widely used as an active ingredient in antacids and calcium supplements. Due to its exceptional bioavailability and safety profile, calcium carbonate is the preferred choice for neutralizing stomach acidity and providing essential dietary calcium.

Environmental Applications

High purity calcium carbonate plays a crucial role in various environmental applications. In water treatment, it acts as a neutralizing agent for acidic water, mitigating the harmful effects of acid rain on aquatic ecosystems. Additionally, calcium carbonate is employed as a liming agent in agriculture to neutralize soil acidity, promoting nutrient availability and increasing crop productivity.

Paints and Coatings

The paint and coating industries utilize high purity calcium carbonate as an extender and pigment. Its high refractive index and brightness enhance opacity and contribute to the reflective properties of coatings, resulting in aesthetically pleasing and high-quality paint products.

Conclusion

High purity calcium carbonate derived from suitable high purity reserves serves as a versatile and indispensable mineral across a wide array of industries. Its applications range from construction and paper production to plastics, pharmaceuticals, and environmental solutions.

The physical and chemical properties of limestone significantly impact the quality and versatility of the derived calcium carbonate, making it crucial to select suitable limestone sources for specific industrial needs. As industries continue to prioritize sustainability and eco-friendly practices, the role of high purity calcium carbonate becomes increasingly vital, bridging the gap between innovation and environmental consciousness. With ongoing research and technological advancements, the potential of calcium carbonate is boundless, presenting new opportunities for growth and development across various sectors.

McGRATHS CONG
Cemfloor
BY PADRAIC MCGRATH
Research and Development, McGRATHS CONG

Substitute Consent – History and Evolution

In recent years, planning for extractive development has become a very complex and nuanced area with ever evolving and more detailed legal requirements. Given the industry substantially derived from Pre-63 development with only a relatively recent obligation to engage with the planning legislation, the changes of the last two decades have been hugely impactful, perhaps not before time but with huge consequences none the less.

The restriction in the ability to regularise offending development in the areas of EIA and AA has resulted in a significant improvement in planning standards across the industry. However, the ease with which a site can fall foul of this legislation has meant there has been a steady stream of sites requiring regularisation with the only available provisions being those of Section 177.

Carrowscoilte Quarry, near Kilkelly, enjoys a 50 year permission at one million tonnes per annum due to its regional importance.

SECTION 261A – THE 'SUNSET CLAUSE'

The outturn of ECJ C-215/06 (The Derrybrien Case) of 3rd July 2008 was, in hindsight, always going to happen – a near ban on retrospective regularisation of EIA projects, further complicated by a similar issue regarding Stage 2 Appropriate Assessment. As the ECJ Decision had its roots in legislative error, the Substitute Consent process designed to answer the Decision was introduced, and many industry sites found to have EIA and/or NIA infringements were granted entry to the process following the Section 261A review, introduced in 2010 and commenced in late 2011 with completion in August 2012. These so-called 'sunset clause' provisions allowed certain qualifying sites an opportunity to seek regularisation without having to prove 'exceptional circumstances', the limiting restriction on retrospective regularisation thereafter.

A favourable outturn for an offending site was the opportunity to apply under Section 177E for Substitute Consent to An Bord Pleanala. Unfortunately, this process only dealt with retrospective development and did not provide for prospective works. In July 2015, additional legislation provided for Section 37L applications for 'further quarrying' to be made in parallel to An Bord Pleanala for those sites still in the Substitute Consent process on foot of the Section 261A process only. This facilitated a double decision by the Board for each such double application, and shortened timeframe to get back to ongoing authorised development status.

Those already through Substitute Consent prior to Section 37L were required to seek prospective permission under Section 34 meaning Section 37L was restricted to a small cohort back then and only those arriving at Substitute Consent via the Section 261A route.

SECTION 177C POST 2012

Sites with new EU law offences or those denied access to Section 177E from the Section 261A process, then and now must achieve access to the process through 'Leave to Apply for Substitute Consent', by way of 177C generally, followed by the substantive Substitute Consent application under Section 177E, both to An Bord Pleanala, then followed by a Section 34 application for prospective development to the local Planning Authority. One has to be successful at eash stage before embarking on the next.

