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The nexus between resources and criminal activities: *'Recycling Crimes'* (Metals)

Abstract

Mankind has always turned to the earth to exist; and, mining has been key to this survival - it has provided a whole array of resources - including 'metals.' The evolutionary process has meant that each generation has advanced their use of metals due to the symbiotic relationship to (industrial/technological) revolution(s). However, this has come at a price – in terms of the environment and also those employed as part of the mining process. This research paper considers the latter, it explores the correlation between obtaining resources and criminal activities. A primary part of this research considers the recycling of metals and the growing criminal trends and criminality linked to this pursuit. This includes a case-study from the UK. The research also factors in Covid-19 and the impact to society including in respect to resources, commodities (mined and recycled).
The findings are that recycling replicates much of the organized criminal activities to be found in mining; and, that, like mining, there is not sufficient legislation and other controls in place to prevent these crimes and abuses. Organized crime is invariably a global epidemic in the same way the virus is.

Key words: ***Recycling; Organized Crime Groups; Precious Metals; Covid-19; UK-EU***

1. Introduction

George Orwell wrote (1937),
"In the metabolism of the Western world, the coal miner is second in importance only to the man who ploughs the soil."

Mankind have always turned to the land to survive. Through a symbiotic process of evolution linked to revolution, certainly in the westernized world, we have mapped out an existence that has become complex, and, at times, often challenging.

Covid-19 has been one such challenge. It has impacted on our lives in many ways and whilst such challenges are not new to mankind, it has disrupted the existence, that living in the 21st century, '*we*' take for granted. This includes in respect to access and use of resources and commodities.

Every generation has witnessed advancements in products (and production) which has necessitated stripping the Earth of resources, whilst some are essential to our existence, many are demanded

because of a link to a higher perceived social standing that such items (many viewed as luxuries) represent.

Metals have played a key role in mans' evolution – being first used in tools and hunting weapons; to then having a major role in the industrial revolution era. They fall into the realms of life's '*necessities*' to luxury '*must-have'* items. Both come at a price, in terms of financial costs but also costs to society. Mining has directly and indirectly cost lives – be it at the '*coalface*' (the source – i.e. the mine) or during the process to get a product to the end-of-line (customer). Even when reaching the later, it has not stopped. Greed has meant that what cannot be brought can be stolen.

Nationally, regionally and internationally it is recognised that trading in resources is thwarted with a whole host of unethical practices and criminal activities. In politically unstable areas, for example, armed groups often use forced labour to mine minerals. These minerals are then sold to fund other criminal activities, such as the buying of weapons – which themselves are formed from mined metals….. *and so the cycle continues*.

Whilst some legislation exists, related to providing better controls and protection at the upstreaming stage (mining – see Figure 4), these are inconsistent across the globe. However, society is becoming more morally conscious and questioning the journey of the resources, commodities and products they desire and buy.

As depletion is recognised in respect to many resources, there has also been a drive to recycle minerals/metals, components and products. Second-hand markets are developing – which aim at recycling resources. In many instances this occurs when a commodity brought is no longer wanted, needed or has been replaced. However, recycling, repurposed good and second-hand trading (the (downstreaming stage – see Figure 4) also needs to be ethical and legal. Despite attempts to do so, there is clear indications that illegal acquirement and practices are increasing, and particularly during the Covid-19 crises.

The primary focus of this research paper is to explore the nexus between resources and crimes, particularly organized crime and mining and the rise in crimes – linked to the second-hand/recycling/repurposing market: in respect to *the acquisition of metals*.

1.1. Research Design

The paper is presented from a legal/soft law (policy) exploratory perspective in the form of a review and related discourse. It is divided into two primary sections:

Part 1: Provides contextualisation and sets the scene: consideration is given from a more global /overview viewpoint and largely from the perspective of upstreaming (Figure 3). This section commences by considering mankind's development – the evolutionary process: from *nomad-to-miner*. Definitions are offered in respect to resources and linked '*wants and needs*' of mankind and mankind's use of resources.

A brief (introductory) commentary is then provided as to the impact of Covid-19, in terms of changes and challenges to society – hardships; restriction of movements – variations to the commodities market, including the need and growth of second-hand/recycling (repurposing/reusing) trade/trading. This is further developed in part 2 in respect to recycling/reusing.

Ethics and crimes in mining and the inconsistency across the globe to tackle these abuses, particularly in smaller-scale operations, are considered. The European Union's (EU) new law on *Conflict Minerals* mining is then discussed.[1] Alongside this, the consumer is also factored in – in terms of a drive to ensure more transparency and ethical practices, from source-to-the end user.

Part 2: Attention is then turned to recycling/reusing resources and the criminal activities associated with a practice that is today aimed to save the planet (downstreaming stage – Figure 3). The focus of this section is firstly given to the European (EU) approach and legislation.

This section, and ultimately the paper, culminates with a case-study from the UK. Specific focus is given to the criminal activities of recycling scrap metal and the rise of certain offences since Covid-19 – such as theft of catalytic converters.

Part 1
2. Our survival – from nomads to miners

'Modern' man, 100,000 years ago, spent their days in a nomadic existence, seeking out basic resources – such as food and water (Carter, 1987). It has always been a case of survival and survival of the fittest, including in terms of dealing with earth's challenges of the day. The population, at that time, lacked the means of advanced mobility (motorized movement) and technology associated with a more globalized society we recognize today (Fox, 2020).

Through time, man began to extend their searches and to seek out land to farm. They began to settle, and to claim ownership of 'their' land (Fox, 2016a. Bender, 2006. Biagini and Hoyle, 1999, Parry, 1974.). Land was invariably claimed in terms of the value to sustaining life and returning wealth through commodities that could be traded and later resources that could be mined (Fox, 2016b). Mankind had began to go from essential needs to acquisitions of wealth, that at times, would lead to conflicts – such as wars and crimes centred around ownership of land and property (Fox, 2016a,b).

2.1. Defining a 'resource' and our 'needs'

According to dictionary definitions, a resource '*is a source of supply, support, or aid, especially one that can be **readily** drawn upon when needed.'*[2]

While according to the National Geographic,
"*A resource is a physical material that humans **need** and **value** such as land, air, and water. Resources are characterized as renewable or non-renewable; a renewable resource can replenish itself at the rate it is used, while a **non-renewable resource has a limited supply**…..*"[3]

[1] Regulation (EU) 2017/821 of the European Parliament and of the Council of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas. *OJ L 130, 19.5.2017, p. 1–20*
The Regulation was signed into law in June 2017.
[2] Dictionary.com: https://www.dictionary.com/browse/resource
Emphasis added.
[3] National Geographic (online)
https://www.nationalgeographic.org/topics/resource-types/?q=&page=1&per_page=25
Emphasis added.

There is little doubt, that, as the human species, we have needs, from the basic, to '*must have*' items. In terms of these requirements, there is an obvious hierarchy, from the 'basic, at the one end of the spectrum to, luxury at the other end.' In this respect, wherever sited on this scale, many of these 'wants and needs' are composed of a resource. However, it is, today, questionable whether resources will also be able to be *readily drawn upon when needed*. Many are in limited supply and, going forward, this may mean that we rely increasing on recycling resources – such as metals.

According to the psychologist Abraham Maslow and his pyramid – the Hierarchy of Needs (1943) mankind's basic (physiological) essentials are centred around our very survival and necessitates 'us' having air, food, water and shelter (see Figure 1). While Bronisław Malinowski, an anthropologist, writings on ethnography and social theory,[4] also reinforced this as the basic requirement for life, with wealth and value being more related to self-fulfillment - sitting at the top step for man (see Figure 2 – applying a stepped approach).

Figure 1: Maslow's Pyramid: Hierarchy of Needs

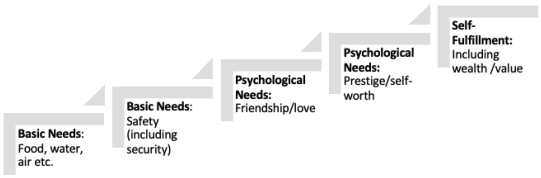

Figure 2: Authors stepped interpretation of Maslow's Pyramid This five-stage model can be divided into deficiency needs and growth needs. The first four steps are often referred to as deficiency needs (*D-needs*), and the top level is known as 'being' or growth needs (*B-needs*). From this perspective it is arguable where the barrier crosses over into greed needs and those that compromise their fellow man.

