



29 June 2020

REPORT

The impact of COVID-19 on materials, minerals and mining communities

The escalation of COVID-19 during 2020 has posed great challenges for individuals as well as organisations and has also led, in some cases, to new opportunities to rethink the way of working. This report considers the impact of the pandemic on several industries and examines what may lie ahead.

Areas covered in this report:

- Raw Material Extraction
- Energy
- Heavy Clay
- Manufacturing
- Iron and Steel
- Packaging
- Industrial Sustainability and Climate Change Goals
- University Education
- How can IOM3 help?

Raw Material Extraction

Mining, particularly underground, generally involves teams of people working and travelling together, certainly not within the (current) terms of 'social distancing' and therefore there have been multiple reactions to this from the mining industry.

South Africa initially shut down most of its mining industry, except for production of coal, the main fuel used for power generation in Africa's most industrialised nation. Mines resumed working from 1 May 2020 under regulations to ease the lockdown, gradually resuming work in an industry that accounts for 8% of South Africa's economic output and employs around 500,000 people. These measures allow surface mines to resume full operations, while underground mines are able to operate at 50% capacity.

Poland, whose power generation is predominantly coal sourced from underground mines, also had to suspend operations at some of the mines until mid-May due to a COVID-19 outbreak in the southern region of Silesia. The high levels of stockpiles, and pressure from the European Union could see the eventual decline of the Polish coal mining industry.

Authorities have employed the army to cordon off Russia's largest gold mine in Krasnoyarsk region of Siberia after more than 1,200 workers were infected with COVID-19. The Olimpiada mine has around 6,000 employees and it is expected that the mine will continue to operate while under quarantine. It is reported that police patrols are working to stop the spread of COVID-19 and authorities have also set up an entry and exit checkpoint to prevent the virus from spreading to nearby villages.

The USA is also affected, with coal miners diagnosed with pneumoconiosis concerned about the impact of COVID-19, which puts them at high risk of developing serious



complications.

COVID-19 is likely to have a marked impact on the way many remote mines are run and is likely to help in cost cutting and may potentially make some mines more efficient and sustainable. It is accelerating the use of more automated equipment, making shift patterns more effective and employing younger and possibly fewer people to better enable social distancing. There are fewer site visits from outside local communities, with management either be based at the mine site or managed through conference calls.

Restocking reagents for mineral processing may be at risk, any extended lockdown period could cause some process plants and their associated mines were ground to a halt¹.

Gold alongside other commodities including silver, lead and iron-ore has fallen with the demand taking a hit and although commodity prices remain relatively unaffected by any short-term supply issues, this could change as China and other countries emerge from the effects of the pandemic.

Energy

According to the IEA, *Global Energy Review 2020*² report, global energy demand declined by 3.8% in the first quarter of 2020, with most of the impact felt in March as confinement measures were enforced in Europe, North America and elsewhere.

The energy industry has been challenged like never before with the oil price falling to -US\$37/bbl of oil. The loss was specific to the American crude benchmark, and the lack of storage facilities as the USA went into lockdown had an immediate effect on fuel consumption. The UK's consumption also dropped significantly, but Brent crude (the crude oil benchmark we refer to) dropped briefly below US\$20/bbl, but soon recovered to the low US\$30s. There is, however, pressure on crude storage in the North Sea region, with stories of several hundreds of thousand US\$/day per million-bbls of oil reported to be put into storage. Gas consumption has been less affected as big industrial users shut down, but people stayed at home.

Analysis of daily data through mid-April shows that countries in full lockdown are experiencing an average 25% decline in energy demand per week and countries in partial lockdown an average 18% decline. Global CO₂ emissions were over 5% lower in the first quarter of 2020 than in the first quarter of 2019, falling more than the energy demand, as most carbon-intensive fuels experiences the largest declines in demand³.

Coming out of lockdown, the energy industry faces as much unpredictability as anyone else – there's going to be an initial position of oversupply, cash flow issues, the balance of supply and demand. When looking ahead, it is important that the oil and gas required for the foreseeable future is met with extraction locally as UK produced gas has a much lower carbon footprint than imported LNG. The oil and gas industry even before COVID-19, needed to look at ways to reduce the carbon footprint of activities, and integrated energy production and Carbon Capture Storage (CCS) will be needed to meet targets.

