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ENVIRONMENTAL LAW ISSUES IN CONNECTION WITH LANDFILL MINING

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ABSTRACT

In Sweden, landfills are excavated on a relatively modest scale (mainly for the purpose of decontamination, to increase landfill capacity or to free up land for other uses). Lately however, aspirations for excavations aimed at recovering energy and materials have increased and an important goal according to the Mineral Strategy of Sweden is to increase the recycling rate of metals and minerals and reduce the amount of waste. The incidence of certain (critical) metals and minerals, including REE and phosphorus, is moreover assumed to be relatively large in Swedish landfills, and the interest in excavating landfills is therefore expected to increase. The legal situation as regards excavation of landfills in general and of mining waste in particular, is however unclear, not least regarding permit requirement according to the Swedish Environmental Code. Even though landfill recycling may entail numerous negative environmental effects, e.g., acidic and metallic leachate, release of gases, and destabilization of land the regulation of the activity is not clear. The aim of this paper is to describe and problematize the legal situation as regards landfill excavation in Sweden against the backdrop of, on the one hand, a potential increase in the demand for recycled metals and minerals, and on the other hand comprehensive requirements for a non-toxic and healthy environment.

1. INTRODUCTION

Throughout history, landfilling has been an effective method for the disposal of waste in Sweden, and it is still the primary approach to waste disposal in large parts of the world. Landfills, especially those established prior to the advent of modern environmental requirements, do however pose a risk for peoples' health and the environment e.g., in the form of pollution to soil, water and air (SEPA, 2021; Grossule and Stegmann, 2020; Hogland et al, 2018). In Sweden, landfilling of waste has gradually been reduced in favor of other treatment methods since the beginning of the 1990s. Currently, less than one percent of the municipal waste in Sweden is landfilled[1]; only waste that cannot be treated in any other way, such as contaminated masses, are landfilled. According to the Swedish Environmental Protection agency (SEPA) Sweden has two 'strategies' to reduce the environmental impact of landfilling: (1) to reduce the long-term impacts by designing more environmentally 'friendly' landfills; (2) to reduce the amount and the hazardousness of landfilled waste (SEPA, 2020). None of these strategies does however account for previously landfilled waste in older landfills.

Against the backdrop of an increasing awareness of the consequences of environmentally hazardous activities, particularly mining, and an increasing scarcity of virgin materials, most prominently metals or carbon-based materials such as wood or oil, the discourse of landfill mining gained momentum in the 1990s, after being more or less dormant since the first documented operation in the 1950s (Spencer, 1990; Dickinson, 1995; Krook et al, 2012; Burlakovs et al, 2017). In landfill mining, previously disposed of (landfilled) materials or other natural resources are excavated to extract valuable materials (e.g., Savage, 1993; Johansson et al., 2012; Krook et al. 2012; Hogland, 2018) and may thus constitute an alternative to the extraction of virgin materials (Särkkä et al., 2018), as well as a strategy to deal with negative impacts of landfills. This potential function of the landfills has also been pointed out in a number of official investigations and policies, both on EU level and by individual Member States (Laner et al. 2019; Jones et al. 2018).

In Sweden, landfills are excavated on a relatively modest scale, and mainly for the purpose of decontamination, to increase landfill capacity or to free up land for other uses (Johansson et al., 2012; SGU, 2014). Lately, however, plans for excavations aimed at recovering energy and materials have emerged. According to the Mineral Strategy of Sweden an important goal of this is to increase the recycling rate of metals and mineral and reduce the amount of

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waste. The incidence of certain (critical) metals and minerals, including REE and phosphorus, is moreover assumed to be relatively large in Swedish landfills (SGU, 2014).

As regards what quantities of different materials are currently stored in Swedish municipal landfills, Frändegård et al. assert that: "The total amount of deposited materials in Swedish municipal landfills as of 2012 is estimated to be 365 million tons" (Frändegård et al. 2013:10), and that "landfill mining could be seen as a supplementary resource strategy for meeting the growing domestic need for ferrous and non-ferrous metals […]" (ibid. p. 17). According to the authors, about 7 million tons of ferrous metal and 2 million tons of non-ferrous metals would be possible to extract, thus "enough to meet the demand of Swedish industry for ferrous and nonferrous metals for three and eight years, respectively" (ibid. p. 1).