Certainly, in the western world, we take for granted many items that relate to self-esteem and prestige, a vast majority of these being composed of a number of resources and/or valuable elements or components. Many of these resources are today mined across the globe. Mankind now depends on at least 90 metals and mineral commodities to power and charge the global economy,[5] thus, potentially blurring the distinction in respect to our needs and this hierarchal approach. According to research by the Minerals Education Coalition, it is identified that every American (US) born will need 3.19 million pounds of minerals, metals and fuels in their lifetime (Figure 3: Mineral Baby).[6] This equates to 40,633 pounds of new minerals being provided yearly for every person in the US to make things that are used daily.[7] However, the percentage of what is viewed as essential to a life and a luxury is not discussed or factored into this study; neither is the percentage of minerals that is/or are able to be reclaimed and/or recycled/repurposed.

[4] See his various related work (as listed within the references).
[5] *See "Minerals Yearbook: Volume I—Metals and Minerals," U.S. Geological Survey; https://www.usgs.gov/centers/nmic/minerals-yearbook-metals-and-minerals*
[6] Mineral Education Coalition https://mineralseducationcoalition.org/mining-mineral-statistics.
Calculations (from 2020) based on a life expectancy of 78.6 years and mineral data from the National Mining Association, the U.S. Geological Survey and the U.S. Energy Information Administration.
[7] Mineral Education Coalition https://mineralseducationcoalition.org/mining-mineral-statistics

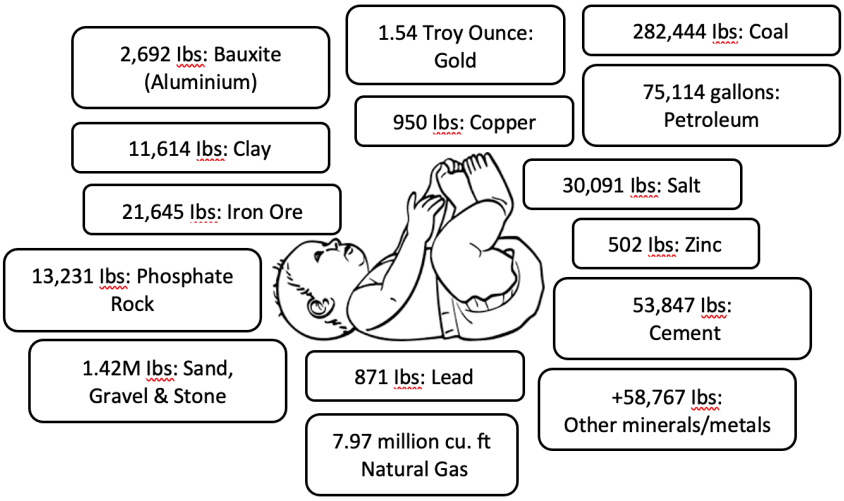

Figure 3: Author's adaptation – Mineral Baby
(Mineral Education Coalition)

There is little disputing that some resources are rare, and, although not a necessity to sustaining our lives, they are recognized to be precious in terms of an associated value linked to their scarcity or our desire to have them (Fox, 2016a).

Metals are key to our existence and are a central component of global commerce. They are found in a whole array of products. Whether they are directly used to mine, in the manufacturing process, within the building industry, in cars, phones or electrical items, metals remain an essential part of the world economy. It is recognised that many metals are a finite resource and therefore there needs to be careful consideration given to their mining, production and consumption. Understanding, quantifying and estimating the ways that metals flow through economies is recognized to be part of the solution to better management of these resources and this includes the aspect of recycling and reusing of metals (Graedel et al, 2011; UNEP, 2011).

The recent pandemic has been one of the biggest challenges to mankind in this era and has been significant in reinforcing the vulnerability and fallibility of mankind, in terms of succumbing to illness; and, at the same time, emphasized the importance of basic needs. Whilst reaching the top step and having wealth, may be an aspiration of many, Covid-19 has brought home the value of health. In an attempt to fight Covid-19, it has led to government restrictions and limitation of movements, and whilst aimed to keep 'us' safe and secure, these have, however, limited our access, including to resources and other luxury items (Hebli and Said, 2020).

Covid-19 and the related implications and restriction of movement has affected the world economy and consequently, the global financial markets and even the means of commodities trading (Baker et al., 2020; Goodell, 2020; Goodell and Goutte, 2021; Yarovaya et al., 2020; Zhang et al., 2020;). A number of studies have examined the impact of Covid-19 on different types of financial markets, like stocks (Ashraf, 2020; Liu et al., 2020, and Phan and Narayan, 2020;) and the oil markets (Bouri et al., 2020; Mensi et al., 2020). Yousaf (2021) has identified that very little research has occurred in respect to the area of the industrial metals' markets and precious metals market, save for gold, where some research has transpired (Salisu et al, 2020 and Corbet et al 2020). This said, these studies tend to consider the markets and are therefore mostly linked to trading that occurs, with less emphasis on the initial sourcing, mining and the second market of reusing/recycling of resources.

However, what is sometimes overlooked in these commodity studies is the effect on the average person – "*Eight out of 10 'new poor' will be in middle-income countries;*" whilst it is recognized that

"*[t]he pandemic and global recession may cause over 1.4% of the world's population to fall into extreme poverty"* (World Bank, 2020).

Covid-19 has distorted the market, it has increased death among miners, it has halted production at some of the mines, it has reduced refinery processes, including across the recycling trade – it has led to a whole host of changes that have impacted, in some form of another on all of us (Newman, 2020; Mokni et al, 2021).

Alongside countless deaths, Covid-19 has invariably led to a vast number of people being furloughed and/or losing their employment, it has resulted in hardship to many, including those working in the mining sector (Deloitte, 2020, FLSmidth, 2020, Laing, 2020, Hilson et al, 2021).

The impact of hardship has also resulted in the legitimate selling of resources (second-hand trading) in some instances in the form and shape of a commodity they have been transformed into – or in a revised version, resembling more the initial resource, such as, recycled metals. In many instances, people need, or will need, to sell possessions to survive.

Conversely, this has also led to an increase of illegitimate trading *or acquirement*, where the resource/commodity has been obtained by illegal purposes, sometimes due to sheer greed and taking an opportunity to prey on society, at other times by organized gangs, but at all times, arguably when society has been at its most vulnerable. Whilst this is not new behaviour, invariably Covid-19 has brought out the best and worst in mankind, including an increased propensity for criminal activities. Metal has been particularly targeted in this respect. This said, mining resources, including metals, has always been fraught with illegal acts and exploitation.

3. Ethical/unethical: mining and trading

Mankind has always had a tendency to exploit one another, whether this is seen as against individuals or nations. This exploitation far exceeds the aspect of survival, or survival of the fittest and is ultimately linked to greed and self-actualization/self-fulfillment (at the expense of others).

3.1. An overview

Throughout the entire process of acquirement of resources, from *source-to-end-user* (see Figure 4) there is a constant risk and indeed, likelihood, of a crime being committed, certainly there is acknowledged probability of exploitation – somewhere along the process.

Illegal mining is recognized to be mining that is undertaken without state permission, in particular in the absence of land rights, mining licenses, and exploration or mineral transportation permits. However, in some instances the State may turn a blind eye to activities, including abuses that occur in respect to the miners. Often mining, particular illegal mining, is related to organized crime rings and a whole array of crimes (Zabyeline et al., 2020). Many of these are transnational, operating a complex network of criminal ventures across the globe (Wagner, 2016).

Hence, there is an obvious intersection of organized crime with illegal mining which takes its toll on both the environment[8] and the people of the respective countries – particular those that mine or are ancillary to the task.

More recently, in the context of mining, there have been ethical debates centred around a number of themes such as resource depletion, environmental and social problems, conflicts between mining companies and local communities, and risks exposure to workers (UNDP, 2018). In this respect, mining is viewed as having both negative and positive consequences. It can contribute to sustainable development, particularly to its economic dimension. It can bring fiscal revenues to a country, drive economic growth, create jobs and contribute to building infrastructure.

In terms of ethical practices, linked to the initial source (mining and trading) marked developments have occurred over a period of time, with far more emphasis now being accorded to managing mining for sustainable development and in accordance with the United Nations (UN) Sustainable Development Goals (SDG's). However, there is still more to be achieved, including in respect to criminal activities and exploitation of the workforce.

In respect to metals and precious metal mining, key actors in the supply chain, from sourcing, to mining and trading, have, debatably, increased their responsibility over a period of time, largely due to the end suppliers requiring more accountability and transparency.

