Challenging the 'Refuse Revolution': War, Waste and the Rediscovery of Recycling, 1900-1950

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ABSRACT. *This article argues that the experiences of war played an important role in reshaping the social practices of waste disposal between 1900 and 1950. Before 1914 recycling was declining in the face of the challenge presented by the 'refuse revolution', the emerging culture of hygiene, and the rise of incinerator technology. This decline was partially reversed between 1914 and 1945 by the wartime imperative to efficiently utilise resources. The need to preserve both valuable shipping space and foreign currency reserves compelled wartime governments to seek stricter recycling measures from local authorities. One consequence of this was that waste management professionals, whose duties had previously been confined to the maintenance of the public health, suddenly reconstituted themselves as experts in resource management. In turn they transformed their attitude to waste, developing new salvage technologies that promised to increase levels of reuse and recycling. During this period there emerged a brief challenge to the nascent throwaway society. However, wartime salvage efforts did not prosper with the removal of the campaign for national survival. Even the economic problems of the late-1940s proved insufficient to maintain the level of recycling without the drive provided by patriotism and Britain quickly slipped back into a throwaway culture.*[1]

I

Recycling has become a pillar of the contemporary search for that utopia we call the 'sustainable society'. In the age of environmentalism recycling is presented as a

means of forging a new relationship between the consumer society and the waste it inevitably generates, a relationship that holds at bay the ecological implications of uncontrolled, unbounded consumption. Recycling is thus perceived to act as a brake upon the entropic results of runaway capitalism: a modern-day alchemy that can transmute increasing mounds of useless stuff into things of value. But, as so often, the claims of the good ship novelty come to grief on the rock of history. The current fad for recycling is not new. The municipal reclamation of domestic waste was pioneered in the early twentieth century, which saw efforts to encourage the 'salvage' or 'utilisation' of refuse as a means of coping with the problems of growing urban waste and of providing raw materials during wartime crises. This 'rediscovery' of recycling was partially an attempt to revive an older sense of the value of waste, which had been undermined by a combination of industrialisation, urbanisation and the professionalisation of waste disposal in the course of the 'refuse revolution'.

Recently, historians have displayed growing interest in the politics and culture of consumer society.[2] However, little has been said about the environmental consequences of consumerism in generating the endemic waste-crisis of the twentieth century. It is worth remembering, after all, that the 'consumer' or 'affluent' society was often referred to as the 'throwaway society'. The rise of mass consumerism certainly affected attitudes to waste and value. Susan Strasser has shown that recycling was deeply embedded in the social and economic practices of western societies before the emergence of consumerism in the mid-nineteenth century. The improvisation of items from second-hand materials, or *bricolage*, was a practice not merely determined by poverty but which formed part of a

broader culture of domestic handwork.[3] Strasser demonstrates that, from the end of the nineteenth century, this culture of recycling was declining in the face of an assault by new products, new modes of shopping and new advertising techniques. Waste was central to the new culture of consumerism, whose success was founded upon the exploitation of new identities partly forged through the marketing of packaged consumer goods.[4] Strasser observes that in the twentieth century disposable goods became symbols not just of affluence, but also of abstract ideas like freedom and hygiene. The development of new packaging technologies, combined with the general increase in consumption, contributed to a revolution in the amount, and nature, of household waste.

It would be unwise to place all the blame for the twentieth century's wasting habits upon the rise of consumerism; after all, many of the changes Strasser observes in America did not become significant in Britain until the 1950s. Ideas have also played an important role in the making of the throwaway society. As John Scanlan has recently observed, there are deep metaphysical and ideological roots to the twentieth-century's obsession with waste and disposal, which are inherent in the ideas of modernity and progress.[5] To understand fully the social tendency to waste, we need to appreciate the structures of intellectual and ideological organisation that have both propelled and accompanied economic change, and which helped to create what may be called the garbage instinct. It has long been recognised that disposal is partly a normative ritual, an act of judgement between the valuable and the worthless, the ordered and the disordered.[6] The culture of *bricolage*, embodied in domestic housework or the informal activities of urban scavengers, represented one set of normative attitudes to waste. These norms were

upset after 1870 by what Professor Luckin has termed the 'refuse revolution': the term he gives to the professionalisation and municipalisation of waste disposal between 1870 and 1914.[7] The 'refuse revolution' was not, however, the last word in sanitary reform. Between 1914 and 1950 the aims and ethics of disposal, as they had been established by urban sanitary reformers down to 1914, faced new challenges in the context of a global political and economic crisis. The outcome of this challenge would help to shape Britain's emergence as a 'throwaway society' after 1950.

