
The European Waste Hierarchy: from the sociomateriality of waste to a politics of consumption

Johan Hultman, Hervé Corvellec

Department of Service Management, Lund University, Box 882, SE-25108 Helsingborg, Sweden; email: johan.hultman@ism.lu.se; herve.corvellec@ism.lu.se

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Abstract. Municipal solid waste is a central concern for environmental policy, and the sociomateriality of waste—the ways in which waste is socially defined and dealt with—is an important issue for sustainability. We show how applying the European Union’s waste policy through the European Waste Hierarchy (EWH) affects the sociomateriality of waste. The EWH ranks the desirability of different waste-management approaches according to their environmental impact. We investigate how the EWH has been acknowledged and interpreted in five different organizational contexts with relevance for Swedish waste management: EU environmental policy, the Swedish EPA, two municipal waste-management companies, and the trade organization Swedish Waste Management which represents the interests of municipal bodies involved with waste. In addition to preventing the production of waste, the EWH aims to disassemble, circulate, and reintroduce as much material as possible into production processes. We show how these aims shape paradoxical relationships between economy and society on the one hand, and environment and nature on the other, and open the way for a discussion of a politics of consumption through material management.

Keywords: sociomateriality, municipal waste management, the European Waste Hierarchy, industrial ecology, ecological modernization

Introduction

“[T]he problem with contemporary social theory is that it has predominantly theorized connection and assembly. But there are good reasons to think that, in the overall scheme of things, disconnection and disassembly are just as important.”

Graham and Thrift (2007, page 7)

Preindustrial as well as industrial societies have largely been characterized by material circulation and thrift (Laporte, 2002; O’Brien, 2008). However, 20th-century mass production, based on the demands of contemporary urban consumer societies and made possible by the increased availability of materials and energy, has made waste an environmental problem in terms of its growing amounts and its increasingly complex nature (Kennedy, 2007; O’Brien, 2008; Rankin, 2011; Zaman and Lehmann, 2011). Technologies such as exurban landfills and poorly controlled incineration have contributed significantly to the negative environmental impact from waste. These technologies encourage consumer disengagement with the environmental and social conditions of production and consumption. The sociomateriality of waste—the presence of waste in society, the ways in which waste is defined and dealt with, and the effects this has for society and the environment (cf Deutz and Frostick, 2009)—is, then, characterized by dissociation. But this dissociative sociomateriality of waste is changing. This is a result both of how hazardous materials hidden in products resurface with problematic consequences when the products reach the end of their commercial life (Gregson et al, 2010) and of how waste has become economically desirable on complex markets.

Enabled by the evolution of applied industrial ecology, it is increasingly possible to use waste as input in production processes (Commoner, 1997; Ehrenfeld, 1997; Erkman, 1997; Frosch, 1992; Harper and Graedel, 2004). In such circular material management, recycling is a complement to and even replacement for the extraction of ‘virgin’ materials. European Union policy reflects the shift from waste as problem to waste as resource (Corvellec and Hultman, 2012; Watson, 2009). EU waste and environmental policy is effected through the European Waste Hierarchy (EWH) (EC, 2008a). The EWH expresses principles of minimizing environmental harm from waste management and delineates five steps, of best to worst management options. The EWH implies “significant consequences for waste management principles and practices in the future” (EC, 2005, page 7), as waste should increasingly be sorted and circulated. Through principles articulated in industrial ecology, the EWH aims to change the status of waste in relation to the design, production, and consumption of products.

But the EWH is also an illustration of how, when it comes to connecting waste to the EU’s sustainable consumption and production action plan (EC, 2008b), waste research remains “trapped by increasingly anachronistic understandings” and “the policy agenda is often ahead of waste research” (Watson, 2009, page 200). Addressing this, we argue that the EWH challenges dichotomous understandings of economy and society on the one hand, and environment and nature on the other. We show how the EWH calls for the creation of new connections between precommodity and postcommodity phases of products that point towards a new politics of consumption.

Although circular material management makes it problematic to speak of waste as a generic concept, the term is still used to describe important aspects of material practice and discourse. Strategic waste plans and waste-management companies are qualified by the term ‘waste’ even if they are becoming vital parts of a material economy that defines the conditions of consumer society. It would, as Bartl (2011) argues, make more sense to speak of ‘resource management’. Having acknowledged this, in our discussion we will temporarily accept the ‘classical’ (Bartl, 2011, page 2369) use of the waste concept to demonstrate the sociomateriality of waste emerging from recent policy developments.

The European Waste Hierarchy

The EWH is normative since it ranks the desirability of practices. It is also dynamic as it allows for interpretations of what mix of waste-management options gives the best overall ecological, economic, and social benefits (Swedish EPA, 2009). The least preferred option is disposal of material, which in institutional terms means landfill. Next is material transformation, in the form of incineration of materials combined with recovery of the energy contents of the material for electricity and heat, followed by recycling and composting of materials. This last is more explicitly about transformations through disassembly, sorting, and circulation to allow materials to reenter industrial and biological production processes. The next step in the EWH is reuse of products. This promotes practices that circulate products between commodity and noncommodity phases in such a way that their functions can be repeatedly fulfilled. The most desirable option in the EWH is waste prevention—design, production, and consumption practices that do not result in the creation of waste. This includes design for recycling and reuse, eliminated spill in production, and consumer practices that encourage thrift such as repair, maintenance, and second-hand retail.

These options demand energy input, and while landfill has little output of value except the potential to recover methane, incineration with energy recovery and recycling result in outputs with economic value. In this sense, reuse and waste prevention are qualitatively different since the result is a decrease of output with economic value (Alexander, 2005).