Heavy Clay

¹ www.iom3.org/sites/default/files/MTD%20Newsletter%20Summer%202020.pdf

² www.iea.org/reports/global-energy-review-2020

³ www.iea.org/reports/global-energy-review-2020/global-energy-and-co2-emissions-in-2020#abstract



The UK construction industry was already experiencing a slowdown in activity, falling by 1.7% in February according to the Office of National Statistics due to a decrease in private housing by 5.6%⁴. McBains, a UK property and construction consultancy, had expressed concern in regard to these figures, stating that they were a 'worrying sign of sluggishness in the sector with nothing to fall back on through the pandemic'.

Several manufacturing companies, however, have recommenced production following temporary suspensions over March and April. After four weeks of closing, Michelmersh, for example, reopened its five UK brickworks at the end of April⁵, conducting an 'orderly and safe recommencement of production across its plants', using government guidelines to keep staff safe. On 27 April, Ibstock resumed production, with the aim of implementing safety measures to bring staff back into the workplace. While companies in other parts of the ceramic sector where there is strong customer demand, or where demand is now picking up, are manufacturing in line with social distancing guidelines. Several brick manufacturers, for example, who briefly stopped their manufacturing operations are now returning to work, ensuring health and safety guidance is followed to protect workers.

Manufacturing

The pandemic hit manufacturers, like many others, in an unexpected and unprecedented way. For the first time in history, demand, supply and workforce availability are affected globally at the same time. While some industries were needed more than ever to provide vital equipment other industries felt the strain as production halted and factories were shut.

Many across aerospace, chemical, automotive, steel, aluminium, pharmaceutical, packaging and other sectors within manufacturing, including those providing essential services and materials, responded to the call to action by UK Government and are playing a direct role in combatting COVID-19 by producing the material we need to fight the spread of the virus.

The UK economic, commercial, and industrial landscape looks set to reshape as a result of COVID-19. There is a suggestion that a relocation of business, talent and investment away from London is likely. The emergence of new technology and business models from the Northern Powerhouse could accentuate this trend.

The last 12 weeks has seen a rapid growth in reported idea generation and adaptability. Manufacturers have redirected resources to make personal protective equipment, enable formulation and bottling of hand sanitisers and create smart surfaces based on redox substituted graphene, capable of not only blocking many viruses but also of deactivating COVID-19 thus rendering the virus harmless to humans.

Iron and Steel

As the manufacturing sector has been hit by the COVID-19 pandemic, so too has the steel industry. Most steel using sectors have either closed or significantly reduced steel consumption during the period. The automotive sector has been closed, although there are now small signs of production restarting in this area. Similarly, the heavy construction sector was paused at the beginning of the pandemic but is now beginning to resume operations. Aerospace too, has been severely impacted by the pandemic. Some sectors, however, have bucked this trend. The steel packaging sector has seen an unprecedented demand for steel as consumers stock up on tinned food and there has

⁴ www.ons.gov.uk/businessindustryandtrade/constructionindustry/bulletins/constructionoutputingreatbritain/february2020

⁵ www.iom3.org/clay-technology-magazine/news/2020/may/15/coronavirus-working-through-pandemic



been increased demand for light construction products which have been used for field hospitals across the UK and rest of the world.

The result of the reduced steel consumption has been a drop in steel demand of up to 30% for the period. In a capital-intensive industry such as steel, any reduction in volume has a significant impact on cash flows and as such steelmakers across the globe have been reconfiguring their assets on a temporary basis in order to minimise fixed costs through the period.

Operating a steelworks while adhering to social distancing measures is a challenge that the industry has risen to admirably. The adoption of new procedures, physical separation and additional PPE have allowed steelmakers to continue production whilst ensuring the health and safety of employees.

The buying power of large steel companies has enabled bulk purchases of some supplies, particularly PPE, which in many cases have then been donated to local NHS establishments. In addition, steelmakers and associated research institutions have provided materials for industrial health service waste bins, power generators for hospitals, manufactured hand sanitiser and developed mechanical ventilators. Steel companies are at the heart of the communities in which they serve and as such have had a critical role in supporting the national pandemic response and will play a vital role in rebuilding the post-pandemic economy.

Packaging

Packaging and consumer companies will have experienced differing results during the COVID-19 lockdown depending on the market they supply. Food, drink and pharmaceuticals have largely seen demand growing whereas DIY and other non-essential markets will have experienced a significant drop in demand.

Corrugated case suppliers have been very busy due to the rise of home delivery and online shipping whereas food service packaging demand has collapsed due to the closure of all pubs, restaurants and canteens.