This said, gold mining, is still recognized to be fraught with workforce abuses (particularly children – IPEC, 2000, 2002, 2004, 2005); and, there still remains a variance between the size of operations and legal practices. More applied, ethical trading normally occurs on large scale operations, which is highly mechanised, formalised and regulated with standardised systems in place for maximising production and decreasing risks.

Gold mining tends to fall within the realms of artisanal and small-scale mining (ASM[9]) for the most part. Globally, it is estimated that more than 100 million people – workers and their families - depend on artisanal/small-scale mining compared to about 7 million people worldwide in larger-scale, industrial mining.[10]

Small scale operations, more often prey on the vulnerable and are associated with more physical demands, being both informal and unregulated. In many instances, it lacks industry or state support being linked to small groups of people who often live in poverty. These miners do not have the resources to implement systems for maximising yields, for protecting their own health and safety (Sanmiguel et al, 2015) or for environmental protection. Workers are often oppressed, sometimes subject to forced-labour and other abuses.

According to the International Labour Organization (ILO) Forced Labour Convention, 1930 (No.29) forced or compulsory labour is:

> *"all work or service which is exacted from any person under the **threat of a penalty** and for which the person has not offered himself or herself **voluntarily**."*

[8] Note, for the main part, environmental/green crime – is outside the scope of this paper.

[9] ASM accounts for about 20 percent of global gold supply, 80 percent of global sapphire supply and 20 percent of global diamond supply, 26 percent of global tantalum production and 25 percent of tin (ILO data).

[10] The World Bank https://www.worldbank.org/en/topic/extractiveindustries/brief/artisanal-and-small-scale-mining [Accessed 12 July, 2021]

The threat of a penalty can be a punitive sanction or may involve a loss of rights and other privileges. This can therefore take the form of psychological manipulation or physical violence, including restraint and even death or the threat of death (both to the worker and/or his/her family).

The voluntary element can involve an initial deception and then later coercion, in terms of being manipulated, deceived and subject to fraudulent promises and then later prevented from leaving the work through physical or psychological controls. This can also cross over into the realms of human trafficking.[11]

Child labour abuses are particularly acute in mining with it being estimated that more than one million children are engaged in child labour[12] in mines and quarries, mostly within artisanal and small-scale mines.[13]

Small scale mining often takes place in remote areas and where law enforcement is weak. Schools and other social services provisions are also scarce. There tends to be alcohol and drug abuse and whilst prostitution is additionally prevalent.[14] Girls are also commonly involved in supporting mining-related jobs such as providing and selling food and supplies to the miners, domestic work for third parties and in some cases may also become victims of commercial sexual exploitation.[15]

Covid-19 will, without doubt, exacerbate many of these issues and abuses, certainly when mining resumes to a level pre-Covid, as there will be a need to replenish the workforce, as many would have fallen as victims of this virus (Newman, 2020).

Even when selling resources, there may again be a tendency for exploitation in terms of selling at a reduced cost and/or illegally – sometimes to finance other criminal activities.

The ILO recognises that small-scale mining is expanding rapidly and therefore the likelihood is for these abuses to increase. ILO acknowledges also that ASM is uncontrollably in many developing countries, citing one reason for this is that as much as 80 per cent of small-scale mining falls outside any legal or regulatory framework.[16]

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[11] The Palermo Protocol of 2000 (the United Nations Protocol to Prevent, Suppress and Punish Trafficking in Persons, especially Women and Children) defines human trafficking as "the recruitment, transportation, transfer, harboring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person for the purpose of exploitation. Exploitation shall include, at a minimum, the exploitation of the prostitution of others or other forms of sexual exploitation, forced labor or services, slavery or practices similar to slavery, or the removal of organs."

[12] Child labour usually involves children 'working under coercion applied by a third party (other than by his or her parents) either to the child or to the child's parents, or work performed by a child as a direct consequence of their parent or parents being engaged in forced labour.
The coercion may take place during the child's recruitment, to force the child or his or her parents to accept the job, or once the child is working, to force him/her to do tasks which were not part of what was agreed at the time of recruitment or to prevent the child from leaving the work.
If a child is working as a direct consequence of his or her parents being in a situation of forced labour, then the child is also considered to be in forced labor.' (Commdev.org: Addressing Forced Labor in Artisanal and Small Scale Mining (ASM) 2014 version)

[13] ILO data: http://www.ilo.org/ipec/areas/Miningandquarrying/lang--en/index.htm

[14] Ibid.

[15] ILO data: Girls in Mining: Research Findings from Ghana, Niger, Peru and the United Republic of Tanzania. ILO, 2007.

[16] Press Release (1999) 'Small-scale mining on the increase in developing countries' https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_007929/lang--en/index.htm

This said, the legislative framework is often viewed as being fragmented and inconsistent across the globe. The legal and normative framework of mining encompasses domestic legal frameworks - where mining takes place, mining contracts, international laws, voluntary standards by the mining industry and customary rules, as well as other policies (or more accurately, *soft-laws* which are quasi-legal instruments such as customary law that are not legally binding).

International '*laws*' are really an extended form of guidance and remain subject to the political willingness of a nation to impose and comply with. This approach is therefore often limited in terms of ensuring compliance and equal standards across the world.

Covid-19 has, indisputably, also presented an opportunity for further divergence from more legitimate and ethical practices and legal requirements. Questions have been raised regarding mineral resource governance, anti-corruption practices and other criminal activities during the pandemic, which have seen an increase of abuses and offences being identified (Transparency International, 2021).

3.1. A regional - EU approach

One area where there has been more concerted regional unity is in the European Union (EU). The EU has recognized many of the inconsistencies across the globe, particularly in politically unstable areas, wherein mineral mining and trading is also associated with crimes, in terms of financing armed groups, fuelling forced labour and other human rights abuses, including supporting corruption and money laundering. In a bid to address these challenges, as of, 1 January 2021, a new law came into full force - the *Conflict Minerals Regulation*.[17] Whilst this is seen as a positive measure, it is nevertheless limited in terms of jurisdiction and applicability.

The EU Regulation directly applies to companies that imports minerals and metals into the EU, no matter where they originate. However, it only identifies four conflict minerals, namely: tin, tungsten, tantalum and gold (also referred to as 3TG). The US also has similar legislation on the same conflict minerals (Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Act of 2010). And it is identified that this is due to the fact that these minerals are more often linked to armed-conflicts and related human rights abuses. This said, these same abuses do occur in other resource mining, so a wider range would have been preferable.

The EU Regulation applies to both upstream and downstream operations (Figure 4).

[17] Regulation (EU) 2017/821 of the European Parliament and of the Council of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas. *OJ L 130, 19.5.2017, p. 1–20*
The Regulation was signed into law in June 2017.

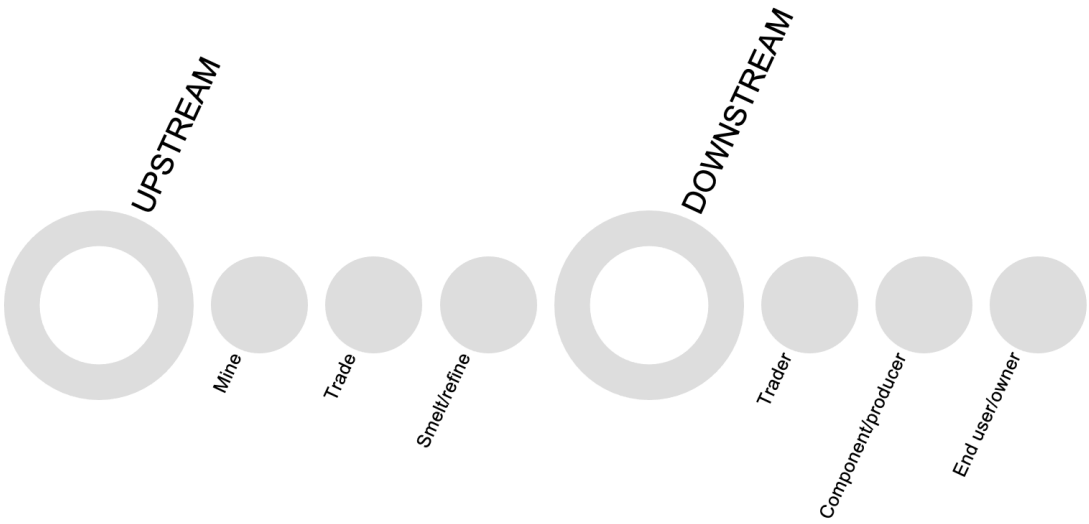

Figure 4: Source - Authors: Taken from EU Regulation guidance document

It is recognized that the 3TG's are used extensively in everyday, arguably, self-fulfillment, items – such as mobile phones, cars and in jewellery (much in the same way though that other metals including precious metals, such as platinum and palladium also are used).