In Sweden the application of the principles of the EWH has meant that between 1999 and 2009 recycling and reuse of materials from household waste has increased from 36% to

49% by collected weight, while incineration with energy recovery has increased from 39% to 48%. Waste going to landfill now accounts for less than 2% of the collected household waste (Swedish Waste Management, 2011). Bottom ash from incineration with energy recovery is used to cover landfills and is considered as a recycling output. Fly ash from incineration is classified as hazardous waste and exported.

The EWH is a practical application of industrial environmental management principles (Gertsakis and Lewis, 2003) which have radically changed waste economies (EC, undated) and has its policy roots in the landfill, incineration, and integrated pollution prevention and control directives (EC, 1999a; 2000; 2008c; see also EEA, 2007). It is the ordering principle for the EU's thematic strategy on the prevention and recycling of waste (EC, 2005) under the 6th Environmental Action Programme (6EAP). The EC statement (undated, page 15, emphasis added) that 6EAP "launches a wide debate on a range of issues, including points that had been *previously seen as taboo*, such as the definition of waste and the waste hierarchy" is critical. It reflects the sense of a paradigm shift in policy making that the material connection between waste and products evokes.

The possibility of using waste as an economic resource has meant that progressively more interest has been directed both to the materiality of waste (Bartl, 2011; Rankin, 2011) and to the definition of waste since it becomes an ambiguous concept (EC, 2008; MacKillop, 2009; Pongrácz and Pohjola, 2004). The EWH promotes both vertical integration of the different phases in a product lifecycle and coordinated action across institutional and organizational boundaries (EC, undated; 1999b; Roberts, 2004; Watson et al, 2008). The translation from policy principles to practice is complex, and economic incitements combine with environmental concerns in different organizational, logistic, and political solutions (Boyle, 2003; Fischer, 2011).

Waste research reflects this multitude of localized governance approaches (Bulkeley et al, 2005; 2007; Watson et al, 2008). The spatial ordering of waste has been analyzed in comparisons between different localized waste-management practices (Buclet and Godard, 2001; Cooper, 2010; Cossu, 2009; Davies, 2008; Davoudi, 2000; Gille, 2007; 2010), and as theoretically grounded arguments concerning time and space and governmentality (Bulkeley et al, 2005; 2007; Watson, 2009; Watson and Bulkeley, 2005). The EWH promotes economic growth through eco-innovation and other measures to decrease environmental impact and is thus an agent of ecological modernization (Deutz and Frostick, 2009; Jänicke, 2008) under a capitalist regime of accumulation. But the combination of economic and environmental incitements implied both by prevention of waste and by material circulation also means that the EWH promotes an ecological modernization development that questions a dichotomous relationship between the economy and the environment (Murphy and Gouldson, 2009; Spaargaren and Cohen, 2009).

Study design and methods

For the purposes of this study, five different organizational contexts of importance for waste management in Sweden were identified: the European Union; the Swedish EPA (Environmental Protection Agency); the waste trade organization Swedish Waste Management; and two municipal waste-management companies. In terms of amounts and economic value, community-based and other nonprofit agencies play a marginal role in Swedish waste management and have therefore not been accessed. The European Union decides upon material policies common for all member states. The responsibility for articulating EU waste policy in a national context lies with the Swedish EPA. This body formulates a national waste strategy according to the EWH, which is implemented by a mix of public and private actors.

A series of extended producer-responsibility systems organize the management of specific waste streams such as packaging, electronic waste, and batteries. Municipalities are responsible for the remaining household waste. How municipalities organize household-waste management vary. Most waste collection is contracted to private companies, but a major part of postcollection management is done by municipal waste companies. Household waste is covered by a municipal monopoly. Municipalities can choose to collect and manage this waste themselves or contract out these activities. Industrial waste circulates on deregulated markets and is not restricted by municipal boundaries. ‘Household-like’ waste (for example, organic material from hotels, businesses, and schools) is covered by the municipal monopoly.

Municipal waste-management companies have a monopoly on managing household waste within the jurisdiction of their owners, but can also treat household and industrial waste from other municipalities if they win the contract in a tendering process [see Corvellec et al (2012) for a description of the business model of Swedish waste-management companies]. Two municipal waste companies, A and B, have been accessed for this study. The selection was based on their positions as dominant municipal companies in Southern Sweden and their acting according to different waste-management principles. Company A is co-owned by six municipalities and works towards waste minimization. Company B is co-owned by fourteen municipalities and prioritises energy recovery through incineration. Table 1 summarizes the municipal solid-waste-management practices of the two companies in relation to the EU average.

Table 1. Distribution between different management options of municipal solid waste for company A and company B in relation to EU average 2009 (percentage of collected metric amount) (Blumenthal, 2011; Corvellec et al, 2012).

	Company A	Company B	EU average
Landfill	2	4	38
Incineration with energy recovery	18	69	20
Recycling	59	27	24
Other	21	0	18

A key stakeholder in Swedish waste governance is the waste trade organization, Swedish Waste Management. This organization primarily represents municipalities and municipally owned waste-management firms, but also private transportation companies and private waste-management firms.

EU environmental and waste policy was analyzed through documents that the European Commission states as important for the evolution of the EWH. This material has served to answer how waste is defined and narrated at the European level. The Swedish context was analyzed through the Swedish waste strategy. This work is available through publicly accessible minutes of 2006–10 meetings of the Waste Council—a group of waste-industry stakeholders called upon regularly by the Swedish EPA in its work to formulate the national waste strategy—and other publicly accessible documents with relevance for the national waste strategy. We accessed information from Swedish Waste Management through its trade publication *Waste and Environment*. This publication expresses the views of the public service waste-management industry in relation to policy, and this material was used to investigate the relation between policy and practice on a discursive level. We conducted seven open-ended interviews with staff in waste-management companies. Informants held positions as market, economy, executive, and recycling managers. The interviews lasted between 2 and 2.5 hours each and were fully transcribed. This material was analyzed to find out how waste policy and

discourse were expressed as practice in organizations that have made a recent transition from being the end-of-the-line point of disposal to agents of transformation and circulation.