As Section 34(12) requires that any development requiring retrospective development where EIA, determination for EIA, or Stage 2 AA cannot be validated, such developments are limited to the Section 177C 'Leave' application process. This 'Leave' process really entails two matters – the first is to assess that EU law offences actually exist such that the provisions of Section 177C are appropriate in that instance, and this gives the applicant an opportunity to challenge any sub-threshold EIA decision or Stage 2 AA decision by the Planning Authority. If the Board decides that no such offences existed, the Section 177C application is refused on that basis and the applicant may apply to regularise the development with a Section 34 Retention Application to the local Planning Authority.

Where the Board assesses an offence as present, it proceeds to the second matter which is to determine whether or not 'Exceptional Circumstances' exist in that case, such circumstances being set out in heading form in the legislation. This has proved a high bar in many

instances, and remains so. If successful, the applicant is permitted to proceed to the full Section 177E application stage with rEIAR and/or rNIS. Under more recent legislation, the matter of the exceptional circumstances matter must be re-visited at Section 177E stage for public consultation; thus, the Section 177C process (where an offence is present) is reduced to being a temporary gateway based on an initial finding by An Bord Pleanala that exceptional circumstances are present at that stage.

Where Substitute Consent is granted, prospective works depend on a further Section 34 application to the local Planning Authority with likely appeal to An Bord Pleanala. One can see how this can run to a five-year process to complete all three stages (more if there's a failure at the final hurdle). If the high bar to be allowed an opportunity to regularise has been achieved, then that timeframe is quite unacceptable to get back on track (or not).

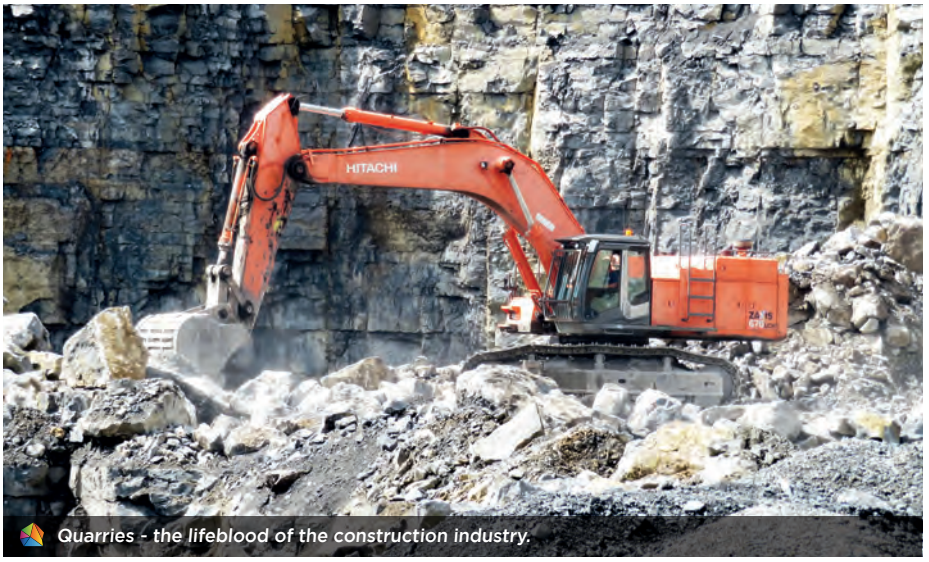
2022 LEGISLATIVE AMENDMENTS

After years of lobbying by industry, the Planning & Development, Marine and Valuation (Amendment) Act 2022 contained many improvements to the regularisation process where EU offences are present. While passed into law, these provisions which include significant changes to Sections 34(12), 37L and Section 177 of the main Act have not been commenced at the time of writing (July 23) but can make the process much faster for those applicants meeting the necessary thresholds.

Importantly, it provides for the reintroduction of Section 37L to allow for a parallel application for prospective works for all forms of development in the Substitute Consent process, thus shortening the overall process – an obvious but absent element post Section 37L's limited run in 2015/16.

Section 177C Leave stage, having been reduced to a 'temporary gateway', it is to be scrapped with direct access to Section 177E immediately available to all applicants. This is fine where an AA offence exists as the cost of the application with rNIS will not be substantial and there is a significant timesaving by a reduced and a somewhat telescoped two-stage process.

