

Sand Supply – a UK Perspective on a Global Issue

Introduction

The minerals and minerals products industries, of which aggregates is a major constituent, are essential to the economy and our way of life. They represent the largest materials flow in the UK economy, around one million tonnes per day in a typical year, and this supply should not be taken for granted or assumed. The industry has published a UK Minerals Strategy [1], recognised by Government, to help ensure that future demand is supplied sustainably. Current Government planning policy and guidance seeks to ensure that there is a steady and adequate supply of aggregates to meet demand. There is a debate taking place globally about the availability, access to and consumption of sand. In a new UN Report the Acting Director of the UN Environment Programme writes “we now find ourselves in the position where the needs and expectations of our societies cannot be met without improved governance of global sand resources” [n]. The same report states that “*the environmental and social impacts of sand extraction is an issue of global significance.*” This paper aims to set out both the UK and international perspectives.

Summary

- The UK has robust minerals regulation and implementation for sand and aggregates extraction on land and in the marine environment which will help to ensure future sustainable supplies of aggregates and mineral products. The UK aggregates and minerals industries are characterised generally by high operating and sustainability standards
- There will remain significant UK and international demand for aggregates and other mineral products such as concrete and asphalt which rely on aggregates, because these materials are essential to provide safe, resilient and sustainable housing and infrastructure. Sand is also extracted and used for a range of high-quality non-construction uses such as glass making
- Population growth, greater affluence and more urbanisation and development are driving large increases in global demand for materials and mineral resources including sand and other aggregates
- In some parts of the world, the regulation of natural resources is inadequate and can be associated with illegal harvesting/extraction and environmental degradation
- The need for resource-efficient urbanisation and development globally, together with the implementation of effective regulations for sustainable construction and minerals/natural resources supply are key issues
- Resource and minerals businesses have a responsibility to operate to good sustainability standards globally, including where regulation and/or implementation are inadequate

The UK Perspective

Are we running out of sand and construction aggregates in the UK? No, not at a national level.

Minerals can only be worked where they are found, which can create a geographic imbalance between where resources are geologically available, and where they are used. This means that some parts of the country are net producers, while others are net consumers. Access to geological resources is and will be subject to a number of constraints – a complex mix of social, environmental and economic factors that have to be managed to ensure sustainable supply of resources. The UK is broadly self-sufficient in aggregates, with imports and exports each accounting for less than 5% of UK demand.

Consequently, when viewed at a UK scale, it is not so much that we are running out of sand or other aggregates, rather, that the time, effort and costs required to secure the resources that society needs have increased, and are likely to continue to do so in the future. A well established and evolving regulatory system is in place to manage where and how mineral extraction takes place in this country. As the UN reports [e] “*Whilst it is critical for political leaders to take appropriate measures, the mining of aggregates has not yet reached their political agenda. This is primarily because sand loss has not yet reached a level of scarcity that would threaten the economy. Few, if any, measures are being*

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implemented, with the notable exception of the European Union, and the United Kingdom in particular.”

The latest planning guidance in England (National Planning Policy Framework – NPPF) states [h]: *“It is essential that there is a sufficient supply of minerals to provide the infrastructure, buildings, energy and goods that the country needs. Since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation.”*

Government’s December 2018 Resources and Waste Strategy (Our Waste, Our Resources: A Strategy For England [k]) states: *“Some lightweight materials have large environmental footprints, like plastics, while some heavy materials have small footprints, like aggregates.”*

Operational standards are generally good and restoration is required of extraction sites, often to provide new wildlife habitats and increase biodiversity. In addition, nearly 30% of aggregates supply is sourced from the recycling of demolition wastes and materials arising from other industrial activities. So while the sustainability of aggregates and mineral supply is always an issue, addressing this is central to the way industry operations in the UK are managed and regulated. That being said, it has to be acknowledged that even in a mature regulatory environment, there may be some local variability in regulatory and operational standards across the UK.

The core message underpinning all of this, for society, for Government and even for the minerals industry, is that continuing sustainable supply of these essential resources cannot and should not be assumed. The Mineral Products Association has sought to contribute to the assessment of future aggregates demand and supply through the publication of long-term demand and supply scenarios [i], an initiative which will be updated. Ensuring sustainable supply requires robust, long-term strategic national policies that allow a steady and adequate minerals supply to be properly planned, monitored and managed. Only with the appropriate policy and governance arrangements in place can society be sure that the right resources will be able to be provided in the right place and at the right time.