The generation of empirical material for the study allows us to explain how waste-management stakeholders interpret their role in relation to the EWH and its redefinition of the sociomateriality of waste. The material was not collected to analyze how consumers actually experience waste practices.

From problem to resource: the disassembly of waste

European waste policy works in different ways under different national conditions (Boyle, 2003), but the EWH challenges more fundamental assumptions of difference. In a first step we show how the EWH articulates economy and environment in a paradoxical relationship with each other. We then illustrate an infrastructural aspect of this paradox by considering economy and environment as discourses of society and nature.

Framings of economy and environment

A reading of the EU's environmental strategy reveals that the EWH rests on a number of categories represented as ontologically unproblematic: notably, the environment and the economy:

“The first objective of any waste policy should be to minimize the negative effects of the generation and management of waste on *the environment*. Waste policy should favour the practical application of the waste hierarchy” (EC, 2008a, paragraph 6, emphasis added), and:

“[the distinction between disposal and other steps in the EWH should be] based on a genuine difference in environmental impact through the substitution of natural resources in *the economy*” (paragraph 19, emphasis added).

The environment and the economy appear in policy as given. EU waste policy blackboxes (Latour, 1987) the economy and the environment, making these categories appear as self-evident, ahistorical, and contextless.

The EWH connects waste generation with design, production, and consumption (Deutz et al, 2010; EC, 2003). The aim of EU environmental policy with regard to waste is not to decrease the metric amount of waste but, rather, to break “the link between economic growth and the environmental impacts associated with the generation of waste” (EC, 2008a, paragraph 40; EEA, 2009). This principle of decoupling is reflected in the Waste Council's conclusion that the goal of waste strategies should not be expressed as decreased amounts of waste since less waste does not necessarily equal less environmental harm, but rather in terms of environmental impact (Waste Council meeting, 18 April 2006). One interpretation of this is that waste is a resource so, in a way, the more waste, the better. The point is, rather, to organize circular modes of material management, but the decoupling principle indicates that EU environmental policy requires economic growth to become operational.

By blackboxing the economy, marketing (in the sense of bringing to the market) waste becomes unproblematic. Waste generation is positioned as an activity on the same level of value creation as the extraction of natural resources. If the EWH works, the difference in economic value between precommodity and postcommodity phases of material will be minimized. The Waste Council consequently proposes strict quality standards for recycled materials to ensure a market, although these are no stricter than for ‘virgin’ materials, to encourage increasingly refined practices of disassembly and sorting into economically useful material categories (Waste Council meeting, 20 September 2006).

But not only does the EU waste policy blackbox the environment and the economy: through the EWH, these categories also become coconstitutive. Historically, industrial economies have systematically externalized environmental costs in the value chain from

extraction to production to consumption (Princen, 2006). Callon (1998a; 1998b; 1999) discusses this in terms of framing and overflow, where certain stakeholders in economic relations (individuals, communities, the environment) are excluded from affecting or being affected by the outcome of the relation because the conditions for this are framed by other, more influential stakeholders. Excluded stakeholders might gain no advantage from the economic relation, and they might be negatively affected by the overflow of the relation in environmental, social, and economic terms (Alexander, 2005). How they are affected is not taken into account by how the relation is framed. Through such a process of framing and overflow, 'economy' and 'environment' have come to be understood as dichotomous concepts.

The EWH principles upset this dichotomy. This is illustrated both by how the rationale for developing the EWH shifts between environmental and economic motives, and by how these motives reinforce each other. In the thematic strategy on waste (EC, 2005, page 6), "EU waste policy has the potential to contribute to reducing the overall negative environmental impact of resource use. This will contribute to maintaining the resource base, essential for sustained economic growth." In EC Directive 2009/98/EC (EC, 2008a), there are mixed causalities regarding environmental and economic gains from the EWH. On the one hand, it is important to recognize "the potential benefits to the environment of using waste as a resource" (paragraph 19), while on the other, the goal of the EWH is "to focus on the environmental impacts of waste generation and waste management, thereby strengthening the economic value of waste" (paragraph 8).

The dual approach to the positive effects of the EWH is taken to a conclusion when the environment *de facto* becomes reliant on the economy. In the Integrated Product Policy (EC, 2003, page 8), "Continual environmental improvement requires incentives for producers to make new product generations greener than their predecessors taking into account the parameters set by the market", at the same time as "An effective IPP requires the economic and legal framework to be conducive to greening products and to their purchase, ideally with minimum government intervention." This is not a dichotomous relation between environment and economy: it is a fix whereby a healthy environment is created through 'greened' consumption (Fuentes, 2011) on a free market coupled with the material circulations prescribed by the EWH. Correspondingly, environmental practices also create markets: "Europe's drive to deal with waste in environmentally sound ways has generated jobs and business opportunities. The waste management and recycling sector has a high growth rate" (EC, 2005, page 3). The economy and the environment become posited in such a way that they make sense only in relation to each other. Apart from illustrating the EWH as an agent of ecological modernization, this fix demonstrates how the hierarchy proposes to make waste management a guiding principle in the design process of products (Deutz et al, 2010). The EWH makes design, production, and consumption subjects for policy making (Deutz, 2009; Jackson, 2006).