There are however significant drawbacks associated with landfill mining and the scientific literature provides a fragmented impression of its pros and cons, as can be expected given the complexity of the issue. The excavation of landfills has consequences for both human health and the environment, and the very undertaking of the activity is governed by economic, social and legal prerequisites. What are considered pros and cons is largely a matter of perspective - from a global resource perspective, recovering materials from landfills can be seen as an opportunity, while the negative consequences might be in the foreground from a local perspective. Thus, while many authors argue that the problems outbalance the benefits, both from an environmental and an economic perspective, some see it as a solution to the overall resource problem (Esguerra et al., 2019).

There are considerable challenges in connection with landfill mining. Of these, methane emissions and local pollution as a result of disturbing and moving waste, and a lack of economic feasibility, in terms of e.g., waste treatment and disposal costs in connection with re-landfilling, are frequently mentioned (Laner et al. 2019; Esguerra et al., 2018; Johansson et al., 2017; Hogland et al., 2018; Frändegård et al., 2015; Van Passel, 2013). A different perspective is presented by Calderon Marquez et al., where landfill mining is outlined as a "strategic alternative" for sustainable development and "proper waste management" (Calderon Marquez et al. 2019:1102). In terms of positive economic factors, i.e., revenues from landfill mining, Laner et al., mention material sales, reclaimed void space and (future) avoidance of land landfill management costs etc. (Laner et al. 2019).

One of several significant gaps in the discourse of landfill mining appears to be the regulatory system. On EU level, De Römph refer to landfill mining as "…a promising but underexposed idea in EU policies, let alone in EU legislation" (De Römph, 2018:91). In Laner et al., the results from the study point to "the role of policy intervention" as an important factor to enhance the (economic) conditions for landfill mining not least as the economic performance of an individual activity will depend on the regulatory costs (Laner et al., 2019). Similar conclusions are made by Van Passel et al. who argue that "[enhanced landfill mining] projects have a clear private economic potential when adequate regulation and support policies are in place" (Van Passel et al., 2013:98). The consequences of "[u]nfavorable institutional conditions for landfill mining" are also highlighted by Johansson et al. (2017) that points to the importance of the design of the regulatory framework in supporting landfill mining and the current discrepancy between the basis for the landfill legislation (to permanently dispose of the material) and landfill mining (to excavate the material).

This paper aims to contribute to this research through increased knowledge of the function of the institutional framework – in particular the environmental legislation – in relation to landfill mining in Sweden. More specifically, the purpose of the paper is to describe and problematize the legal situation as regards the excavation of landfills in Sweden against the backdrop of; on the one hand, a potential increase in the demand for recycled metals and minerals, and on the other hand comprehensive requirements for a non-toxic and healthy environment.

1.1 Method

The analysis is conducted within the framework of EU and national level legislation on waste and landfill mining. Our intention is to contribute to the research in waste law in general, and to the discourse on landfill mining in particular. We do this by (a) exploring and analysing the legal framework governing waste and landfill mining in Sweden, and (b) providing insights on the manner in which this legislation corresponds to political ideas or ambitions of a circular economy and thereby an increased excavation of landfills. We use "constructive analytical jurisprudence" to analyse the concepts, rules and structures of the relevant laws. Constructive, as opposed to dogmatic, here means "problem oriented", which entails that the legal framework is analysed from the point of view of the factual situation rather than solely from the linguistic and logical elucidation of legal concepts (Westberg 1992, Agell 1997). The study of the legal material is qualitative, and in principle limited to legislation currently in force.

2. RESULTS

2.1 Concepts and definitions

A landfill is defined, as per the EU Landfill Directive, as a site where waste is stored either by the waste producer (internal landfills) or an independent landfill operator (article 2(g)). To classify as a landfill, the intended storage generally need to be of permanent nature, as the following is excluded from the scope of the Directive:

a. facilities where waste is unloaded in order to permit its preparation for further transport for recovery, treatment or disposal elsewhere, and
b. storage of waste prior to recovery or treatment for a period less than three years as a general rule, or
c. storage of waste prior to disposal for a period less than one year.

Storage of a more intermittent nature is not regarded as landfilling and landfill mining is thus legally restricted to 'mining operations' in long-term operational or closed disposal sites (landfills). Resource extraction from storag-

es sites of a temporary nature does not classify as landfill mining, at least not legally.