II

For the first three-quarters of the nineteenth century the recycling of waste products was a fairly common activity. In many urban areas domestic refuse was collected by scavengers and dustmen, and taken to dust-yards of the kind that inspired Dickens's novel *Our Mutual Friend*. These dust-yards were staffed mainly by women who were paid to rummage through the filth of cities and towns in search of reusable items such as brass, rags and waste paper. In 1900 Emily Hobhouse, who was working as a researcher for the Women's Industrial Council, described conditions in London's riverside dust-yards for the *Economic Journal*:

> A man shovels the newly brought refuse into her sieve, she sifts, and then rapidly sorts the remainder before a fresh supply is thrown. Grouped about each sifter some half dozen baskets stand ready to receive the divers sortings. Rags, bones and string, cork, boots and paper, coal, glass and hard core are all thrown into these receptacles. Dust flies thick into the woman's face, and permeates her

clothing and her hair; but the open air is health-giving, and she works on unheeding.[8]

As 'health-giving' as such air may have been, the dust-yards were nonetheless facing increasing criticism from urban reformers by the end of the century. The yards were understandably attacked for being unhygienic, a view encouraged by the lingering influence of miasmatic epidemiology. In a letter to *The Times* of 1883, one complainant described a Battersea dust-yard and the noxious smells emanating from it, and argued that 'a more ingenious method for distributing infection could not be devised'.[9] Concern with the health effects of living in close proximity to a yard continued into the new century. In 1906 the sanitary engineer A.E. Abbott declared that 'the practice of sorting is [also] to be condemned, not only in the interest of those employed in the work, but of the public generally, more especially if the sorting is done in the neighbourhood of dwelling houses'.[10]

An equal concern was expressed over the place of women in the yards. Dust-yards employed women in occupations increasingly described as 'disgusting, degrading and unhealthy'.[11] They provided potent images of women in a sea of filth; a visit to the yards would find women and girls 'standing up to their waists, if not higher' while 'the foul odours awaiting sorting, are not only breathed in by these human beings, but may, and often do, become a nuisance to surrounding neighbourhoods'.[12] The concern that dust sorting was 'degrading' reflected the growing assumption that waste handling was not

acceptable work for a woman.[13] In 1903 the engineer, and advocate of incineration, W.F. Goodrich, succinctly expressed his distaste for the dust-yard:

> Within five minutes of the Strand a sorting and sifting process is carried on at a wharf on the South side of the river. I recently spent half an hour there and watched the process. I could not help feeling sorry for those women who thus sort and sift the filth of those more fortunate. I also wondered how such a filthy and degrading process could have any advocates at all in the light of our modern sanitary science.[14]

Despite his admirable concern for the well-being of the women, it is doubtful whether dust-women viewed matters in quite the same way. Emily Hobhouse claimed that most of the women wanted to keep their work, though they preferred to be brought under the regulation of the Factory Acts.[15] Dust-women therefore took the pragmatic line that legal protection, rather than unemployment, offered the best opportunity for improving their position. Hobhouse stated that dust-yard work was the only work available to many poor women, and underlined the importance of the dust-women in creating value out of waste, calling it a 'veritable romance'. The 'romance' stopped, of course, at the point where women realized in wages the value they had made. Full-time women workers in the dust-yards of London earned no more than fifteen shillings a week, a sum more commonly dwindling to ten or twelve shillings.[16]

If the dust-yards were increasingly seen as sites unsuited to the employment of women, then their reputations also suffered from the administrative and technological changes accompanying the reform and professionalisation of local government in the nineteenth century.[17] The rise of Progressivism in local government from the 1890s further intensified these processes as Progressive local authorities, inspired by the example of the London County Council, sought to restrict the use of contractors and to close down the dust-yards, taking responsibility for the collection and disposal of household waste. As John Clark has shown, local authorities were assisted in exerting control over waste disposal by the arrival of a new technology, the incinerator or dust-destructor.[18] The first municipal dust-destructors began operation in the 1870s, but the technology did not become widespread until the 1890s. Thereafter, destructors quickly spread to nearly every large town in the country. Progressives proved enthusiastic advocates of refuse destruction, seeing in the purificatory fires of the incinerator a hygienic and progressive technology that enabled refuse to be quickly removed from homes and neutralised as a source of disease.[19] In turn, incineration provided the opportunity for the moral regeneration of urban populations in new clean, disease free cities.[20]

Concerns about hygiene, and the image of dust-destruction as a modern, progressive technology, fed into growing criticism of recycling as an incomplete means of disposal. In order to generate an orderly urban environment it was necessary to make waste disappear completely and only incineration, it was claimed, offered such a solution. In 1903 W.F. Goodrich concluded that the utilisation of waste should be rejected by

modern local authorities on the grounds that 'the refuse is *not finally disposed of*, the residuum is not rendered innocuous, the question of sanitary disposal is not met it is dodged'.[21] Worse still, the market for waste products was so variable that efforts at waste utilisation were 'trying to save something that isn't worth saving after it is saved', a waste of time and money.[22] Recycling lacked finality, and its dependence upon creating markets for salvageable materials, which required storage before their value could be realised, made it a potential seedbed for disease. In contrast, incineration apparently achieved the instant disappearance of waste. In fact, in terms of pollution, incineration created as many problems as it solved, especially solid waste, in the form of clinker and ash, and noxious smoke and fumes. At the turn of the twentieth century, however, these problems were generally ignored.