Municipal waste-management companies perform the fix. They operate in institutional environments that sometimes allow them to act on markets but in other instances prevent them using the full potential of their material management competence and infrastructure in an economically competitive manner. For example, investment in a large-scale incineration facility demands a large and predictable input of waste material in order to secure return on investment, but the company might not be able to source this input within the geographical area where it is legally allowed to operate. One solution might then be to use company resources by exporting competence.

Company A: "[A]nd then there are all these EU-projects [which we have identified as a source of income] to finance development. You know, to facilitate the export of

[environmental technologies], we must get money to evolve. Otherwise all the others will race past us. We will lose the position we have.”

Interviewer: “But EU projects and waste. Are they usually motivated by the environmental good they do, or are the motives more businesslike...?”

Company A: “Hmm, I think they [EU] have seen the connection. In order to give [underdeveloped countries] economic development, one has to solve all the infrastructural issues. So it loops back to infrastructure if they don’t have facilities to manage waste in an environmentally OK way... . Economy and environment, it goes hand in hand”

Apart from pointing to the complexities of transferring technologies from the Global North to the Global South (UN, 2010), the quote illustrates that, when the economy and the environment are positioned as coconstitutive, it is not only incineration with energy recovery and recycling in the EWH which become vehicles for the economisation of environmentally motivated practices: reuse of products and waste prevention also do this. In answer to a question about the way in which the waste-management company had to explain to its owner municipalities that the primary aim actually was to benefit the environment, not to make money, the respondent narrated waste-management history as a material economy where materials always, in one way or another, had been revalorized through collection and sorting. The two highest steps in the EWH represent a qualitative shift since they suggest that waste-management companies should prevent the circulation of materials instead of organizing it:

Company A: “What has been profitable was to help the customer solve the problem of getting rid of the waste. You know, the actual service has been to collect it. And why should [big, for-profit waste-management companies] invest in an adviser who goes out to their customers and tells them how to decrease the amount of waste? It will never happen! But there is *one* role no one has taken. To help customers decrease their costs. You know, to help customers reduce waste and thereby reduce transportations and thereby reduce costs. So ... we started this environmental consultancy. The vegetable industry, here in these parts! Before—everything in a container, emptied two times every day and then you went along to incinerate it. I mean, is that smart? It’s half water. So then we put these mills there, they separated the water and so there was only this organic stuff left ... the water they could use, recirculate in their production, and the rest we transported to our biogas reactor. So that became gas and biogas. Suddenly ... it was quite a different thing from waste” (emphasis by informant).

In order for the EWH to work as an effective tool for waste management, the economy and the environment must be coconstitutive. Either one of the two rationales is not enough to power new material circulations on its own: remove one of them and EU environmental policy falls apart.

Infrastructure, society, and nature

If ‘economy’ and ‘environment’ are read as discourses of society and nature, the EWH can also be unpicked to show how EU environmental policy both affirms and dissolves an infrastructural separation between these latter categories. The separation between society and nature is based on a deeply rooted metaphor of human impact on the environment: that is, to think of society as outside/beside nature acting upon it (Head, 2008). This is a consequential dichotomy: “Putting the significant explanatory divide between humans and nature requires us to *conflate bundles of variable processes* under the headings ‘human’, ‘climate’ and ‘nature’” (Head, 2008, page 374, emphasis in original). The separation between society and nature blackboxes relations, causalities, and feedbacks (cf Graham and Thrift, 2007).

By grounding policy in this separation, EU policy works to move from infrastructure that allows for leakages from society to nature, such as landfills, to a regime of material circulation that keeps nature secure from negative overflow. Through its environmental strategies, the EU

strives to become a ‘recycling society’ (EC, 2008a, paragraph 28). This concept implies that a specific regime of material circulation is crucial enough for social relations to define a society (cf Gille, 2007; 2010), and that society is distinguished from what lies outside it. The 2008 Integrated Pollution Prevention and Control Directive states that EU environmental policy should prioritise “the move towards a more sustainable *balance between human activity* and socioeconomic development, on the one hand, and the resources and regenerative *capacity of nature*, on the other” (EC, 2008c, paragraph 3, emphases added). This balance only concerns materials that circulate in and out of a commodity phase: “An excessively wide interpretation of the definition of waste reduces the attractiveness of materials that would otherwise be *returned to the economy*” (EC, 2007, page 5, emphasis added).

The construction of waste as an economic resource is an answer to the question of waste as a problem: for example, in the statement that “Waste is a key environmental, social and economic issue and a growing problem” (EEA, 2009, page 5). The problem is defined as a matter of underdeveloped practices of material circulation, where: “[r]ising global consumption patterns are putting increasing pressure on ecosystems and waste infrastructure” (page 5). The deficiencies of modes of material circulation then become possible to define as leakages between society and nature. The Swedish EPA (2009) principles for sustainable waste management express the goal as “the detoxification of material flows”. At the same time, “Non renewable materials [should be] kept in 100% closed cycles.” Reading this in relation to the sustainable balance between human activity and the capacity of nature proposed by EU policy, the separation between society and nature would be a necessary condition for a sustainable development, although a ‘detoxification’ of material circulation would decrease this necessity.

Both the EU and national waste strategies are articulated against the discursive and material separation between society and nature, with infrastructure to keep the boundaries intact. But the most preferred step in the EWH—waste prevention—questions the rationale for this separation. The trade publication *Waste and Environment* argues that waste is valuable and that this value increases as materials are disassembled to allow for the circulation of material between commodity and noncommodity phases. In addition to managing waste, the waste-management sector takes upon itself other responsibilities: to pressure producers to design products for reusability and disassembly; to ensure that recycling centres are accessible and in good order to facilitate citizen’s presumed tendencies to act in responsible and moral ways; and to bring waste issues into the heart of physical planning, thus making the building of sustainable cities possible.