While there is no clear legal definition of operations that de facto constitute 'landfill mining' it is generally perceived as an activity where masses are extracted from an existing landfill for remediation or resource extraction purposes (Savage et al., 1993; Johansson et al., 2012). Landfill excavation for remediation purposes carries a lot less institutional uncertainty as remediation is an established activity with a clear objective to enhance environmental quality (by freeing up space for more waste, removing contamination or preparations for closure of the landfill). So far, most of the current successful landfill mining operations have also largely been deemed as remediation of contaminated areas where any resource extraction has been secondary (Hogland et al., 2018; Johansson et al., 2012).

With starting point in the objective of a circular economy some researchers argue for a clearer distinction between the old regime of landfill mining consisting of primarily remediation activities with resource extraction as a positive side effect, and the new regime, enhanced landfill mining, where resource extraction is the primary goal of the activity (e.g., Geysen et al., 2009; Jones et al., 2013). Enhanced landfill mining is defined by Jones et al as "the safe conditioning, excavation and integrated valorization of (historic and/or future) landfilled waste streams as both materials (Waste-to-Material, WtM) and energy (Waste-to-Energy, WtE), using innovative transformation technologies and respecting the most stringent social and ecological criteria" (Jones et al., 2013). Johansson summaries the difference between the (old) concept of landfill mining – primarily targeting remediation – and the emerging concept of 'enhanced landfill mining' and concludes that the new approach moves "towards a resource perspective with advanced technology for material process to reach higher quality outputs" (Johansson, 2016:21). As there is no explicit regulatory framework that covers neither landfill mining nor enhanced landfill mining, the European Parliament suggested, in the 2017 Waste Package (art. 5), that the Commission should further examine the possibility of a regulatory framework. The proposal was however rejected by the Council and the proposed amendments were not included in directive 2018/850 (OJ L 150, 14.6.2018, p. 100-108). A definition is however crucial as there is a major difference, not only on a principle level, between an activity that is undertaken with the primary purpose of remediation and one of resource extraction, not least in terms of the legal prerequisites for the activities.

2.2 Legal framework for landfill mining

It follows from the precautionary principle and previous CJEU case law, that the classification of waste should be extensive, and that any treatment of waste should either be categorized as (1) recovery or (2) disposal (i.e., landfilling) as shown by para 62-63 in the CJEU ruling Abfall Service AG (ASA) v Bundesminister für Umwelt, Jugend und Familie (Case C-6/00). The reasoning behind the 'one or the other' approach is that the legal prerequisites as well as the intentions of the legislation differ between disposal, on the one hand, and recovery on the other. As a waste treatment operation, landfill mining is in practice a combination of both recovery and disposal. According to article 3 of the waste framework Directive (WFD) 'recovery' means:

any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. […]

In the same article, the meaning of 'disposal' is outlined as:

any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy […]

As far as we can tell, there is no legal source (legislative act or CJEU case law) that defines landfill mining in the way recovery and disposal is defined. Disposal is seen as the end of the life cycle of a product and the legislation is not designed with the excavation of waste in mind. However, in addition to generate resources, the process of excavating waste with the purpose of extracting resources will also give cause to new waste in the form of unwanted, and most likely contaminated, masses. Thus, while the extraction of resources would be considered a recovery operation, the disposal of unwanted masses would be considered a disposal operation. Whether or not the excavated masses should be considered as waste in the first place is also neither obvious nor previously determined by the CJEU. This highlights the need for a regulatory framework specifically designed for landfill mining, as it is important to keep in mind that the operator (i.e., the person/legal entity responsible for the excavation) does not have any interest of disposing of the material, at least not initially, but rather hope to assimilate resources[2].

According to article 13(c) of the landfill Directive the operator (as defined in the landfill directive) of a landfill is responsible for the aftercare of a landfill after its closure. This entails 'maintenance, monitoring and control in the after-care phase for as long as may be required by the competent authority.' In the recent preliminary ruling AMA – Azienda Municipale Ambiente SpA v Consorzio Laziale Rifuti – Co.La.Ri, the CJEU states that provisions on closure of landfills apply to all existing landfills, with the exception of those that were closed no later than two years after the Directives entry into force on the 16th of July 1999 (i.e. 16th of July 2001 at the latest) as per article 18(1) and 19 of the Directive (Case C-15/19, point 34-35). The court further clarifies that when the waste is deposited into the landfill is irrelevant. The responsibility of the operator is the same regardless of whether the waste was deposited before or after the date of transposition (Case C-15/19, point 48-49). The provisions in the Landfill Directive thus applies irrespective of when the landfill was made operational, on condition that it was not closed before July 16 2001. This is not unproblematic as the theoretical basis for the allocation of costs as formulated in article 10 of the Landfill Directive is the Polluter Pays Principle (PPP), i.e. 'the landfiller pays'. Accordingly, the costs for aftercare should be