Businesses have had to adapt in a fast, efficient and considerate way. They have had to assess everything about their business from how they are able to continue to operate production in a COVID-19 secure manner, through to maintaining the supply of all their raw materials including packaging materials. For many businesses their route to their consumers has also changed significantly with many businesses having to package their products for routes such as click and collect or online delivery. Packaging suppliers have had to work hard to respond to the changing situation and fluctuating demands of their customers.

As a direct result of the pandemic, we have seen single use plastics in certain products increasing, due to concerns regarding contamination or as mitigation against reuse. As we move out of lockdown this is something that will be an area of focus and consideration, especially working to WRAP's UK Plastics Pact roadmap to 2025. Is this a change forced upon us by COVID-19, do we as an industry need to reconsider and amend the existing rules for packaging? It certainly adds to the complexity of what is required to meet the demands of product protection, customer needs and the drive for sustainability.

Regarding reuse systems the barrier will be consumer behaviour post-COVID – will they



trust that the packaging (and any single-use packaging) is really clean?

There should be no technical risk in using returnable packaging systems, as the company/brand is in control of the washing process whereas the reuse of packaging and reusable cups will require the implementation of new protocols to minimise the risk of cross contamination.

For pharmaceuticals, COVID-19 has highlighted both threats and opportunities. The threat is that it has highlighted the UK's vulnerability as far as vaccine manufacturing is concerned. This goes beyond not just the development and manufacturing of the vaccines at good manufacturing practice (GMP)⁶, but also the packaging required to protect and dispense the vaccine. Although vaccine research in the UK is excellent the ability to scale-up is limited. Unlike the UK, Europe, for example has historically invested in substantial capital investment for vaccine manufacture and this extends to packaging materials and this ensures a robust supply chain capability there. The UK needs to continue to plan for the future to avoid this obvious threat.

The opportunity could be for the UK to have the capacity to manufacture a GMP supply where speed to patient is paramount. The proposed Vaccines Manufacturing Innovation Centre has received some Government funding and hopefully it will secure a long-term sustainable capability in the future. Coupled with this immediate challenge, there is also the opportunity for the UK to expand into areas such as cell-based vaccines, thermo-stable medicines and innovative packaging. With specific reference to packaging the UK has the opportunity to secure a reliable and independent component supply chain that will complement the vaccine manufacture and fill/finish capability. The NHS, academia, industry and research councils are all key stakeholders that could accelerate this opportunity.

Industrial Sustainability and Climate Change Goals

This is typically the period where most companies will be producing their annual sustainability report to show reductions in carbon footprint and set targets for the coming year. Companies who have already been doing this have not put sustainability on the back burner, it is still business as usual to produce these reports although there could be a delay in release. Companies that score high on environmental, social and governance (ESG) are outperforming the market during the pandemic. While the year 2020 started with a focus on the three 'E's' (economics, efficiency, and environment) with the aspect of climate change and sustainability being at the forefront of political discussions, COVID-19 has put more emphasis on the 'S' social aspect as the media is now focusing on what companies are doing to address this crisis in terms of how they are supporting employees and customers.

While the big international climate change event scheduled for November 2020 in Glasgow (COP26) was postponed, the Petersberg Climate Dialogue meeting still took place virtually⁷. The COVID-19 crisis has been viewed from a sustainability lens and we have seen a reduction in emissions due to the pandemic. In May 2020, a report by University of Reading and the UK centre for Ecology & Hydrology suggested that carbon dioxide (CO₂) emissions in European cities has reduced by up to 75% due to the COVID-19 lockdown, with a 59% reduction in London.

Organisations that have signed up to net zero science-based targets in alignment with

⁶ www.gov.uk/guidance/good-manufacturing-practice-and-good-distribution-practice

⁷ www.gov.uk/government/news/petersberg-climate-dialogue-summary-video



the Paris agreement have not backed out, including IOM3. Nonetheless, for a few sectors like retail and hospitality their efforts towards long term sustainability strategies have slowed down. Sustainability consultancies have also found ways to ensure companies do not lose their climate change targets by adopting new ways of virtual energy audits, leveraging on software for real time data collection to measure climate change. In general, the goal is still to ensure that we do not emerge from a health crisis into making the climate crisis worse. In addition, firms are calling on government to ensure that the post-COVID economic boost and recovery plan is led by green initiatives, such as investing in low carbon infrastructure, generating green jobs, and prioritising company bail outs based on their climate reduction plans – often described as ‘building back better’ or a ‘green recovery’.