However, this is not necessarily how waste-management companies for whom Swedish Waste Management speaks understand their responsibility when it comes to material circulation:

Interviewer: “[But] do you work to prevent waste?”

Company B (prioritizing incineration with energy recovery): “It’s very difficult for waste-management companies to make any demands on society when it comes to preventive measures to decrease the amount of waste. Really, we are deeply engaged in a lot of issues. But that question is not ours. We are, as I said before, end-of-pipe But the fact is that the amounts that arrive here increase. Our role is more to make use of what we receive. We find it very difficult to influence the amount of waste in society. You see But it is difficult because society—whoever that is in this context—wants us to take on that responsibility, but Think again!”

Waste-management companies align their interpretation of the EWH with the Waste Council, which proposes that products should be detoxified at the sites of production, not at the point of disassembly and circulation:

Interviewer: “This [the waste-management facility] is actually the most important station between what people do and what effect this has on the environment ...”

Company A (prioritizing minimisation of waste): “What happens outside our fence, outside the actual facility, is what happens in society. And what happens in society is that people go to work, to school, to their businesses. And there material is produced. And this material we have decided to mix in a container, and then we *call it* waste. Because waste does not exist. There is no waste! There is only material! There is only a container. And an industry. And into the container you put plastic. But plastic is not waste. Plastic is plastic. And you put in wood. And wood is wood. But we invented a word for it. And we call it waste” (original emphasis).

Waste is a material category that is actively produced [the respondent would agree with Douglas (2003 [1966], page 44), that “Dirt is the by-product of a systematic ordering and classification of matter”, although he would disagree with calling it dirt]. From this perspective, the EWH prescribes alternative material production practices, but ‘production’ in this case is not limited to an economic understanding of production in contrast to consumption. Rather, the production of material assemblages is performed in all aspects of social life, by producers and designers (Braungart and McDonough, 2009) as well as by consumers (Gregson, 2009). If the EWH alternative practices were realized, this would, according to the Waste Council, make it possible to bring “[m]aterials back to nature in a sustainable way” (Waste Council meeting, 4 October 2010). The EWH connects society and nature, and infrastructure is transformed from barrier to mediator.

Reassembling the sociomateriality of waste

Recycling, reuse, and prevention give a history and a future to products outside their commodity phase. This is a break with traditional waste-management principles where “[t]he matter of waste becomes fixed and limited through management” (Gregson and Crang, 2010, page 1026). The EU’s waste policy provides a social context for products and highlights their mobility (EC, 2003, page 4):

“[t]he product can be designed perfectly, but inappropriate use and disposal will cause significant environmental impacts. Products now involve a greater variety of actors throughout their life-cycle. [Environmental policy] also has to take account of the fact that a product may be assembled, marketed and used many miles apart under different sets of societal values.”

Culture and social relations become explicitly relevant for waste management: “The challenge [is] to combine improving life styles and well-being—which are often directly influenced by products—with environmental protection” (EC, 2003, page 3). Here, products (materiality) bring forth qualities (well-being and environmental good) through practices (consumption) (Shove, 2006). The EWH assigns sociomaterial agency to materials, but a condition for this is a new understanding of consumption.

Gregson and Crang (2010) offer this by using the concept of ‘inorganic vitality’ from Bennett (2004), who argues for the force of “thing-power” that “emphasizes the closeness, the intimacy, of humans and nonhumans” (page 365). Bennett’s argument concludes with a politics of consumption:

“[the] political potential [of thing-power materialism] resides in its ability to induce a greater sense of interconnectedness between humanity and nonhumanity. A significant shift here might mobilize the will to move consumption practices in a more ecologically sustainable direction” (page 367).

Does the EWH—through its contradictory actions of blackboxing, mediating, and bringing together—have the potential to contribute to such a politics of consumption by making the ‘interconnectedness’ between humans and materiality visible?

The EWH ties consumer culture, economy, and environment together in an association that has the ability to bring new meaning from formerly blackboxed categories (EEA, 2009, page 6):

“Preventing waste by limiting unnecessary consumption [is one form] of strict avoidance of waste. Waste prevention also encompasses actions that can be undertaken once a product reaches its end-of-life: rather than discarding the product, the final user should consider reuse, repair or refurbishment as options.”

It is in the potential for making the life cycle of products relevant for consumption that the EWH can be discussed in terms of the inorganic vitality of Bennett (2004). The EWH associates the design, production, commodity, and waste phases of materials by investing products with genealogies and futures, and thereby performs an aspect of “the recurring trope of the ‘magical’ revalorization of waste” (Cooper, 2010, page 1040). In this, it connects to a host of other consumer and corporate tendencies associated with quality, branding, identity, responsibility, information, and marketing. The agency of the EWH can here be understood as connecting commercial interests with the functional and symbolic aspects of consumption through environmental narratives. Conditions of production potentially become an important characteristic for consumer practices—or this is what EU policy predicts (EEA, 2009). By being equipped with life-cycle information, products could generate links backwards and forwards from a commodity phase, helping consumers to make ecological sense of consumption by informing them of where products come from and where they are heading next (cf Alexander and Nicholls, 2006; Jackson, 2006). Such connections to different aspects of product life cycles would animate products in a way that blackboxed products have little potential to do.