The EU points to the fact that consumers increasing want to know if a product they have bought is funding violence, human rights abuses or other crimes overseas and whilst this Regulation aids to provide some vision it is far from effective in ensuring total clarity, whilst also having an incomplete/limited scope.

3.2. The consumer and the drive for improvement: fairness and transparency

In order to compensate for this inconsistent approach, there has been a parallel drive to increase the transparency and fairness in mining operations – much in the same way as occurs in other commodities and sectors (such as farming).

There are two primary names associated with this approach: **Fairtrade**[18] and **Fairmined**.[19]
These schemes aim to support particularly small-scale operations by certifying that they employ responsible mining practices in compliance with their respective standards. Part of this necessitates conducting regular audits to ensure that standards are maintained. This therefore aids to build accountability as well as providing the ability to trace the source – giving confidence to legitimate traders and final end-point consumers.

Linked to the theme of social and corporate responsibility, there has been a concerted effort to undertake recycling – whereby society (certainly in the western world) is encouraged to think about what is thrown away, whereby, the drive is not to view it as waste, but to see it as an opportunity. Alas, however, it also presents itself as an opportunity for those with less scrupulous ambitions.

[18] Fairtrade: https://www.fairtrade.net/about/what-is-fairtrade
Also, see Fairtrade in the Covid-19 era: https://www.fairtrade.net/about/fairtradetogether-covid-19-updates
[19] Fairmined: https://fairmined.org
Associated with gold mining.

PART 2
4. Resources: *recycling/reusing*

Recycling is often thought of and identified as a modern phenomenon. In actual fact, recycling is not new – there are indications that the process of recycling scrap metals has been around since the biblical period (reports vary, but suggestions are that it first occurred around 400-700 years BC[20]). Reforging metal(s) is believed to be the oldest recycling practice, then applied, as a cost-effective alternative to seeking out newer mined metals.

Historians have stated that some of the Severn Wonders of the Ancient world were created from recycled metals.[21] The more neoclassical US colossal, the Statue of Liberty, which ironically stands for liberty and freedom, is known to be covered in over 80 tonnes of copper and bronze with parts of it having been recycled.[22]

During World War II metal was in short supply in many countries with mining being reduced and trade routes being under threat of attack. In the US, the government launched a national campaign to encourage citizens to start to collect anything made of metal so that it could be recycled and, paradoxically used in tanks, ships and other weapons used to fight overseas (Rockoff, 2000, 2007). The drive was centred around patriotism and victory (Goodwin, 1994).

In the current era recycling is less about allegiance to a nation, as supporters of recycling today particularly point to the negative factors related to mining, mineral depletion and the need to save the planet. Predominantly identified are the negative consequences to the environment and the link and drive to the UN's Sustainable Development Goals (2030). The simple fact is that humans have consumed more resources in the last 50-years than in all our previous history.[23] Many resources are not finite and are therefore rapidly running out (Fox, 2016a; Barbi et al, 2016, Meinert, et al., 2016).

This said, despite the honourable intentions, there are also well-known and, in fact, growing criminal activities associated with recycling practices – just as there is mining. So, whilst advocates for recycling/second-hand trading may point to a higher moral compass – there is a growing need to tackle the crimes and crime rings that lay behind the principle of saving the planet and conserving resources – invariably the effects to humans also need to be factored in.

4.1. Defining: recycling and reuse

The recycling of non-renewable resources is frequently advocated as a solution to diminishing or restricted resources. Recycling has been used for a whole host of activities and has largely become associated with a recovery operation in terms of waste that can be salvaged and reprocessed into products, materials or substances whether for the original or other purposes.

The EU draws a distinction between the terms, reuse, recycling, recovery and disposal, in alignment to the target stated in EU waste legislation. Most definition are found in the Waste Framework

[20] As identified on various scrap metal sites; for example
Singleton Scrap Metal site: https://www.singletonscrapmetal.co.uk/news/the-history-of-metal-recycling/
Metal Man Recycling: https://www.metalmenrecycling.com.au/the-complete-history-of-metal-recycling/
[21] Ibid.
[22] See further information on the Statue of Liberty: https://www.statueofliberty.org/statue-of-liberty/overview-history/
[23] Globalrecyclingday.com: The seventh resource (after the six in terms of importance – water, oil, natural gas, coal and minerals) is said to be recycling - https://www.globalrecyclingday.com/seventh-resource/

Directive.[24] Definitions for *recycling* and *reuse* in waste specific Directives partially deviate from the corresponding definitions found within the Waste Framework Directive, hence, there are variables found within a number of legislative provisions.[25] Most of these have some connected to metals – such as batteries (alkali metals – e.g. lithium) or end-of-life of vehicles.[26]

Metals are unique – they allow for thermal and electrical conductivity, performing at high temperatures with a high fracture toughness. This said, they occur across the periodic table – being labelled according to their specific characteristics, for example as, 'precious,' 'ferrous' and 'non-ferrous.' They are valuable in terms of the various use to which they can be applied and the fact that they are inherently recyclable; meaning in theory, they can be used over and over again – minimizing the need to mine them. This said, in each phase of the recycling process, there is a degree of metal loss (residue) (Figure 5).

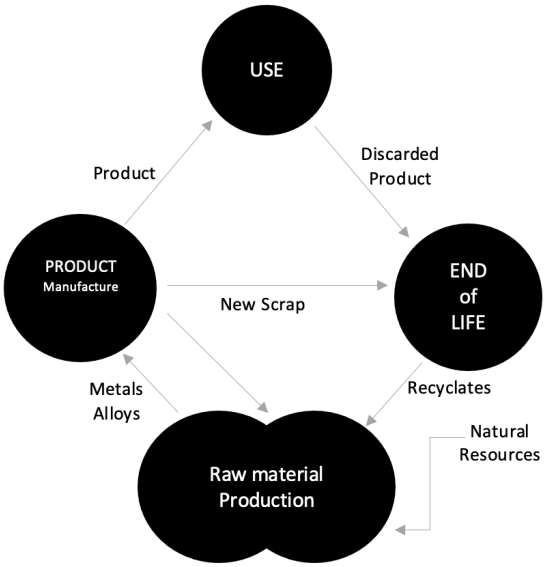

Figure 5: Life cycle
(Source – Authors. Based on Meskers, 2008)

Metals remain at the centre of the EU circular economy initiative, 'where the value of products, material and resources is maintained in the economy far as long as possible, and the generation of waste minimized' (EC, 2015). In 2011, the EU determined that under certain circumstances,

[24] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance)
OJ L 312, 22.11.2008, p. 3–30
Its predecessor being: Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste (Text with EEA relevance)
OJ L 114, 27.4.2006, p. 9–21

[25] For example: Waste specific Directives:
- Batteries: Directive 2006/66/EC
- End-of life vehicles: Directive 2000/53/EC
- Packaging and packaging waste: Directive 94/62/EC
- Waste electrical and electronic equipment Directive 2002/96/EC

For all waste legislation see:
https://ec.europa.eu/environment/topics/waste-and-recycling/waste-law_en

[26] Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles - Commission Statements. *OJ L 269, 21.10.2000, p. 34–43.*

therefore, scrap metal ceases to be waste (EU Regulation[27]). One intention of the Regulation was to create some consistency and certainty within the EU bloc recognizing that trade in recycled metal is hampered by different national legislation. As of the end of 2020 the UK is no longer a member of the EU ending its transitionary membership period on January 1, 2021.

5. UK - CASE STUDY: *a glimpse into a growing global problem*

Scrap Metal Thefts

Scrap metal is big business. Whilst the EU is looking at the potential to revise rules to encourage more recycling, and specifically processing within the EU, there are concerns that this would impede upon free and fair trade.[28] This said, it is unlikely that there would be an outright ban. The EU is the world's largest steel scrap exporter and in 2019, shipped more than 21.7 million tonnes, along with 1.1 million tonnes of aluminium.[29]

The UK is heavily dependent upon the export of scrap metal. In 2019 the UK produced around 11 million tonnes of scrap metal and exported more than 9 million tonnes.[30]

Following the US Wall Street Crash (1929) the UK government identified concerns in 1935 that the flourishing UK steel industry needed protection from European Cartels.[31] Today the steel industry in the UK has all but diminished, it is certainly a shadow of the industry it once was. Global oversupply, particularly in the form of cheaper Chinese steel, has affected the UK steelmakers, which were already struggling with high business rates and energy costs compared to other countries. This said, the UK was still the largest exporter of steel among the then 28 Member States in 2020.[32] Ironically, the imported steel is likely to contain exported scrap metal from the UK.