considered already when holders (as previously defined in the landfill directive[3]) deposit waste into the landfill via taxes, fees, or 'price of admission'. In accordance with previous CJEU case law it is however up to the individual member states to allocate this as they see fit (Case C-254/08). In relation to this, Advocate general Kokott clarifies in an opinion delivered on 16 January 2020 that:

Articles 10 and 14 of Directive 1999/31, in the light of the principles of non-retroactivity, legal certainty and the protection of legitimate expectations, do not justify the collection of additional fees from previous holders who deposited waste in the landfill and who paid the fees required for that purpose if the duration of the maintenance of the landfill after closure is subsequently extended and that cost factor has not yet been taken into account in the initial fee.

It is thus not possible to retroactively impose fees to holders with the argument that the cost was not taken into account initially. This however gives rise to some concern: if the provisions apply 'retroactively' but with no capacity to allocate cost, it is not the original polluter who pays, it is the operator.

The question is thus who should pay for landfill mining in accordance with the polluter pays principle. Is it (1) the original holder (2) the operator, or (3) the 'miner'? Another question is if the costs for remediation activities, which has previously been the primary objective of landfill mining, should be considered when the waste is initially disposed by the holder. Based on the PPP, the answer would be yes. In accordance with article 10 of the landfill directive "…estimated costs of the closure and after-care of the site for a period of at least 30 years shall be covered by the price to be charged by the operator for the disposal of any type of waste in that site." As remediation activities such as freeing up space and contamination treatment certainly are included in 'costs of closure and after-care' this is a strong indication that the holder of the waste should bear the costs of such activities. Based on the same logic, the costs for primarily resource extraction activities are not likely to be considered in the same way, at least not in accordance with current regulation.

To conclude this section, (enhanced) landfill mining is not prohibited provided that the operation complies, as stated by the European Commission, with the main requirements in article 13 in the WFD (i.e., without risk to water, air, soil, plants or animals; without causing a nuisance through noise or odours; and without adversely affecting the countryside or places of special interest) and with a permit from the 'competent authority' in accordance with article 23. It is however the responsibility of the member states to transpose these requirements into national legislation.

2.3 Legal framework for landfill mining in Sweden

The EU waste legislation has primarily been transposed into Swedish law via the Swedish Environmental Code (SEC) (via Ch. 15), the Waste Ordinance, Ordinance on Landfilling of Waste (Landfill Ordinance) and the Environmental Assessment Regulation (MPF). As far as waste in general is considered, the primary rules in Sweden are found in Ch. 15 of the SEC, which was recently modified to better correspond with EU legislation (Government Bill, 2019/20:22). The definition of waste and waste management operations (such as recovery and disposal) is meant to match the corresponding definitions on union level. However, in recent rulings of the Land and Environmental Court of Appeal (M 7806-16 and M 1832-17), a more stringent approach to the waste definition is taken due to the Swedish transposition of the derogation regime in article 2(c)[4] of the WFD, which in turn has extended the scope of landfilling. The Swedish transposition of the Directive has thus resulted in that 'less' traditional landfilling, such as permanent storage of surplus masses in conjunction with road construction, also requires a permit for landfilling[5].

Overall, the basis for the Swedish legislation for landfilling of waste is the goal of reducing both the amount of landfilled waste and its hazardousness. The strategy for reducing the environmental effects is partly to reduce emissions from the landfills in the long term by controlling the design of the landfills, and partly to reduce the amount of and hazardousness of the landfilled waste. As mentioned above, operational landfills require a permit in accordance with the landfill directive (art. 6-9) and it is the individual member state's responsibility to guarantee that a permit process is in place. In Sweden, this is done via the SEC.

According to Ch. 9, s. 6(3) the SEC, the government can issue regulations requiring operators to apply for a permit to landfill waste. It thus follows from Ch. 29, s. 18-26, of the MPF that landfilling, as a main rule, requires a permit. Which type of permit depends on the waste - landfilling of certain specified amounts of non-hazardous, and non-inert waste does, for example, require a 'class A' permit from the Land- and environmental court, whereas landfilling of smaller volumes of the same type of waste can be permitted by the County Administrative Board (CAB) as a 'class B' permit (MPF, s. 20-21). The same logic is applied to hazardous waste (s. 23-24).