However, if the offence relates to EIA, then the rEIAR must be submitted at very considerable cost (with additional cost if the prospective Section 37L with EIAR is also pursued) without having the Board's initial assessment of exceptional circumstances which the relatively inexpensive Section 177C application currently provides. Thus, for a small operator with an alleged or accepted EIA offence, these changes now involve a very substantial and high-risk outlay in the first instance.



Quarries - the lifeblood of the construction industry.

This revised two-stage but concurrent process could probably be expected to be turned around in less than a year. This has to be welcomed and does not necessitate any reduction in standards or assessments.

The notable change to Section 34(12) involves a narrowing of the preclusion on validation of retention applications currently relating to sites where EIA, a determination for EIA and Stage 2 AA would have been required pre-development; the amendment will drop the preclusion relating to determinations of EIA. This should provide smaller offending areas with an opportunity to undergo sub-threshold EIA determination with only those applications adjudged to actually require EIA being invalidated.

This partially replaces the first consideration in the current Section 177C process in that it appears a formal Schedule 7/7A EIA Screening Report can be submitted in addition to a Stage 1 Screening for AA under Section 34 for assessment prior to a decision that EIA and/or Stage 2 AA was required (either leads to invalidation and Substitute Consent requirement). Currently, submitting a Schedule 7/7A EIA Screening Report is de facto a First Party admission of EIA as a necessary consideration requiring a determination. Unfortunately, this improvement removes the opportunity to put matters before the Board in similar manner to the current 'Leave' stage.

PLANNING & DEVELOPMENT BILL 2022 (AS OF JANUARY 2023)

The Substitute Consent process is clearly complex and time consuming for applicants, and a faster process is to be welcomed by those meeting the necessary high bar to get through. Many sites eagerly await the commencement of these provisions.

Caselaw cearly suggests there was never a need to separate the retrospective and prospective elements into distinct applications. On initial reading of the Planning & Development Bill 2022, an amalgamation appears to be proposed within a process to be called 'Retrospective Consent' where the current 'Leave' stage is dispensed with and a prospective element can be added to the application to the 'Commission' (An Bord Pleanala).

There is a proposed requirement for mandatory pre-planning consultations for applications of this nature which must surely be for the better. There appears to be provision requiring the Commission to issue a direction to cease, currently not mandatory in Section 177, which may be appealed by the applicant. Obviously, it is early stages and is subject to change when the final draft makes its way through the legislative process.

However, it raises the question whether the currently enacted legislation will actually be commenced, of immense concern for those already awaiting commencement since July 2022.

BY LIAM SMYTH FIEI
Specialist Quarry Planning Consultant

Liam is a chartered civil engineer, and fellow of Engineers Ireland, with degrees in civil engineering, law and business admmininstration, as well as post graduate diplomas in EIA management and advanced planning and environmental law. He has over 35 years of construction materials industry experience, the last 20 of which have been primarily in quarry planning.

Prospectors & Developers Association of Canada

PDAC 2023

The annual Prospectors & Developers Association of Canada (PDAC) Convention is the premier event of the world's mineral exploration and mining industry. PDAC focuses on driving a sustainable, competitive and responsible exploration and mining sector, bringing together mining executives, geologists, government officials, investors, analysts, and students from around the globe.

This year's convention marked a return to pre-pandemic times having reverted to its usual time in March and attracting nearly 24,000 delegates, exceeding the 2020 convention numbers. Much of the focus of this year's convention centred on the critical minerals space and with more than 1100 exhibitors covering over 600 000 ft2 of the Metro Toronto Convention Centre alongside governments, companies, and leading experts from around the world made the 2023 convention one of the largest in the association's 91 years.

For the third year running, iCRAG and Geoscience Ireland together with Enterprise Ireland (EI) co-hosted the Ireland Pavilion. Geological Survey Ireland (GSI) and the Geological Survey of Northern Ireland (GSNI) shared an Ireland Booth, accompanied by Northern Ireland's Department for the Economy and Ireland's Geoscience Policy Division, marking a welcome return to an all-Ireland approach.

Irish companies exhibiting at PDAC 2023 included Aurum Exploration, Priority Drilling, SLR Consulting, Golder-WSP and Mincon plc. Mineral development companies with Irish links attending were Conroy, Minco, Ormonde Mining, Group 11 and Equity Exploration. In addition, for a sixth year, the European Union and EU Member States were represented by the European Commission booth.