The Waste Council (4 October 2010) reasons along these lines when it draws up visions for future national waste-management strategies. In addition to addressing issues of material assemblage and circulation, such as intelligent design (“every material in the right place/product”), design for disassembly and producers as ‘lifecycle managers’, it also translates these issues in thing-power terms. The result is that the EWH is envisioned to direct attention to “product rucksack responsibility”, that is, how consumption is conditional upon consequences removed in time and space. The Waste Council also anticipates that the EWH will facilitate the ethic of not dispersing toxins, how this will redistribute time spent on consumption towards time spent on social interaction, and how a major social norm will come into being to create new things from old things. The council predicts how human–product relationships will focus on function rather than owning, and even how individuals will come to “spend lavishly on love instead of wasting resources”. The sociomateriality of waste as it is articulated by the Waste Council would affect a comprehensive range of aspects of consumer societies.

Conclusions

With its grounding in the need for vertical and horizontal integration, the EWH illuminates the conditions and consequences of precommodity and postcommodity phases of products. It questions the logic of environmental overflow. In our analysis we have argued that the EWH makes a generic waste concept increasingly meaningless. Ordered material can be used as input in production processes, connecting the generation of waste through consumption to the creation of products. But this also has a legitimising effect on consumer practices. If the potential for disassembly and sorting is optimised in a commodity through its design, consumption might become self-generating. By defining waste as a resource, and organizing material circulation according to the EWH, incitements to decrease the rate of consumption diminish.

Consumption might become constructed as an environmental act. EU environmental policy carries within itself a potential rebound effect (Hertwich, 2005) by decoupling the environmental effects of waste generation and not waste generation in absolute terms from economic growth. In this, EU environmental policy is aligned with a notion of ecological modernization that blackboxes the economy by assuming capitalist accumulation strategies.

The least attractive option, landfill, is neither economically nor ecologically preferable since materials are inactivated instead of circulated. Incineration with energy recovery and recycling promote the maximized use of waste as a production resource. But the EWH presents different incitements to different stakeholders in waste governance. If all waste-management practices were to become deregulated, the economic incitement would be also to maximize the amount of circulated materials. The bond between economy and ecology would break, and the EWH would lose its present function when applied to the municipal stakeholders in this study. For reuse and the prevention of waste to make sense, the economic and environmental rationales of waste-management companies must be coconstitutive. But, as shown by Alexander (2005), waste prevention is easily given low priority. The decoupling of the environmental effects of waste from economic growth within an ecological modernization paradigm favours increasing material circulation since this is how environmental success is measured. Reducing the amount of circulated material under these conditions is a nonvalue.

Nevertheless, the analysis implies two things that point towards the sustainability potential of the EWH. First, that ways of organising material circulations affect practices and material ontologies (cf Gregson, 2009). Linear material streams reflect a dichotomous understanding of society and nature. Circular regimes of material flows that pay attention to material assembly and disassembly challenge such a dichotomous understanding. If circular material flows are combined with a strong discursive element that connects material circulations with a sociomaterial context, the dichotomy between society and nature becomes difficult to uphold.

The EWH does this. Therefore, second, and consequently, the EWH articulates the material politics of sustainability in consumer societies (Spaargaren and Cohen, 2009). Waste-management companies are instrumental in this achievement because this is where much 'waste' is organized. Having developed from end-of-pipe sites of waste disposal to sites of material transformations, revalorization, and circulation, they are already performing the 'unblackboxing' of material management. For example, companies A and B invite school classes to their facilities, arrange waste-as-art exhibitions, and in other ways instruct consumers on how to contribute to value-creating material transformations. They unblackbox by making visible and narrating materials. The EWH principles of reuse and prevention provide the means to increase the intensity of such efforts. The prevention of waste and the reuse of products, coupled with repair and maintenance, potentially challenge the economy/society versus environment/nature divide by increasing the knowledge content of products through life-cycle information in the form of consumer-oriented narratives. EU policy suggests new practices, such as systemic inclusion of second-hand retail facilities in urban areas and a wide network of maintenance and repair workshops. This would generate social benefits as well as being more energy efficient than recycling (King et al, 2006). The Swedish EPA has begun to articulate such thinking as well. Swedish Waste Management argues explicitly for the inclusion of material management from the beginning of urban physical planning processes [aiming towards 'zero-waste cities' (Zaman and Lehmann, 2011)], and waste-management companies have the means to materialize it.

The principle for the emergence of a sociomateriality of waste characterized by engagement between consumers and product life cycles—and thereby a new politics of consumption—is to stretch the links embedded in materials as far as possible, both backwards and forwards,

from the commodity phase. This is done through consumption, but consumption that includes narratives of material transformation, circulation, and revalorization (Cooper, 2005; Lane and Gorman-Murray, 2011). Here, municipal waste-management companies have two distinct prosustainability characteristics: they deal with waste, and their environmental rationale coconstitutes their commercial interest. Investing products with knowledge in a postcommodity phase of materials—for example, by featuring food waste as public transport fuel—is for these companies environmentally motivated. How the knowledge contents of products could be increased from the ‘waste end’ of things is to a degree a matter of legislation and economic rationales, but hints can be found in how the waste-management companies in this study employ interactive computer games to narrate material transformations, use popular culture semantics to encourage households to participate in the sorting of materials, facilitate reuse by organizing second-hand sales of products, and make visible through public advertisement how food waste becomes biofuel for public transportation. The point is to extend the understanding of waste management as a service of public interest to include not only practices of design and production but also practices of consumption. If this principle of material management is followed through, it would affect the politics of consumption and sustainable development.