In keeping with the overarching objective to minimize the amount of landfilled waste, the Landfill Ordinance stipulates that only waste that has been treated may be landfilled (s. 14). With treatment is intended: "the use of physical, thermal, chemical or biological methods, including sorting, which modify the properties of the waste so that its quantity or hazard is reduced, its handling is facilitated or recycling is favored." The requirement for treatment does however not apply to inert waste, where treatment is not technically feasible, or other waste where treatment does not lead to reduced negative effects on human health or the environment. (s. 14, the Landfill Ordinance). In terms of substantive rules, the regulation requires that the operator has as good knowledge as possible about the composition of the waste, leachability, and other properties and effects both in general and in the long term (s. 16).

There is however no specific rule or regulation in the SEC, or in any other piece of legislation (such as the Minerals Act) that targets landfill mining[6]. While there are possibly regulations that can be applied analogously in this respect, the lack of specific rules for such a relatively new type of activity raises many legal questions, including who has the right to carry out the excavation and under what conditions;

who is responsible for the excess waste from the excavation (i.e., can excess waste be re-deposited and under what conditions?); and should excavation from all types of landfills be considered in the same way or do the differences in age, content, placement etc., call for special regulation?

These are important questions, not least considering that the responsibility of the operator of the landfill ceases 30 years after closure if the permit authorities have not taken future costs beyond those 30 years (economic or environmental) into account when issuing permits.

More specifically regarding the relationship between landfill mining and remediation of contaminated soil, there is moreover no clear-cut demarcation between the different activities. The question of under what conditions landfill mining can be considered – and thus may be authorized as – remediation depends on a number of factors.

Landfill mining – if that is the purpose of the planned activity – falls under the definition of environmentally hazardous activities under the SEC, as it entails risking spread of pollutants. Hence, the activity may be subjected to a permit requirement in accordance with Ch. 9, s. 6 in the SEC[7]. At the same time, landfill mining will often take place in areas classified as contaminated, which makes the rules regarding remediation applicable. The SEPA has investigated this issue and concluded that, in the current situation, the operator can "choose" which set of rules to follow when commencing a project. If the supervising authority subsequently assess that this was not appropriate, it can order the operator to change the approach (SEPA, 2015:70). The SEPA does not believe that this situation would change if landfill mining were to be subjected to a specific permit requirement, as the purpose of the activity would still be decisive (SEPA 2015:70).

The consequences of this legal situation is that an operator who commences a landfill-mining project might be held responsible also for existing contamination, as it has been established in case law that a new actor can become "polluter" and thus jointly and severally liable for the contamination (NJA 2012 s. 125). This joint liability entails that anyone of the polluters can be sought to answer for the entire remediation costs – a risk that is hardly mitigated by the fact that it is possible to subsequently demand refund by the other polluters as these may have gone bankrupt, or cannot be found. According to SEPA, this also does not constitute a reason to change the existing regulations for contaminated soil. The main reason for SEPA's assessment seems to be the small extent of landfill mining in Sweden. If the activity becomes relevant to a greater extent, SEPA believes that there may be reasons to reconsider this position. However, for landfill mining to become relevant, it might be necessary to address also the lack of specific regulations governing the activity. According to Krook et al. "Neglecting ELFM in EU policy and regulatory frameworks is, therefore, not a neutral act but rather an effective way to lock in conventional practices and lock out ELFM." (Krook et al., 2018:6).

All in all, there is a significant legal uncertainty in connection with landfill mining in Sweden that needs to be resolved before this type of activity can be pursued on a larger scale.