PDAC PROSPECTORS & DEVELOPERS ASSOCIATION OF CANADA

BY DR AOIFE BRADY
Chief Operations Officer, iCRAG

GSNI and GSI at PDAC 2023.

AN APPRECIATION

John Barnett

FRICS FSCS FIQ CEng – Chartered Mineral Surveyor
President, IMQS 1987-89

(1937 – 2023)

John Barnett was one of the first chartered mineral surveyors to work within the Irish mining and minerals industry. He was born in Burnley, Lancashire, England in 1937. After leaving school, John trained and worked as a mine surveyor and mine planning engineer with the UK National Coal Board. In 1966 he was appointed the first minerals planning officer in Staffordshire County Council. Four years later, in a fortunate twist of fate, John applied for and was successfully appointed a Lecturer in Mine Surveying at Bolton Street College, part of what was (then) the Dublin Institute of Technology (DIT). Once in post at Bolton Street, word about John's practical knowledge and experience soon spread around the Irish mining and quarrying industry and he started to undertake some private consultancy work alongside his lecturing duties.

In 1976, on the back of a burgeoning demand for his consultancy services, John left Bolton Street and established his own mineral consultancy practice, providing a range of services including survey, valuation and planning and development advice for mines and quarries. Clients included major Irish and British quarrying and mining companies. One of his earliest clients was Irish Salt Mining & Exploration Co. Ltd. who own and operate Kilroot Salt Mine near Carrickfergus in Northen Ireland for whom John was trusted technical advisor from 1976 to 1999. He was also retained for a time as planning and environmental advisor to the Irish Concrete Federation.

Recognising the increasing importance of environmental matters across industry, John embarked on a master's degree in environmental science at Trinity College, Dublin in 1985. As part of this degree John researched and published a seminal thesis on Mineral Resources in Ireland covering mineral ownership, mineral valuation, and minerals planning & development. His specialist expertise in these areas lead to a growing demand for his expert witness services in arbitration / tribunal hearings and legal cases.

In 1995, as John was contemplating retirement, he backed his consultancy business into the CSA Group, a firm of Consulting Geologists. John Barnett & Associates Ltd. (JBA) was set up as a subsidiary of the CSA Group and under his guidance grew strongly during the late 1990's and early 2000's on the back of a strong demand for construction materials and public infrastructure development during the Celtic Tiger years.

John Barnett.

In his time working in private practice as a sole practitioner and subsequently, in John Barnett & Associates (now SLR Consulting Ireland), John was instrumental in employing and training the next generation of chartered mineral surveyors in Ireland – including Paul McCabe, Mervyn Ross, John Shiels, Fergus Gallagher, Shane McDermott, Thomas Freeman, Peter O'Connor, Peter Kinghan and Tim Paul. John set, and took pride in, high professional standards and his thoroughness, attention to detail, and methodical approach was energetically impressed upon those he mentored, employed and worked with.

He was a strong advocate of professional accreditation and was a Fellow of the Society of Chartered Surveyors in Ireland; the Royal Institution of Chartered Surveyors and the Institute of Quarrying. John was an active member of the Irish Mining & Quarry Society, serving for a period as a Member of the Council, a Past President of the Society and was a regular attendee at the Annual IMQS Dinner Dance, with his wife June.

In his spare time John had a passion for travelling and took great pride in managing to visit all of the countries on the United Nations country list (over 200). He would delight in regaling people with his latest adventures in Madagascar, Antarctic etc. over a pint in his local - Finnegans or The Queens in Dalkey. Model railways were another of John's passions. He developed one of the country's most extensive outdoor model railways in the back garden of his home, Alvina. John and June would regularly open up their garden for social occasions, inviting family, friends and the local community for refreshments and a viewing of the model railway.

John was a visionary, and on a professional level, made a significant contribution to the development and evolution of the minerals and mining industry in Ireland through his work as a trusted advisor and educator. We are fortunate that he crossed the Irish Sea with his family in the early 1970's to settle in Dalkey and, in time, become an honorary Irishman.

John is survived by his wife June, his two daughters, their partners, four grandchildren and a great grandson.