Evidence suggesting that the domestic supply of aggregates is relatively resource efficient include:

- Proportion of the UK land area subject to all mineral extraction and activity = 0.3%
- Proportion of the UK seabed subject to marine aggregates extraction = 0.01%
- Share of GB aggregates market supplied from recycled sources = 30%
- Relative UK/EU primary aggregates sales per head per annum = 2.8 tonnes / 4.8 tonnes
- Biodiversity = MPA surveys have identified 8,192 hectares of former quarries restored to priority habitats with a further 11,458 hectares of priority habitat are planned

The Global Problem

In recent years there has been increasing attention on the demand for sand, the potential for global shortages and the consequences of unregulated extraction. While the references to resource pressures have typically focussed on ‘sand’, what is usually being referred to are construction aggregates more generally, and particularly sand and gravel supply.

Actual and forecast changes in global demand for materials are startling. Global demand for primary materials is currently estimated by the UN at 90 billion tonnes and is forecast to double by 2050 [a]. The OECD has published broadly similar forecasts, with a baseline prediction of global primary materials use increasing from 79 billion tonnes in 2011 to 167 billion tonnes in 2060 [b]. Primary material resources are broken down into four categories in these analyses: biomass including wood, fossil fuels, metallic minerals and non-metallic minerals [a] [b]. The extraction of non-metallic minerals, mainly comprising minerals for construction use such as aggregates, was estimated at 42 billion tonnes in 2017 by the UN [a] and is the fastest increasing category of global materials use. The OECD estimates that 32% of global primary materials use is accounted for by aggregates.

Why is this happening? The main drivers for materials extraction are population growth, affluence and urbanisation. The world’s population is forecast to increase from 7.55 billion in 2017 to 8.55 billion in 2030 and 9.77 billion in 2050 [c]. The rate of growth of the global population is slowing but the annual increase in population is 83 million per year [c].

Within this overall picture, demand for construction materials is being driven by urbanisation and the associated needs for housing, commercial and industrial buildings, schools, hospitals, transport networks, clean water and sanitation. Over the next 30 years, 2.4 billion more people will live in cities and the proportion of the world’s population living in urban

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areas will increase from 54% in 2015 to 66% in 2050 [d]. Cities accounted for 40 billion tonnes of material use in 2010, a figure predicted to rise to 90 billion tonnes in 2050. A related statistic which demonstrates the potential scale of increase in demand for construction materials is that the 1 million km² occupied by cities in 2010 is forecast to increase to 2.5 million km² by 2050, with the increase being compounded by the fact that cities are becoming less densely populated and spreading out.

These enormous development demands are putting increasing pressure on global materials supply and, significantly, creating adverse environmental impacts due to a lack of effective management of resources and associated illegal activity. The UN reports that “while there may be local shortages of these materials, there is no prospect of any major global supply constraints for centuries to come” [m] and states that “the main non-metallic minerals in terms of mass, namely sand/gravel and limestone, are of minor importance in terms of environmental impacts. Nevertheless, mining activities may have local impacts on ecosystems” [m]. Such adverse impacts are related to the UN’s observation that “crushed rock, sand and gravels are also extracted and traded illegally in large quantities in some regions of the world, at times by organised crime” [n]. In practice, the increasing demand for these materials has outpaced the capacities of Governments and others to regulate and manage the supply chain.

For example, the UN states that Singapore has increased its land area by 20% over 40 years and has imported 517 million tonnes of sand over the past 20 years to enable this land reclamation [e]. It reports further that *“sand is typically imported mostly from Indonesia, but also from the other neighbouring countries of Malaysia, Thailand and Cambodia. Export of sand to Singapore was reported to be responsible for the disappearance of some 24 Indonesian sand islands.”* In addition *“there is also an alleged illegal sand trade. As the price of sand increases, so does the traffic of sand by local mafias”* [e].