More in detail, excavated waste is furthermore subject to regulations in the form of bans and waste taxes. Redepositing excavated masses may be prohibited depending on the composition of the masses. This implies that the excavators are forced to deliver any excess (unwanted) waste for incineration or other 'recycling' at varying costs (Krook et al, 2012:518). In addition, any lawful landfilling of unwanted masses will be subject to an additional waste (landfilling) tax, depending on whether the excavated landfill contains waste that has already been taxed or not (Government Bill 2019/20:124 p. 18). In any case, taxation will constitute a detriment for potential landfill mining; even if the excavated waste was not taxed initially, the imposition of a tax liability for the 'excavator' in principle implies a transfer of the original polluters' responsibility upon the 'excavator', which is not consistent with the PPP. In the legislative preparatory works regarding changes in the Swedish law on Waste Tax, exemptions form taxes were amply discussed. Nine out of 14 referral bodies were against a general tax exemption for landfill mining, which was also in line with the Government Bill. Four referral bodies (Linköpings universitet; Stena Metall AB; Återvinningsindustrierna; Ragn-Sells AB) considered the investigation 'inadequate' inter alia because the scope of the proposed environmental assessment was limited, and there are "compelling reasons from an environmental, climate and resource efficiency point of view for promoting landfill mining [authors' translation]".

The amendments to the waste tax legislation entered into force on of January 1, 2021 and did not include any general exemptions from the waste tax. Instead, a possibility for a tax repayment was introduced[8]. Following this, the government has decided to further investigate the possibility of tax exemptions for excavated waste; the results of this investigation are still pending and shall be reported to the government at the latest on February 28, 2022.

In accordance with the PPP, taking into account future costs that may arise due to the landfill already at the time of disposal of the waste will promote a more 'efficient' resource use. There are two reasons for this. Firstly, if it is more expensive to landfill waste that could be subject to future resource extraction, holders are incentivized to choose a different recovery or disposal method, although it is very challenging (if not impossible) to determine what will be valuable in the future[9]. Secondly, if the costs of landfill mining are, at least in part, covered at the time of disposal the potential for economic benefit should be higher for the excavator, thus creating further incentives for landfill mining. Neither of this constitutes the basis for resource extraction from landfills made operational under current and older legislation (which is the vast majority of Swedish landfills). As previous case studies have shown the most 'benefits' are to be made from older, not newer landfills due to increasingly stringent landfill regulations (Johansson, 2012; Hogland et al. 2018).

In spite of investigations conducted on behalf of the government indicating that there is some political ambition for landfill mining (SEPA, 2013; SGU 2014; SEPA 2015) and also proposals for legislative changes (Government Bill 2019/20:124), landfill mining largely remains unregulated, and several regulatory barriers can be identified on national level.

3. DISCUSSION AND CONCLUSIONS

In this paper, we have discussed the legal situation regarding landfill mining. We have explored the different concepts associated with the excavation of landfills for different purposes – landfill mining and enhanced landfill mining – and the legal implications of this. We have mainly targeted Sweden, but as a member of the EU, EU law, especially in the area of waste, heavily influences Sweden and both Swedish legislation and relevant EU Directives are therefore accounted for. The aim of the paper has been to provide increased knowledge of the function of the institutional framework, in particular the role of environmental legislation, in relation to landfill mining in Sweden. The motive for the study is the potentially conflicting goals concerning, on the one hand, the increased demand for recycled materials, primarily metals and minerals, and on the other hand the comprehensive requirements for a non-toxic and healthy environment as expressed by the Swedish environmental quality goals.

3.1 The importance of a legal definition

Against this backdrop, we conclude that, from a legal perspective, it is important to be able to distinguish between different activities as the requirements that are to be set according to the legislation are applied differently depending on the circumstances of the individual case. More specifically, the lack of a clear legal definition of what constitutes (enhanced) landfill mining creates uncertainty regarding both which rules apply and how they should be applied. This in turn increases (the already high) costs of an activity that could possibly be part of a circular economy. On the other hand, legal uncertainty also means increased complexity in terms of what environmental requirements can and should be imposed on the activity; without a legal definition, it is difficult to make trade-offs between the pros and cons of the activity and thus to determine suitable conditions.

3.2 The question of permissibility

According to EU law, landfill mining is not prohibited, although it is also not promoted or directly regulated. As Einhäupl et al. concludes in their review of stakeholder needs, this does not mean that there are no legal barriers to (enhanced) landfill mining: "[d]espite the impression that no current legislation is hindering ELFM implementation, industrial and scientific actors, and regional institutions would appreciate a defining legal framework." Out of all interviewed stakeholders all nine mentioned the need for regulatory change (Einhäupl et al., 2019:118). The situation is the same in Sweden, where there is no specific requirement for a permit for the excavation of landfills to recover resources. An important question is therefore how the operation should be assessed – is it mining, "ordinary" environmentally hazardous activity, waste management or a combination of these?