Paradoxically, as the UK is now no longer a member of the EU it will be interesting to note the relationship with the bloc and any adherence to the Unions advocated approaches and a change of direction regarding exporting outside Europe for recycling.

Today, in the UK, the metal industry is highly regulated with dealers needing a number of permits and licences to operate legally. This said, it has experienced one of the highest surges of metal thefts since the end of the last decade.

5.1. UK – Legislation

[27] Council Regulation (EU) No 333/2011 of 31 March 2011 establishing criteria determining when certain types of scrap metal cease to be waste under Directive 2008/98/EC of the European Parliament and of the Council
OJ L 94, 8.4.2011, p. 2–11.
[28] Eurometal.net. 2021. EU Regulation revision could threaten scrap exports
https://eurometal.net/bir-eu-regulation-revision-could-threaten-scrap-exports/
[29] Metalbulletin. 2020. Focus: EU mulls banning or restricting scrap exports in major shake-up of regulations.
https://www.metalbulletin.com/Article/3961287/FOCUS-EU-mulls-banning-or-restricting-scrap-exports-in-major-shake-up-of-regulations.html
[30] Ibid.
[31] British Metals Recycling Association (BMRA).
https://www.recyclemetals.org
[32] Data Bureau of International Recycling (BIR) as with the letsrecycle.com report, 'UK exports most steel scrap in Europe in 2020.' June 18, 2021 (Joshua Doherty)
https://www.letsrecycle.com/news/latest-news/uk-exports-most-steel-scrap-in-europe-in-2020/

As a result of the growth of metal theft offences, which is said to have been driven by increased commodity costs, the UK deemed that there was a need to revise the legislation that had been in effect since the 1960's.

The Scrap Metal Dealers Act (SMDA) 2013 repealed the earlier Scrap Metal Dealers Act, 1964 (and linked legislation) leading to a revised regulatory regime for the recycling of scrap metal and vehicle dismantling in England and Wales.[33] The Act incorporates the separate regulatory scheme for motor salvage operators under the Vehicles (Crime) Act 2001.

The revised legislation was aimed at tackling some of the illegal activities associated with scrap metal and recycling, specifically regarding verification of the origin of the metal – largely related to theft. In England and Wales, the offence of theft is defined as – dishonesty appropriating property belonging to another with the intention to permanently deprive them of it.[34] In other words, illegal acquirement. Technically, the Home Office (HO 2013) defines metal theft as 'thefts for the value of their constituent metals, rather than the acquisition of the item.' Particularly identified, at that time of the new legislation (the impetus for the revisions[35]) was the propensity of metal thefts from the railways, which was said to be on the increase (Ashby et al, 2017). The HO report, (2012) into tackling metal thefts and looking at the needed revisions, identified that there was between 80,000-100,000 police recorded metal theft offences in 2010/2011 – although, as also referred to by Ashby et al (2017), the true extent was not totally known or appreciated in terms of the actual number of offences of theft and handling offences – as there was not an accurate means of recording this information.[36] However, the report did make mention of the severity of this crime in terms of targeting not only transport modes and infrastructure but telecommunications, water suppliers, religious and heritage buildings, construction, and so on. The impact to society and the economy is enormous, not only in terms of financial losses but the major disruption caused when infrastructure is targeted. Also highlighted, was the associated risks to individuals in some instances.

The new (SMDA) legislation made it illegal for anyone to buy scrap metal using cash,[37] hence, aiming to create an audit trail relating to the origin. Scrap metal dealers must now ensure that they verify the identity of all sellers, thus, sellers need to present a valid photographic ID that provides their full residential address, or a formal document such as a utility bill and a valid photographic ID. The Act prescribes the documents and information that is acceptable for verification.

Technically, local authorities remain the principal regulator in respect to the granting and refusing of licences to trade. Whilst there may be a tightening up of practices this only relates to those that are registered and primarily aim to trade legitimately in the trading of scrap metal. This said, there are still concerns that unlicensed scrap collectors are passing stolen metal onto unscrupulous licensed companies, where metal (including precious metals) become untraceable.

[33] In Scotland the equivalent law is the Air Weapons and Licensing (Scotland) Act 2015.
[34] Section 1-7 of the Theft Act 1968. SI c.60.
[35] The Home Office's 'Operation Tornado', created as a nationwide initiative aiming to reduce metal crime – which hastened the revision to the previous 1964 legislation
[36] Home Office Impact Assessment report. Tackling Metal Theft – prohibit cash payments and higher fines: IA No. HO0058. February 22, 2012
[37] Instead, an electronic transfer of funds, a cross cheque or a prepaid card system is advocated to used.

The SMDA was supposed to prevent this avenue for metal thieves, giving Councils the power to do inspections of licensed dealers, but reports have shown that (as of October, 2018) only a fraction had been inspected, with only a fewer dealers having been closed down.[38]

5.2. Serious and Organized Crime

The National Crime Agency (NCA) '*leads the UK's fight to cut serious and organised crime, protecting the public by targeting and pursuing those criminals who pose the greatest risk to the UK*.'[39]

For three consecutive years the NCA have been raising awareness of organized criminal groups (OCG's) and their propensity to steal various metals across the UK.

- In 2019, the NCA referred to the fact that organized crime had moved into the theft metal market, particularly identifying the targeting of church roofs. If approached, whilst committing the offence, they raised concerns that there was also the increased risk of violence (NCA, 2019). It was identified that this growth followed a period of sustained decline in the 1990's.

In its 2019 strategic assessment of serious and organized crime,[40] the NCA also pointed to the fact that a recent rise in metal prices had attracted OCG's and that metal theft was on the rise as part of a globally expanding and organized crime (2019). It was identified that these gangs worked across Europe and were benefitting from an increase in copper prices, hence, stealing copper pipes, as well as the lead from church roofs (Church Times, 2019).

Specific reference was made to the illicit outbound movement of precious metals which was not just to the EU but internationally focused also.

- The 2020 assessment, by the NCA, reiterated this message, '*Metal theft is one of the fastest growing crimes globally*.'[41]

Concerns were raised in terms of the sophistication of the OCG's, who were now identified as using advanced, specialist tools to force entry or make holes in the walls or roofs of premises. Consequently, it was also identified, that, '*the specific nature and regularity of some of these techniques suggest a high degree of organisation*.'[42]

- In the 2021 NCA report, a 72% increase of metal thefts were reported, from 20,898 in 2019, to 36,015 in 2020.

The NCA identified that this increase was partly heightened by an increase in commodity prices; however, what was not factored in was the correlation of this to Covid-19 in terms of market distortion and a reduction of mining over parts of this period.

[38] BBC Radio 5 Live – as reported in BBC News. Catalytic converter thefts in England and Wales rise sixfold. 21 August 2020.
[39] NCA website at https://www.nationalcrimeagency.gov.uk/who-we-are/our-mission
[40] Serious and organised crime is defined in the 2018 Serious and Organised Crime Strategy as individuals planning, coordinating and committing serious offences, whether individually, in groups and/or as part of transnational networks
[41] NCA 2020 report: https://www.nationalcrimeagency.gov.uk/news/nsa2020
[42] Ibid.

What was identified however, was that it was anticipated that as commodity prices were forecast to continue to rise, so, therefore, would the likelihood of further criminal organized activity.

In this same report the link to other OCG activities was also identified. One specific example related to the corruption in illegal trafficking, in this instance, whereby cocaine was hidden within containers of scrapped metal being shipped from Belgium to Ghana. The full reach of OCG's, in this offence, was identified in terms of organized corruption involving the police, a lawyer and a port manager – much in the same way that has been reported in terms of mining operations and the sanctioning of illegal activities in order to profit individuals and cartels.

Currently, it is believed that metal thefts cost the UK economy an estimated £770 million per year – equating to almost £15 million per week.[43] The resale value of metal continues to make metal theft a lucrative proposition. Much in the same way as the EU (as well as the UK) refer to metals being at the centre of the EU circular economy initiative, it would appear that OCG's also see the value of increasing their activities financed partly through illegally acquired metals.

However, it is likely that the true scale of this issue is still not fully understood.