Tim Paul, Director, SLR Consulting

OBITUARY

James (Jim) Walsh

B.E, M.E, C. Eng, F.Inst.P., M.I.E.I.
Churchtown, Dublin / Limerick City, Limerick
President, IMQS 1973-75

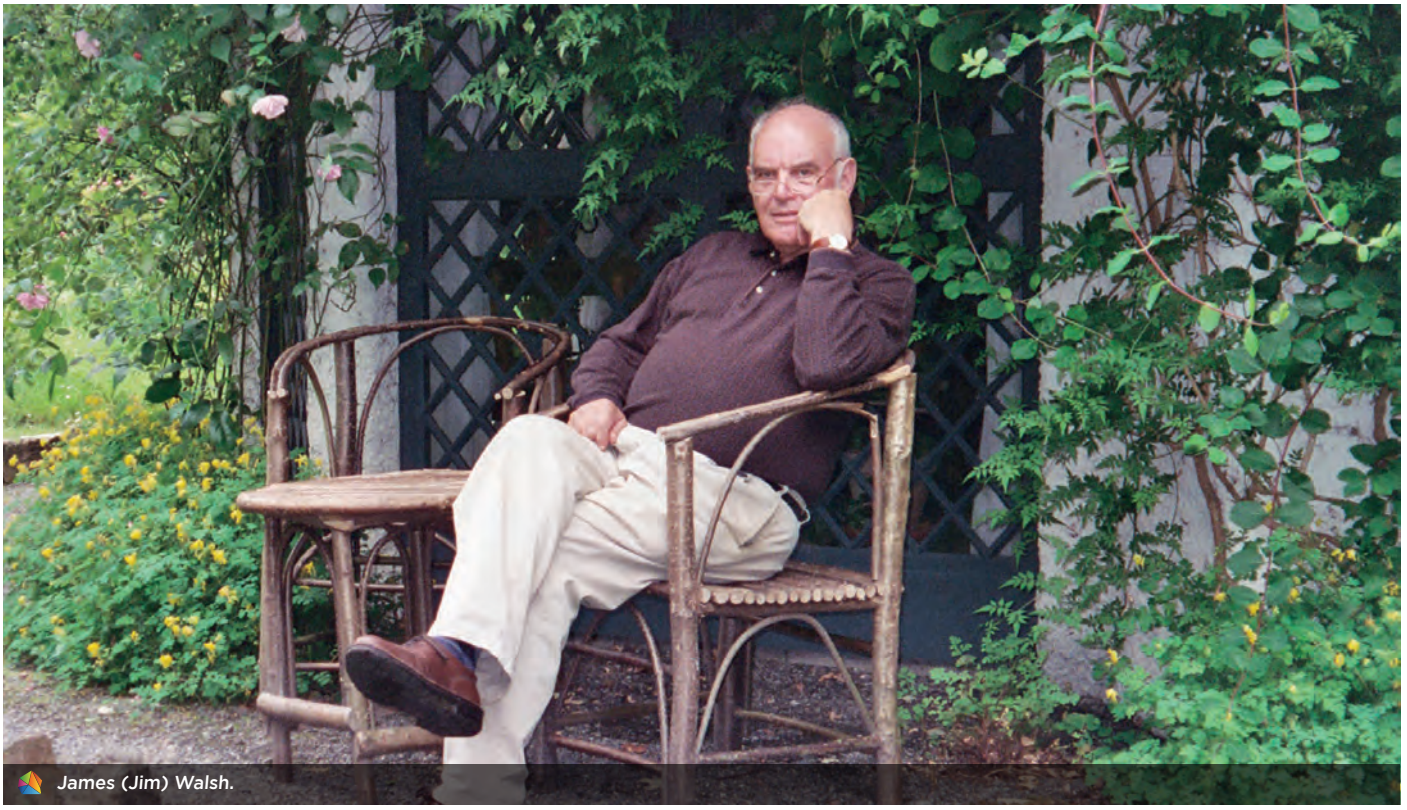
(Died 29th Jan 2023)

Jim graduated from UCD M&E engineering with 1st class honours. He then started his career in Irish Cement and got his masters in mining engineering while on assignment in the coal mines of North East of England. He came back to Ireland and continued his assignment working at the Arigna coal mine in Co Roscommon.