Such illegality and criminal activity occurs in other natural resource industries and mirrors that reported by Global Witness [f] in the timber supply chain. *“National laws regulate the production and trade of timber products at all stages, from harvesting to processing to sales. These laws can be violated in any number of ways, such as taking wood from protected areas, harvesting more than is permitted and harvesting protected species. Illegal logging occurs around the world, and in some places, illegal logging is more common than the legal variety.”*

Potential Solutions

Given these global factors, the potential adverse impacts from the supply of construction materials, including aggregates, timber and other metallic and non-metallic minerals are clearly significant. There are four key issues to address in order to better manage such impacts, whilst enabling societies to have the economic and social benefits of materials use and construction activity, both in developed and less developed countries.

1. First, make future urbanisation well planned and resource efficient. 60% of the global urban infrastructure which will exist in 2030 has not yet been built [a]. The UN estimates that material use per capita in cities is rising to a range of 8 to 17 tonnes per head but a more sustainable target is 6 to 8 tonnes per head. More compact design of cities, reversing the current trend, could reduce resource use, for example, by reducing the amount of physical infrastructure required in cities. Does this mean that such development can do without mineral products such as aggregates and concrete? No, there will remain significant demand because these materials are necessary to provide safe, robust and resilient housing and infrastructure for growing urban populations. For example, 50% and 40% respectively of the urban populations in South Asia and Sub-Saharan Africa still lack access to sanitation services [d] which concrete infrastructure could provide. Tim Harford of the BBC reported in 2017 [j] *“Nearly 20 years ago, poor families in Coahuila state in Mexico were offered an unusual handout from a social programme called Piso Firme. Piso Firme means “firm floor”, and when economists studied the programme, they found that the ready-mixed concrete dramatically improved children’s education. Previously, the floors were made of dirt, which let parasitic worms thrive, spreading diseases that stunted kids’ growth and made them miss school. Concrete floors are much easier to keep clean. So the kids were healthier, and their test scores improved. Economists also found that parents in the programme’s households became happier, less stressed and less prone to depression. That seems to be \$150 well spent.”*
2. Second, ensuring that the supply of materials is properly regulated and that regulations are enforced. The UN reports [e] *“Whilst it is critical for political leaders to take appropriate measures, the mining of aggregates has not yet reached their political agenda. This is primarily because sand loss has not yet reached a level of scarcity that would threaten the economy. Few, if any, measures are being implemented, with the notable exception of*

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the European Union, and the United Kingdom in particular. There is a need for regulating sand extraction in both national and international waters. Other policy actions include the introduction of scientific mining operations, followed by ecological restoration. Greater consideration of substitute and sustainable use of the resource could drastically reduce impact on the environment." Of course, it is unrealistic to expect that the regulatory environment in many developing countries will be as robust as in developed countries and experience suggests that regulatory implementation can be extremely variable even in developed countries, for example within Europe. Equally, the opportunities for achieving similarly high levels of aggregates recycling as the UK in developing countries will be more limited as urbanisation will be weighted heavily towards new greenfield construction and not redevelopment, which releases resources for recycling. More effort could be put into sharing the regulatory and operational experience and expertise of countries such as the UK with developing countries to help improve regulatory capacities and industries' operational performance.

3. Third, resource and minerals businesses have a responsibility to act sustainably wherever they operate and to evidence such responsibility, for example through independently-audited environmental management and responsible sourcing standards (ISO 14001 for environmental management systems and BES 6001 for the responsible sourcing of construction products).
4. Fourth, and linked with regulation and corporate behaviour, there needs to be greater transparency about the governance and activities of minerals and other natural resource industries and the revenue flows associated with industry activity. The international Extractive Industries Transparency Initiative (EITI) [g] is designed to increase such transparency and create a platform for debate about the governance of the sector. The EITI is being implemented in 51 countries but there is further progress required to deepen the implementation, to support the reforms that are catalysed by the EITI process and to encourage other countries with significant extractive industries to join. The UK is implementing the EITI.

To encourage transparency about the activities and contribution of the UK Minerals Industry and its future role, the UK Mineral Strategy [l] was published in 2018 and includes "Public Understanding and Engagement" as one of the key pillars of the Strategy.

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The Mineral Products Association is the trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar and silica sand industries.

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