As part of this research, three UK police services were approached under the Freedom of Information Act[44] (FOI - 2000) – Northants Police, Staffordshire Police and the British Transport Police (BTP[45]). Specifically asked was the following information:

Metal Thefts: FOI Enquiry

Please detail in the current year (2021-2022)
And previous two-years (2019-20; 2020-2021)

1. The recording of thefts of metal within the force area (for example: volume – number of crimes recorded)

- Please identify the type of metal (copper, lead, etc) and any other/further breakdown that may be possible
- Detail how this is recorded according to HO recording rules etc (codes/offences etc)

My understanding is that this may be in one of three ways: *please confirm*
- Infrastructure related
- Non-Infrastructure related
- Not classified

2. The (number/volume) of thefts of catalytic converters from motor-vehicles, and if this can be extracted from data (crime recordings) – in other words how is this offence recorded?

[43] How bad in the problem in 2021? – Note there is some fluctuation in figures:
See the following:
https://www.clearway.co.uk/news/metal-theft-how-bad-is-the-problem/
West Yorkshire Police: https://www.northyorkshire.police.uk/staying-safe/safer-business/metal-theft/
The Association of Chief Police Officers estimates that metal crime costs the British economy around £350 million each year: https://www.publicpolicyexchange.co.uk/event.php?eventUID=LB23-PPE
[44] 4 June, 2021.
[45] BTP is one of the oldest (modern) police forces in the world. They police the railways in England, Wales and Scotland. They provide a service to rail operators, their staff and passengers across the country. BTP also police the London Underground, Docklands Light Railway, the Midland Metro tram system, Croydon Tramlink, Tyne and Wear Metro, Glasgow Subway and Emirates AirLine.
https://www.btp.police.uk/police-forces/british-transport-police/areas/about-us/about-us/our-history/

3. Are you able to provide geographic scope to show where all these offences are most problematic?

4. Any actions/operations taken (singularly or with other forces and/or partners, the operation name, who with – success, etc.)

5. The number of detections, prosecutions or otherwise relating to the above enquiry?

The latter police service, BTP, has the lead for coordinating and reporting on metal theft[46] and have always had a more accurate recording method for these specific (metal related) crimes. As part of the FOI request, BTP supplied a comprehensive break-down in an Excel spreadsheet of the various thefts from across the country for the years (i) 2019-2020; (ii) 2020-2021 and (iii) 2021-2022.

In the first period/year – thefts from motor vehicles were more apparent than in the following year. This was largely assumed to be as a result of Covid-19 and less traveling on the trains and hence a noticeable reduction of cars being parked in railways stations, given that all thefts from vehicles recorded were related to parking at railways stations. However, it was not apparent that in any of these crimes, that there was direct correlation related to metal thefts (since there is no specific offence code to identify this). This said, it was clearly distinguishable that theft of metal in general, had a separate identifier in terms of live metal/cables (J29) and non-live (J30) metal/cables. In the second year there was a noticeable increase of both J29 and J30 offences. Overall, in 2019-2020, based on the data supplied, there were 861 entries showing thefts from across England and Wales (it was not apparent that Scotland was included in this data). In the period 2020-2021 only 270 entries were recorded – the lowering mostly due to less theft from vehicles.

Whilst the third year is not complete – it does reveal that more detail is being recorded in respect to where the metal is being taken from with an obvious link to plant and other machinery. In terms of arrests there were only eighteen in 2019/2020 and twelve in 2020/21 recorded by BTP – which show just how lucrative these crimes are becoming in terms of profitability vs. arrest.[47]

In terms of Staffordshire Police, whilst they did reply and stated that they held this information, they also did not provide any further breakdown in accordance citing Section 17(1) of the FOI and Section12(1).[48] There reasoning was that this was,

> '*due to the fact that Staffordshire Police are using a new system to record crime and although data from the previous system has been transferred to the new database, the property fields are structured differently and there is no way of readily identifying certain property types*.'

Northants Police failed to respond to the FOI request.

Hence, much in the same way as was reported in 2012, within the HO impact assessment report, it is still apparent that, the recording of metal thefts is not consistently recorded by the police services in England and Wales and metal crimes (thefts and other offences) may therefore be categorized

[46] National Police Chiefs' Council Lead for Metal Crime, BTP is currently (2021) Assistant Chief Constable Charlie Doyle.
[47] Also identifying that of those arrested it is not known how many where actually charged for an offence (including theft of the metal/theft from motor vehicles, etc).
[48] Citing the Act (section) which states that there is no obligation for a public authority to comply with a request for information if the authority estimates that the cost of complying with the request would exceed the prescribed [cost] limit.

differently – making it difficult to determine the sheer scale of these offences and which metals are actually being targeted.

However, one area that has been particularly identified as on the rise, as referred to within the 2021 NCA report, is – the theft of catalytic converters and this has certainly coincided with Covid-19 virus and lockdown periods.

5.3. Precious Metals and Catalytic Converters

A catalytic converter ('*cat*') sits between the engine and the tailpipe of a motor vehicle collecting toxic gases (such as carbon monoxide, nitric oxide, nitrogen dioxide and hydrocarbons) plus other particles. They aid to clean these emissions through a chemical reaction.

The interior of the 'cat' is usually filled with a honeycomb structure onto which a coating is applied that contains the catalyst – that causes the chemical reaction. Most commonly used are precious metals, which are rare metals that have a high economic value.

Historically, precious metals have been prized and associated with self-fulfillment (self-actualization) – in other words, '*wealth and status*' but today they are increasing sought and used in technologically-sophisticated products (Table 1: Precious metals and use)

Precious Metals	Chemical Symbol	Use
Ruthenium	Ru	This is used for the majority within electronics (e.g. hard drives) and also as a process catalyst/electrochemistry.
Rhodium	Rh	The major use is within automobiles as a catalytic converter.
Palladium	Pd	The major use is within automobiles as a catalytic converter.
Silver	Ag	The principal uses are: within electronics and other industrial applications such as catalysts, batteries, glass and metal as well as within jewelry.
Osmium	Os	Very little industrial use – used rarely as a catalyst.
Iridium	Ir	The majority use is within electro-chemistry.
Platinum	Pt	The major use is within automobiles as a catalytic converter.
Gold	Au	Mostly used in jewelry but also some used in electronics.

Table 1: Precious metals and common use

The one most associated with use in catalytic converters is palladium, alongside platinum and also rhodium.

5.3.1. Thefts of catalytic converters

The increasing cost of precious metals used in catalytic converters has almost certainly been a factor in driving up the theft of 'cats.' The NCA (2021) report refers to the fact that the value of palladium rose by an estimated 19% and rhodium by 148% in 2020. The same report also states that there were 28,849 reported thefts of catalytic converters in 2020, compared with 17,602 in 2019. A rise of 64%.

However, given the recording of crimes by the police services in England, Wales and Scotland the accuracy of these figures is perhaps questionable. This is certainly borne out by the *Which* findings in 2021.[49] It is understood that these thefts are committed by OCG's and that removal of the catalytic converters is becoming increasing rapid due to specialist tools being used.

So prolific in fact have catalytic converter thefts become (particularly during the Covid-19 crisis) that between Monday 19 and Friday 23 April, 2021 a joint operation was launched (operation 'Goldiron') to target the offenders.[50]

Ultimately, catalytic converter thefts stand to impact on the average person, who need to use their vehicle as part of their day-to-day living. In the UK a high percentage of car parks targeted were hospital, where nurses and other medical staff were tending to the sick. However, this is not just a UK phenomenon, the US is also reporting a similar spike across the same period.[51]

According to the US National Insurance Crime Bureau, the pandemic has directly resulted in a rapid rise in catalytic converter theft. In 2019, an average of 282 catalytic converters were stolen every month; in 2020 the average had risen to 1,203 - in December (2020) alone, 2,347 catalytic converters were stolen.[52] Undoubtably, this crime trend is also being replicated in many more countries world-wide, either in terms of catalytic converters or thefts of metal per se.

5.4. Recycling impact

Similar to mining, exporting for recycling purposes has been affected by Covid-19.[53] Yet this has not stopped OCG's operations.

Invariable Covid-19 has resulted in an increase of catalytic converter thefts, not only in the UK but further afield. Like other metals acquired by criminal means – this will require processing through recycling.