As for research in sustainability, the push towards 'build back better' could result in heightened interest in engineering solutions for a low-carbon economy. This includes strategic investment to decarbonise UK energy and transport sectors as well as the construction industry. It may also lead to increased focus on risk and resilience, particularly related to the minimisation of supply chain risk. For materials, this very much links to improving management and circularity of materials, and particularly those of high strategic importance, at end-of-life. This is an interesting time for environmental research, but it certainly is now more than ever we need government to hear our calls and take our economic recovery in the UK one which is sustainable, fair, and resilient.

Education and Research

COVID-19 had a sudden impact on universities. The rapidly changing situation in March necessitated a swift and unexpected move to online and remote teaching and assessments. As the consequences for the 2020–21 academic year begin to become clear, thoughts turn to how teaching and learning can be delivered. Universities are now starting to publish plans for the next academic year with many stating that campuses and buildings will be open with mixed face-to-face teaching in small groups and online/remote delivery of content. At least one university has stated that they will not deliver any large group face-to-face lectures for the entire 2020-21 academic year. The student experience will clearly be different, but it must be excellent, and universities must still provide high-quality education that the UK higher education sector is known for. All students, be they undergraduate or postgraduate, home or international and wherever they are in the world, must be supported in their studies and feel part of the larger student body rather than isolated individuals.

Remote/online delivery of teaching is simply not the same as face-to-face teaching and existing resources cannot just be shifted like-for-like to an online delivery platform. Understanding the pedagogy and technology, planning, adapting and redesigning modules to include a significant level of online/remote delivery must be addressed during the summer. Just some of the challenges include:

- What is the best practice for delivery of a blended mode of education and how is this assessed?
- How do we promote student/student (peer) and lecturer/student interaction in lectures, tutorials and problem classes using real-time, but remote, teaching methods?
- How can laboratory teaching and practical components be delivered to develop the hands-on skills needed by our industries and required by accrediting bodies while maintaining social distancing guidelines?



One especially difficult challenge for materials and related disciplines is the access to laboratories to develop the hands-on skills needed by our industries and required by accrediting bodies whilst maintaining social distancing guidelines. This has already impacted students working on a diverse range of individual research projects, with many having to curtail the practical work, and it will affect laboratory-based MSc projects, which typically run over the summer. For the latter case, many projects have been changed to either an extended dissertation/literature review or adapted to use existing data. For the next academic year, meeting the mandatory learning outcomes that assess practical skills and competence in using equipment will be particularly difficult. As well potentially running the same laboratory session many more times to ensure social distancing, possible alternatives include more emphasis on the analysis of pre-existing data or remote or simulated laboratory experiments.

This will undeniably mean increased workload and pressure for staff involved in developing new teaching resources, conceivably from scratch and with, perhaps, limited experience of this way of teaching. This may be exacerbated by time constraints and stress associated with home schooling and other care commitments and countless other COVID-19-related concerns. However, despite the uncertainty and myriad challenges, there are clear opportunities to bring about a positive and long-lasting transformation to the education universities provide. A blended learning approach comprising face-to-face teaching, peer interaction and online delivery is a good thing for student education and it always was – even before the pandemic.

Students also face the difficulty of getting practical training and experience and a concern is the lack of placements, apprenticeships and jobs after graduation. According to the *Financial Times*, apprenticeship starts are expected to drop by 50% this September amid concerns that the Government's furlough scheme is masking future lay-offs and fears of rising youth unemployment.

What is IOM3 doing to support the COVID-19 response?

From the above, it is clear that the outbreak of COVID-19 means that life has changed for the whole world and although there has been some easing of restrictions, there is a long way to go until we achieve some form of normal. IOM3 has been involved in keeping its members aware of latest updates, sharing expertise and exchanging knowledge in the fight against COVID-19 and providing valuable content at this critical time. These activities can be found via the [IOM3 COVID-19 Content Hub](#).

- Ends -

Industry areas in the report compiled by [IOM3 Strategic Advisors](#) and [IOM3 Technical Community Chairs](#) produced on 26 June 2020.

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Notes for Editors

x. The Institute of Materials, Minerals and Mining (IOM3) is a major UK science and engineering institution whose activities promote and develop all aspects of the materials cycle, from exploration and extraction, through characterisation, processing and application, to product recycling and reuse. IOM3 supports professionals in materials, minerals and mining to become heroes of the transition to a low-carbon, resource efficient society, not villains. We seek to be the best professional membership body we can be by providing modern, flexible services, quality technical content and value for money – www.iom3.org