It is important to remember that environmentally sound resource management is a relatively new notion. Sweden were for instance diligently landfilling up until the end of the last century when landfill taxes and bans on landfilling certain materials were introduced through the Swedish landfill ordinance and the Swedish law of waste taxation. Extracting these old and 'forgotten' resources is possibly one way of creating a higher grade of sustainable consumption. By re-introducing materials that have left circulation the need for virgin materials will decrease.

According to Johansson et al. Swedish authorities "seem unable to embrace the complexity of the concept [of landfill mining]." and argue that when the activity "is framed as a remediation activity the authorities are positive in support, but when it is framed as a mining activity the authorities are negative." (Johansson et al. 2017:46). Thus, regardless of whether excavation from landfills with the purpose of recycling resources is a "good" or "bad" idea – both research results and opinions seem to differ here – it can be concluded that as a concept, landfill mining would benefit from a clearer legal framework.

3.3 Concluding remarks

Landfill mining is a complicated process. In this paper, a review of some of the legislative challenges regarding landfill mining are presented. Amongst the identified potential legal barriers, the most problematic at this point seems to be the lack of a legal definition, as this carries with it a chain of "unregulated" issues. The uncertainty that this entails is probably a contributing reason as to why the economic conditions for landfill mining are not considered particularly favorable. While our study primarily covers Swedish legal conditions, there is much to suggest a similar situation is present in other European countries (Cossu et al., 2020). Similiar to the requirements regarding the designing of landfills (Cossu, 2016) current EU law displays no ambition to promote the institutionalization of landfill mining. Such a development can however be considered necessary for the individual Member States to be able to create favourable conditions for landfill mining as an integrated part of sustainable landfilling.

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[1] This can be compared with the EU totals: in 2018, 24% of all municipal waste generated in the EU was landfilled (https://ec.europa.eu/environment/topics/waste-and-recycling/landfill-waste_en).

[2] If the extraction is seen as a recovery operation it is possible that the waste will be subject to the 'end of waste' process, thus ceasing to be waste in accordance with the provisions in article 6 of the WFD. This is important for further use of the 'waste' but the application of end of waste is not unproblematic and, more importantly, unpredictable. As clarified in AS Tallinna Vesi v Keskkonnaamet, operators cannot demand a preliminary ruling regarding the status of the waste, and if operators cannot guarantee further use (i. e., the waste ceasing to be waste), it is challenging to calculate profitability in advance.

[3] Article 2(n) has since been cancelled through Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste.

[4] The reasoning behind the derogation regime in article 2(c) (uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated) was that the waste management regime was deemed inappropriate for this kind of material even though the material de facto is discarded (Guidelines on the interpretation of key provisions of Directive 2008/98/EC on waste p. 42).

[5] Because of the Swedish transposition of the WFD, the regulatory conditions for handling such masses have been under review by the SEPA, commissioned by the government since 2018. However, at the time of writing, no legislative changes have been introduced. As of January 28, 2021 the regulatory framework for masses used for construction purposes in general is under review by the SEPA, commissioned by the government (https://www.regeringen.se/pressmeddelanden/2021/01/hantering-av-schaktmassor-ska-ses-over/).

[6] With regard to secondary extraction of minerals from mining waste, a study from 2017 concludes that while there are no formal hinders in the SEC regarding the possibility of assessing a permit application for secondary extraction, there is a need to investigate whether there are obstacles in the Minerals Act for such extraction, considering that for example the ownership of such minerals is unclear (SEPA and SGU, 2017).

[7] As described above there is no specific regulation targeting landfill mining in the SEC or related regulations.

[8] In accordance with general principles of 'repayment' the repayment cannot however exceed previous taxation, i.e., if the waste was not taxed initially the operator will not be eligible for repayment (prop. 2019/20:124 s. 26).

[9] This is why some researchers suggest a shift towards intermittent 'landfilling' in the future where traditional landfilling is replaced with temporary resource reservoirs (e.g., De Römph, 2016). Jones and Tielemans (2011) and Jones et al (2013) refers to this as enhanced landfill mining in combination with the concept of a 'temporary storage place' where waste is placed temporarily pending future extraction possibilities. To paraphrase Jones et al 2013 "[…] landfills become future mines for materials, which cannot yet be (economically) recycled with existing technologies or show a clear potential to be recycled in a more effective way in the near future." (Jones and Tielemans, 2011; Jones et al., 2013).