The majority of recycling tends to occur outside the UK and the EU (as mentioned above). Just as occurs in mining, this invariably means other criminal acts, including corruption and the exploitation/abuse of the workforce will occur (Verité, 2019). This frequently translates to forced labour and child labour being utilised at some stage of the process too (Williams, 2018). Whilst some legislation and protocols exist these largely relate to the processing of hazardous waste and other

[49] As reported in ORACLE - Police Professional | Catalytic converter thefts more than double in a year. June, 21, 2021.
[50] Reports identify that:
- 56 arrests were made
- 926 sites were visited (catalytic converter process plants, scrap metal dealers, vehicle dismantles and catalytic converter buyers)
- 664 vehicles were stopped
- 1,037 stolen catalytic converters and 297 items of stolen property were recovered
- 244 offences were identified

National Police Chiefs Council: 'https://news.npcc.police.uk/releases/more-than-a-thousand-stolen-catalytic-converters-recovered-following-national-multi-agency-crackdown
[51] See for example CBS News online: https://www.cbsnews.com/news/catalytic-converter-thefts-metals/
[52] See as reported in Motor Trend online. 'Time to Worry About Thieves Stealing Your Car's Catalytic Converter' https://www.motortrend.com/news/catalytic-converter-thefts-nationwide-on-rise/
[53] In 2020, UK exports (of steel) were down 14.4% compared with 2019 to 5.661 million tonnes as the impact of the Covid-19 pandemic hit.letsrecycle.com report, 'UK exports most steel scrap in Europe in 2020.' June 18, 2021 (Joshua Doherty)
https://www.letsrecycle.com/news/latest-news/uk-exports-most-steel-scrap-in-europe-in-2020/

chemicals.[54] Like mining, there is not sufficient legislation and other controls in place to prevent these crimes and abuses.

However, to think these abuses only occur outside the UK or EU would be inaccurate. In 2015 the UK Government introduced the Modern Slavery Act, 2015. Reporting on modern day cases is an obligation to the Council of Europe Convention on Action against Trafficking in Human Beings. There is widespread concern that the waste and recycling sector in the UK appears to be fertile ground for those seeking to exploit vulnerable individuals, many of these being run by OCG's; and, with the UK now out of Europe, there is the increasing likelihood that this may further expand to include the trafficking of workers into the UK (particularly from the east of Europe).[55]

6. Conclusion

Covid-19 has presented a challenge to mankind, including obtaining the very resources 'we' rely upon. Invariably, this has affected both mining and also recycling. Without doubt it has distorted both markets. However, regardless of Covid-19, mining has always presented a challenge in terms of engaging in a whole array of criminal activities and unethical practices, including abuses against men, women and children. These are not limited to one resource or to one geographic location – it is a global epidemic in the same way the virus is.

Although some minerals are essential to our lives, many are luxuries – desired for self-fulfillment or self-gratification; but invariably this comes at a price – not just to the planet but to humans that mine these resources and, arguably, to the wider society that allows many of these crimes to go unchecked.

Domestic/national laws are often seen to be weak or non-existent in some countries, where mining takes place. While internationally, there is an increased focus on ensuring laws and regulations to tackle conflict minerals/metals, human trafficking, corruption, organized crime, as well as the environment, there remains an obvious disparity in the enforcement of the legislation and laws that do exist. Invariably, more laws and regulations are needed but they remain an ineffective means to tackle the issue if they fail to be consistently enforced.

From an international perspective, not all countries, particularly those in which illegal mining is undertaken are signatories or, have ratified many of the important legal instruments. Even when they have done so, there remains no certainty that there is the willingness to adhere to these. Corporate guidance principles are also limited due to their voluntary nature and do not result in due diligence across all levels of the supply chain. Industry codes of conduct and customer demanded approaches (such as Fairtrade and Fairmined) tend to address the large-scale mining sector and the more legally compliant small-scale mining operation. Whereas, the majority of problems highlighted concern the artisanal and small-scale sector – which are illegally run and subject to greater exploitation by OCG's. This includes forced labour at the mine and in the locality and the diversification into other activities – such as financing armed groups, money laundering, drug smuggling, corruption and fuelling forced labour and other human rights abuses – away from the mine.

Even where laws do exist that emphasize criminalization of transnational crime and human trafficking, they still do not mandate and prioritize the protection of victims or the prevention of

[54] E.g the Basel, Rotterdam and Stockholm Conventions.
[55] Resource: Hidden Chains: modern slavery in the recycling sector. 2018 (Rob Cole) https://resource.co/article/hidden-chains-modern-slavery-recycling-sector

trafficking. It is apparent that more needs to be done to tackle the abuses directly related to mining, but the concerns are that this will displace or even grow such networks – as can be seen in the context of recycling.

There remains an obvious need to ensure society recycles – including metals and precious metals. While recycling is advocated to tackle the environmental issues associated with mining, not least mineral/metal depletion plus other concerns related to the process of mining (e.g. water and soil contamination, etc) – it also has a tendency to recycle many of the existing crimes and atrocities, not least organized gangs that prey on the vulnerable.

Just as Covid-19 has distorted the commodities market it has also distorted the OCG network, but organized crime gangs continue to look for opportunities. And, while Covid-19 closed some avenues down, albeit temporarily, it has provided other means to grow illegal networks. As the NCA stated (2021) '*[m]etal theft is one of the fastest growing crimes globally'* – facilitated by OCG's.

Clearly there is expansion into the area of recycling, including recycling of metals. The case study on the UK has shown the adaption of their market; however, it has also shown that the extent of these operations are not known. More recently (during Covid-19) there has been a move by OCG's into precious metals, through the '*acquirement*' - theft of catalytic convertors. And, so, whilst recycling is advocated as a possible solution to saving the planet and reducing mining (including the whole host of atrocities undertaken by illegal mining) the consequences and effects must not be forgotten in terms of replicating many of the offences that occur in mining.

References

Ashby, M.P.J., Bowers, K.J., Borrion H. and Fuyiyama. 2017. The when and where of an emerging crime type: The example of metal theft from the railway network of Great Britain. Security Journal 30, 1-23. (First published online, 2014).

Ashraf, B.N., 2020. Economic impact of government interventions during the COVID-19 pandemic: international evidence from financial markets. J. Behav. Exper. Finan. 27, 100371.

Baker, S.R., Bloom, N., Davis, S.J., Kost, K., Sammon, M., Viratyosin, T., 2020. The unprecedented stock market reaction to COVID-19. The Review of Asset Pricing Studies 10 (4), 742–758.

Bardi, U., Jakobi, R. & Hettiarachchi, H. Mineral Resource Depletion: A Coming Age of Stockpiling? Biophys Econ Resour Qual 1, 4 (2016). https://doi.org/10.1007/s41247-016-0004-x

Bender, T., 2006. *A nation among nations: America's place in world history.* Boston: Hill & Wang.

Biagini, E and Hoyle, B., (1999) Insularity and development on an oceanic planet. In *Insularity and development: International perspectives on islands,* ed. E. Biagini and B. Hoyle, 1-14. London: Pinter.

Bouri, E., Demirer, R., Gupta, R., Pierdzioch, C., 2020. Infectious diseases, market uncertainty and oil market volatility. Energies 13 (16), 4090.

Carter, P., 1987. *The road to Botany Bay.* London: Faber & Faber.

Church Times. 2019. Church lead thieves are becoming more violent. (Wilkinson, P). https://www.churchtimes.co.uk/articles/2019/7-june/news/uk/church-lead-thieves-are-becoming-more-violent

Corbet, S., Larkin, C., Lucey, B., 2020. The contagion effects of the covid-19 pandemic: evidence from gold and cryptocurrencies. Finance Res. Lett. 101554.

Deloitte. Understanding COVID-19's Impact on the Mining & Metals Sector. Guidance for Mining & Metals Executives COVID-19: Mining Industry Impact and Response. 2020. Available online: https://www2.deloitte.com/global/en/pages/about-deloitte/articles/covid-19/understanding-covid-19-s-impact-on-the-mining---metals-sector---.html

European Commission (EC). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Closing the Loop-An EU Action Plan for the Circular economy. COM (2015) 614/2; European Commission: Brussels, Belgium, 2015.

EU Guidance document: *new Conflict Minerals Regulation*
https://trade.ec.europa.eu/doclib/docs/2017/march/tradoc_155423.pdf

FLSmidth. COVID-19: Mining industry impact and response
https://www.flsmidth.com/en-gb/discover/mining-2020/mining-industry-impact-and-response

Fox, S. J. 2016a. SPACE: The race for mineral rights. '*The sky is no longer the limit.'* Lessons from Earth. *Resources Policy.* Vol. 49, September 2016, Pages 165-178

Fox, S. J. 2016b. Green and level playing fields: *A paradox of virtues. DUMPING – Anti-competitiveness. Int. J. Public Law and Policy, Vol. 5, No. 4, 2016,* 333-367.