Jim was then tasked with building a cement plant in Nigeria in the mid 1960's. Following assignments in Iran, Yemen and across Ireland, he when on to become the youngest director of Irish Cement (today Cement Roadstone) after project managing the building of Platin Cement Plant in Drogheda.

In 1973, Jim co-founded the PM Group with Brian Kearney where they project managed complex projects starting with their first major contract- The Kinsale off shore gas rig.

PM Group recently celebrated 50 years in business with over 3500 employees across the world.



James (Jim) Walsh.

OBITUARY

Pat O'Connor

Chair of The Institute of Quarrying NI 2022

The Irish Mining and Quarrying Society was deeply saddened by the sudden passing of Pat O'Connor. Pat was a stalwart of the industry and had a passion and enthusiasm for the extractive industry that was evident to all upon meeting him. Pat was always a great supporter of the IMQS and we were delighted to spend the evening with Pat and his wife Ann at the 2022 Stone Crushers Ball, it is always an honour to be invited and Pat created such a lovey warm welcome and a great evening was had by all. We looked forward to inviting them back down to us in November 2022 for our Annual Black-Tie Dinner with Pat as our Guest of Honour and a firm favourite on the night.

Having spent some time working in England, Patrick, who was Chairman of The Institute of Quarrying NI Branch, returned to Northern Ireland after getting married and worked Monday to Friday as an HGV driver for the T.H.Moore quarry, owned by Gibson Bros, in Newtownhamilton. His love of the job was well illustrated when he would spend his Saturdays at the quarry, armed with a long tailed shovel to clean away excess material which had accumulated under the conveyor belts at the quarry.

When Gibson Bros sought to recruit a new quarry foreman, Pat put his name forward and he was successful, and so began his 'career' in the quarry sector. Not long afterwards, he was promoted to quarry manager in charge of production. He subsequently became manager at Breedon Ireland's Ballystockart Quarry, located near Newtownards in County Down where his responsibilities were varied and ranged from production and quality control to health & safety and biodiversity; it was a job he loved. Breedon Ireland says when Pat joined the team at Ballystockart Quarry in 2017, operating then under the name Whitemountain Quarries, he immediately made an impact and developed firm friendships. "Not only did Pat strive to bring improvements to our business he also reached outside our business with involvement in the local community and in the Institute of Quarrying.

"It was a great sense of pride to us all when Pat was elected Chairman of the institute this year. We know that Pat gained great satisfaction in the significant amounts of money raised for local charities through Institute events. Pat's involvement in any activity or project was always marked with an energy and good humour that was unique to him and made him a pleasure to work with.

Pat, who spent more than 20 years in the industry, was a great believer and motivator in allowing his operatives to reach out and expand their skills and career prospects.

To be a good quarry manager, he once said, you have to listen to other people's suggestions and ideas, working with them closely on a daily basis, following through on any good ideas, to the benefit of the business – and that's what he always strived to do.

Always keen to promote the industry at every opportunity, he regularly invited visitors to enjoy a guided tour around the quarry, especially local school children who had

the opportunity to learn about sustainability initiatives undertaken by him and his team at the Ballystockart Quarry. He also took a keen interest in biodiversity and sustainability at the quarry, overseeing the planting of trees, shrubs and flowers, as well as the installation of a number of beehives.

He regarded his appointment earlier in 2022 as Chairman of the NI Branch of the Institute of Quarrying, succeeding ConExpo's John Moore, as one of the highlights of his career. It was, he said, a real privilege that he never thought he would ever achieve.

Pat is a great loss to not only his family and friends but the industry as a whole. Pat's hard work was recognized at the recent Plant and Civil Engineer awards on 1 December 2022, where Ballystockart received the 'Quarry of the Year' award and Pat's service in the industry was honoured with a 'Special Recognition' award. He will be fondly remembered by the IMQS for his wonderful sense of humour, his contribution to the industry and his never ending dedication to his work

Author: Nicola Nixon, IMQS Past President

Ann and Pat O'Connor.

Pat O'Connor and Nicola Nixon, Stone Crushers Ball, 2022.

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UNDER 5 WINNER: **PATRICK O'SHEA**

1st

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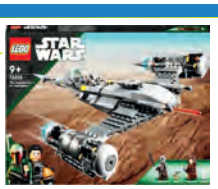
2nd



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