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References

- Alexander A, Nicholls A, 2006, “Rediscovering consumer–producer involvement: a network perspective on fair trade marketing” *European Journal of Marketing* **40** 1236–1253
- Alexander C, 2005, “Value: economic valuations and environmental policy” in *A Handbook of Economic Anthropology* Ed J Carrier (Edward Elgar, Cheltenham, Glos) pp 455–471
- Bartl A, 2011, “Editorial. Barriers towards achieving a zero waste society” *Waste Management* **31** 2369–2370
- Bennett J, 2004, “The force of things: steps towards an ecology of matter” *Political Theory* **32** 347–372
- Blumenthal K, 2011, “Generation and treatment of municipal waste” *Eurostat Statistics in Focus* **31** 1–12
- Boyle M, 2003, “Scale as an ‘active progenitor’ in the metamorphosis of the waste management hierarchy in member states: the case of the Republic of Ireland” *European Planning Studies* **11** 481–502
- Braungart M, McDonough W, 2009 *Cradle to Cradle: Re-making the Way We Make Things* (Vintage Books, London)
- Buclet N, Godard O, 2001, “The evolution of municipal waste management in Europe: how different are national regimes?” *Journal of Environmental Policy and Planning* **3** 303–317
- Bulkeley H, Watson M, Hudson R, Weaver P, 2005, “Governing municipal waste: towards a new analytical framework” *Journal of Environmental Policy and Planning* **7** 1–23
- Bulkeley H, Watson M, Hudson R, 2007, “Modes of governing municipal waste” *Environment and Planning A* **39** 2733–2753
- Callon M, 1998a, “Introduction: the embeddedness of economic markets in economics”, in *The Laws of the Market* Ed. M Callon (Blackwell, Oxford) pp 1–57
- Callon M, 1998b, “An essay on framing and overflowing: economic externalities revisited by sociology”, in *The Laws of the Market* Ed. M Callon (Blackwell, Oxford) pp 244–269
- Callon M, 1999, “Actor-network theory—the market test”, in *Actor Network Theory and After* Eds J Law, J Hassard (Blackwell, Oxford) pp 181–195
- Commoner B, 1997, “The relation between industrial and ecological systems” *Journal of Cleaner Production* **5**(1–2) 125–129
- Cooper T, 2005, “Slower consumption: reflections on product life spans and the ‘throwaway society’” *Journal of Industrial Ecology* **9**(1–2) 51–67

-
- Cooper T, 2010, "Burying the 'refuse revolution': the rise of controlled tipping in Britain, 1920–1960" *Environment and Planning A* **42** 1033–1048
- Corvellec H, Hultman J, 2012, "From 'less landfilling' to 'wasting less'" *Journal of Organizational Change Management* **25** 297–314
- Corvellec H, Bramryd T, Hultman J, 2012, "The business model of Swedish waste management companies" *Waste Management and Research* **30** 512–518
- Cossu R, 2009, "Editorial. Driving forces in national waste management strategies" *Waste Management* **29** 2797–2798
- Davies A, 2008 *The Geographies of Garbage Governance* (Ashgate, Aldershot, Hants)
- Davoudi, S, 2000, "Planning for waste management: changing discourses and institutional relationships" *Progress in Planning* **53** 165–216
- Deutz P, 2009, "Producer responsibility in a sustainable development context: ecological modernization or industrial ecology?" *The Geographical Journal* **175** 274–285
- Deutz P, Frostick L E, 2009, "Editorial. Reconciling policy, practice, and theorizations of waste management" *The Geographical Journal* **175** 247–250
- Deutz P, Neighbour G, McGuire M, 2010, "Integrating sustainable waste management into product design: sustainability as a functional requirement" *Sustainable Development* **18** 229–239
- Douglas M, 2003/1966 *Purity and Danger: An Analysis of Concept of Pollution and Taboo* (Routledge, London)
- EC, European Commission, Brussels
undated, "EU Waste Policy. The story behind the strategy", <http://ec.europa.eu/environment/waste/strategy.html>
- 1999a, "EU Focus on Waste Management", <http://europa.eu.int>
- 1999b, "Directive 1999/31/EC of the European Parliament and the Council on the landfill of waste" *Official Journal of the European Union* **L 182/1**, 26 April
- 2000, "Directive 2000/76/EC of the European Parliament and the Council on the incineration of waste" *Official Journal of the European Communities* **L 332/91**, 4 December
- 2003 COM(2003) 302 final *Integrated Product Policy: Building on Environmental Life-cycle Thinking*, 18 June
- 2005, "COM(2005) 666 final *Taking Sustainable Resource Use Forward: A Thematic Strategy on the Prevention and Recycling of Waste*, 12 December
- 2007, "COM(2007) 59 final *Interpretive Communication on Waste and By-products*, 21 February
- 2008a, "Directive 2008/98/EC of the European Parliament and the Council on waste and repealing certain documents" *Official Journal of the European Union* **L 312/3**, 19 November
- 2008b, "COM(2008) 397 final *The Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan*, 16 June
- 2008c, "Directive 2008/1/EC of the European Parliament and the Council concerning integrated pollution prevention and control" *Official Journal of the European Union* **L 24/8**, 15 January
- EEA, 2007 *The Road from Landfilling to Recycling: Common Destination, Different Routes* European Environment Agency, Copenhagen, <http://www.eea.europa.eu/theme/waste>
- EEA, 2009 *Guidelines on Waste Prevention Programmes* European Environment Agency, Copenhagen, <http://eea.europa.eu/themes/waste>
- Ehrenfeld J R, 1997, "Industrial ecology: a framework for product and process design" *Journal of Cleaner Production* **5**(1–2) 87–95
- Erkman S, 1997, "Industrial ecology: an historical view" *Journal of Cleaner Production* **5**(1–2) 1–10
- Fischer C, 2011, "The development and achievements of EU waste policy" *Journal of Material Cycles and Waste Management* **13** 2–9
- Frosch R A, 1992, "Industrial ecology: a philosophical introduction" *Proceedings of the National Academy of Sciences of the United States of America* **89** 800–803
- Fuentes C, 2011 *Green Retailing: A Socio-Material Analysis* (Lund University Press, Lund)
- Gertsakis J, Lewis H, 2003 *Sustainability and the Waste Management Hierarchy*, EcoCycle, Victoria
- Gille Z, 2007 *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Post Socialist Hungary* (Indiana University Press, Bloomington, IN)