Fox, S. J. 2020. Policing Mining: in outer-space *Greed and Domination vs. Peace and Equity. A governance for humanity! Resources Policy* 64 101517

Girls in Mining: Research Findings from Ghana, Niger, Peru and the United Republic of Tanzania. ILO, 2007.

Goodell, J.W., 2020. COVID-19 and finance: agendas for future research. Finance Res. Lett. 101512.

Goodell, J.W., Goutte, S., 2021. Co-movement of COVID-19 and Bitcoin: evidence from wavelet coherence analysis. Finance Res. Lett. 38, 101625.

Goodwin, D.K. 1994. No Ordinary Time. Franklin & Eleanor Roosevelt: The Home Front in World War II. New York: Simon & Shuster.

Graedel, T.E., Allwood, J., Birat, J-P., Reck, B. K., Sibley, S. F., Sonnemann, G., Buchert, M., and Haguelüken, C. 2011. "What Do We Know About Metal Recycling Rates?" Journal of Industrial Ecology. Vol. 15 Edition 3.
https://onlinelibrary.wiley.com/doi/10.1111/j.1530-9290.2011.00342.x

Hebli, A., Said, F.B. The impact of COVID-19 on tourism consumption behaviour: A perspective article. *J. Tour. Manag. Res.* 2020, *7*, 196–207.

Hilson, G., Van Bockstael, S., Sauerwein, T., Hilson, A.,McQuilken, J. Artisanal and small-scale mining, and COVID-19 in sub-Saharan Africa: A preliminary analysis. *World Dev.* 2021, *139.*

Home Office.2013. Metal Theft, England and Wales, Financial Year Ending March 2013. Technical Report. London. https://www.gov.uk/government/publications/metal-theft-england-and-wales-financial-year-ending- march-2013/metal-theft-england-and-wales-financial-year-ending-march-2013.

IPEC: 2000. Program to prevent and progressively eliminate child labor in small-scale traditional gold mining in South America (Bolivia, Ecuador, Peru), project document (Geneva, ILO, 2000).

IPEC: 2002. Prevention and progressive elimination of child labor in small-scale traditional gold mining in South America (Phase II), project document (Geneva, ILO, 2002).

IPEC: 2004. Combating child labour and improving the situation of informal gold miners in Mongolia, project document (ILO, Geneva, 2004).

IPEC: 2005. Prevention and Elimination of Child Labour in Artisanal Gold Mining (Orpaillage) in West Africa, project document (Geneva, ILO, 2005).

Laing, T. The economic impact of the Coronavirus 2019 (Covid-2019): Implications for the mining industry. *Extr. Ind. Soc.* 2020, *7*, 580–5828.

Liu, H., Wang, Y., He, D., Wang, C., 2020. Short term response of Chinese stock markets to the outbreak of COVID-19. Appl. Econ. 52 (53), 5859–5872.

Malinowski, B. 1922. Ethnology and the Study of Society. Economica 2:208–219

Malinowski, B. 1929. Social Anthropology. Volume 20, pages 862–870 in Encyclopaedia Britannica. 14th ed. Chicago: Benton.

Malinowski, B. 1939. The Group and the Individual in Functional Analysis. American Journal of Sociology 44:938–964.

Maslow, A. 1943. A theory of Human Motivation. Psychological Review

Mensi, W., Sensoy, A., Vo, X.V., Kang, S.H., 2020. Impact of COVID-19 outbreak on asymmetric multifractality of gold and oil prices. Resour. Pol. 69, 101829.

Meskers, C. E. M. 2008. Coated Magnesium – Designed for Sustainability, The Hague: PhD Thesis, Delf University of Technology (ISBN: 978-9-064643-05-7).

Meinert, Lawrence D., Gilpin R. Robinson, and Nedal T. Nassar. 2016. "Mineral Resources: Reserves, Peak Production and the Future" Resources 5, no. 1: 14. https://doi.org/10.3390/resources5010014

Mokni, K., Al-Shboul, M., Assaf A. 2021. Economic policy uncertainty and dynamic spillover among precious metals under market conditions: Does COVID-19 have any effects? Resources Policy. Volume 74. Dec. 2021

National Crime Agency (NCA) 2019. National Strategic Assessment of Serious and Organised Crime. https://nationalcrimeagency.gov.uk/who-we-are/publications/296-national-strategic-assessment-of-serious-organised-crime-2019/file

National Crime Agency (NCA) 2020. National Strategic Assessment of Serious and Organised Crime. https://nationalcrimeagency.gov.uk/who-we-are/publications/437-national-strategic-assessment-of-serious-and-organised-crime-2020/file

National Crime Agency (NCA) 2021. National Strategic Assessment of Serious and Organised Crime. https://nationalcrimeagency.gov.uk/who-we-are/publications/533-national-strategic-assessment-of-serious-and-organised-crime-2021/file

Newman, L. 2020 Copper price surges due to global shortage. *Al Jazeera Media Network*. https://www.aljazeera.com/news/2020/2007/copper-price-surges-due-global-shortage-200701163458731.html

Orwell, G. 1937 The Road to Wigan Pier. Penguin Books.

Parry, J. C., 1974. *The discovery of the sea.* New York. Dial.

Phan, D.H.B., Narayan, P.K., 2020. Country responses and the reaction of the stock market to COVID-19—a preliminary exposition. Emerg. Mark. Finance Trade 56 (10), 2138–2150.

Rockoff, H. T. 'Keep on Scrapping: The Salvage Drives of World War II' (Sept. 2007), NBER Working Paper Series, vol. w13418, 2007, available at http://ssrn.com/abstract=1014795

See Google Scholar (2000): https://www.researchgate.net/publication/24126210_Getting_in_the_Scrap_the_Salvage_Drives_of_World_War_II/comments

Salisu, A.A., Akanni, L., Raheem, I., 2020. The COVID-19 global fear index and the predictability of commodity price returns. J. Behav. Exper. Finan. 27, 100383.

Sanmiquel, L., Rossell Garriga, J., Vintro, C., 2015. Study of Spanish mining accidents using data mining techniques. Saf. Sci. 75, 49–55. https://doi.org/10.1016/j. ssci.2015.01.016.

Transparency International. 2021. Corruption and Human Rights go hand in. 25 June 2020. Report by *Amelia Pace*. handhttps://transparency.org.au/corruption-and-human-rights-go-hand-in-hand/

UNDP. 2018. Managing mining for sustainable development. UNDP Bangkok Regional Hub and Poverty-Environment Initiative Asia-Pacific of UNDP and UN Environment.

UNEP (United Nations Environmental Programme) 2011. International Resource Panel. Recycling Rates of Metals: Status Report. Graedel, T. E., Allwood, J., Birat, J-P., Reck, B. K., Sibley, S. F., Sonnemann, G., Buchert, M., and Haguelüken, C.

Verité 2019. At Risk in the Recycling Sector Supply Chain, available at https://www.verite.org/at-risk-in-recycling-sector/

Wagner, L. 2016. Organized Crime and Illegally Mined Gold in Latin America
Global Initiative against Transnational Organized Crime.
https://globalinitiative.net/wp-content/uploads/2016/03/Organized-Crime-and-Illegally-Mined-Gold-in-Latin-America.pdf

Williams, C. 2018. Majority of forced labour victims 'exploited at recycling facilities', available at https://www.mrw.co.uk/latest/ majority-of-forced-labour-victims-exploited-at-recycling-facilities/10034212.article

World Bank. 2020. COVID-19 to Add as Many as 150 Million Extreme Poor by 2021. Press Report: Press Release No: 2021/024/DEC-GPV. https://www.worldbank.org/en/news/press-release/2020/10/07/covid-19-to-add-as-many-as-150-million-extreme-poor-by-2021

Yarovaya, L., Mirza, N., Abaidi, J., Hasnaoui, A., 2020. Human Capital efficiency and equity funds' performance during the COVID-19 pandemic. Int. Rev. Econ. Finance 71, 584–591.

Yousaf, I., 2021. Risk Transmission from the COVID-19 to metals and energy markets. Resources Policy 73 102156

Zabyelina, Y. and van Uhm, D. (Eds.) 2020. Illegal Mining Organized Crime, Corruption, and Ecocide in a Resource-Scarce World. Palgrave Macmillian.
(See Zabyeline et al., The New Eldorado: Organized Crime, Informal Mining, and the Global Scarcity of Metals and Minerals)

Zhang, D., Hu, M., Ji, Q., 2020. Financial Markets under the Global Pandemic of COVID- 19. Finance Research Letters, p. 101528.