- Gille Z, 2010, "Actor networks, modes of production, and waste regimes: reassembling the macro-social" *Environment and Planning A* **42** 1049–1064
- Graham S, Thrift N, 2007, "Out of order: understanding repair and maintenance" *Theory, Culture and Society* **24**(3) 1–25
- Gregson N, 2009, "Recycling as policy and assemblage" *Geography* **94** 61–65
- Gregson N, Crang M, 2010, Guest editorial: "Materiality and waste: inorganic vitality in a networked world" *Environment and Planning A* **42** 1026–1032
- Gregson N, Watkins H, Calestani M, 2010, "Inextinguishable fibres: demolition and the vital materialisms of asbestos" *Environment and Planning A* **42** 1065–1083
- Harper E M, Graedel T E, 2004, "Industrial ecology: a teenager's progress" *Technology in Society* **26** 433–445
- Head L, 2008, "Is the concept of human impacts past its use-by date?" *The Holocene* **18** 373–377
- Hertwich E G, 2005, "Consumption and the rebound effect" *Journal of Industrial Ecology* **9**(1–2) 85–98
- Jackson T, 2006, "Challenges for sustainable consumption policy", in *The Earthscan Reader in Sustainable Consumption* Ed. T Jackson, (Earthscan, London) pp 109–126
- Jänicke M, 2008, "Ecological modernization: new perspectives" *Journal of Cleaner Production* **16** 557–565
- Kennedy G, 2007 *An Ontology of Trash: The Disposable and Its Problematic Nature* (State University of New York Press, New York)
- King A M, Burgess S C, Ijomah W, McMahon C A, 2006, "Reducing waste: repair, recondition, remanufacture or recycle?" *Sustainable Development* **14** 257–267
- Lane R, Gorman-Murray A, 2011, "Introduction", in *Material Geographies of Household Sustainability* Eds R Lane, A Gorman-Murray (Ashgate, Farnham, Surrey) pp 1–16
- Laporte D, 2002 *History of Shit* (MIT Press, Cambridge, MA)
- Latour B, 1987 *Science in Action* (Harvard University Press, Cambridge, MA)
- MacKillop F, 2009, "The construction of 'waste' in the UK steel industry" *Journal of Environmental Planning and Management* **52**(2) 177–194
- Murphy J, Gouldson A, 2009, "Environmental policy and industrial innovation: integrating environment and economy through ecological modernization", in *The Ecological Modernisation Reader* Eds A Mol, D A Sonnenfeld, G Spaargaren (Routledge, Abingdon, Oxon) pp 275–294
- O'Brien M, 2008 *A Crisis of Waste? Understanding the Rubbish Society* (Routledge, London)
- Pongrácz E, Pohjola V, 2004, "Re-defining waste, the concept of ownership and the role of waste management" *Resources Conservation and Recycling* **40** 141–153
- Princen T, 2006, "Consumption and its externalities: where economy meets ecology", in *The Earthscan Reader in Sustainable Consumption* Ed. T Jackson (Earthscan, London) pp 50–66
- Rankin W J, 2011 *Minerals, Metals and Sustainability* (Commonwealth Scientific and Industrial Research Organisation, Collingwood)
- Roberts P, 2004, "Wealth from waste: local and regional economic development and the environment" *The Geographical Journal* **170**(2) 126–134
- Shove E, 2006, "Efficiency and consumption: technology and practice", in *The Earthscan Reader in Sustainable Consumption* Ed. T Jackson (Earthscan, London) pp 293–304
- Spaargaren G, Cohen M J, 2009, "Greening lifecycles and lifestyles: sociotechnical innovations in consumption and production as core concerns of ecological modernisation theory" in *The Ecological Modernisation Reader* Eds A Mol, D A Sonnenfeld, G Spaargaren (Routledge, Abingdon, Oxon) pp 257–274
- Swedish EPA, 2009 *Principles of Sustainable Waste Management* (in Swedish), The Swedish Environmental Protection Agency, Stockholm, <http://www.naturvardsverket.se/avfall>
- Swedish Waste Management, 2011 *Waste Statistics* (in Swedish), <http://www.avfallsverige.se/statistik/>
- UN, 2010 *Solid Waste Management in the World's Cities 2010* (Earthscan, London)
- Waste Council, 2006–2010, meeting minutes, The Swedish Environmental Protection Agency, Stockholm, <http://www.naturvardsverket.se/avfall>
- Waste and Environment* 2008–2010, trade publication for Swedish Waste Management, Malmö

-
- Watson M, 2009, "Waste management", in *International Encyclopedia of Human Geography* Volume 12, Eds R Kitchin, N Thrift (Elsevier, Oxford) pp 195–200
- Watson M, Bulkeley H, 2005, "Just waste? Municipal waste management and the politics of environmental justice" *Local Environment* **10** 411–426
- Watson M, Bulkeley H, Hudson R, 2008, "Unpicking environmental policy integration with tales from waste management" *Environment and Planning C: Government and Policy* **26** 481–498
- Zaman A U, Lehmann S, 2011, "Challenges and opportunities in transforming a city into a 'zero waste city'" *Challenges* **2** 73–93

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