Incineration was not without its critics. For example, the public health journal *Practitioner* debated the merits of what it called 'cremation', coming to the conclusion that utilisation by mechanical sorting was preferential to tipping and incineration as a less wasteful and costly method.[23] Observing the operations in Chelsea of the Refuse Disposal Company, a dust-yard that employed a simple cylindrical screening method, the journal opined:

> The principle adopted and patented by the Company is that of *utilisation* instead of, as hitherto, *destruction*; and the success of the experiments which have been carried out has been so great as to warrant the statement that every particle of the "dust" is converted by the system into products having a commercial use and

value, and, instead of being a dangerous and costly nuisance to be got rid of at any price, the dust becomes a valuable raw material, and serves a distinct purpose in the economy of our civilisation'.[24]

By removing the need to employ controversial female labour mechanical sorting methods offered a potential lifeline to recycling, but they were not to be taken up until professional attitudes to waste were challenged after 1914.

III

After 1914 the concept of 'waste', as it was used by the cleansing officials of municipal authorities, developed to include new ideas about the efficient use of raw materials. This change in attitude is directly attributable to wartime experience. In 1921 Marylebone Borough Council's highways engineer, James Gair, observed that, between 1914 and 1918, the realisation that 'large quantities of waste paper, rags, bones, metals, etc, which were urgently required for national purposes, were being destroyed or wasted' had undermined incineration as 'the only sanitary method of dealing with this [refuse] problem'.[25] The measures taken during the First World War to promote salvage were rather haphazard. It was not until 1918, for example, that the first efforts were made to implement a national salvage effort. By this stage many local authorities had already taken the initiative in salvaging useful items such as cotton and wool waste, which could be used in the manufacture of cloth uniforms and blankets.[26] Such initiatives were encouraged by the interruption of trade after 1914, which increased prices for recovered waste materials and created a temporary boom in the waste recovery and scrap trades.

With an eye on the profits to be made from waste local authorities established collection and sorting regimes for the recovery of rags, ferrous and non-ferrous metals and organic matter from household refuse. Projects promoted by civil society or the armed forces, such as the recovery of waste foodstuffs, also encouraged the development of a wider culture of reuse.[27] It was not until the creation, in March 1918, of the National Salvage Council that the government attempted to organise such activity. The National Salvage Council was charged with encouraging local authorities in the utilisation of waste products at a time when 'under the pressing demands for certain goods, waste material has reached a high value', in so doing its prime aim was to conserve national resources and reduce the shipping tonnage required for imports.[28] Although largely an exhortatory and propagandist organisation, the National Salvage Council had an important influence on spreading the salvage message beyond existing centres of activity.[29]

During the Second World War salvage efforts by local authorities were of even greater importance to the overall war effort, and they were much better organised and more widespread. This was party because of the greater extent of disruption to Britain's international trade, but also due to the example of earlier salvage efforts which encouraged more decisive activity by central government to encourage salvage. In October 1939 an appeal was issued to all local authorities asking them to modify their refuse disposal arrangements in order to ensure the separate collection of reusable materials, especially waste paper, ferrous and non-ferrous metals, bones and kitchen waste.[30] The government created a Salvage Department within the Ministry of Supply under the leadership of H.G. Judd, an accountant who had earlier served in the Ministry

of Munitions.[31] His deputy was J.C. Dawes, the Inspector of Cleansing at the Ministry of Health and a longstanding proponent of recycling.[32] The Salvage Department required local authorities in England with populations over 10,000 to make monthly returns of their salvage efforts and pressured them to adapt their collection methods to salvage principles. Dawes recalled in 1947 the way in which many local authorities sought to fulfil the new requirements:

> In the majority of districts the new salvage service was grafted on to the existing refuse-collection service, and it soon became quite usual to see the refuse-collection vehicles festooned with bags and other containers carrying certain waste materials separately, instead of in the refuse in the ordinary way. As time went on "salvage" trailers, drawn behind the refuse-collection vehicles were introduced. This proved to be one of the best and most practical, of the many methods of collection which were used. In some districts entirely separate salvage collection services were introduced to collect waste paper, rags, glass, etc., from dwelling-houses, and, of course, separate vehicles were necessarily allocated for the collection of kitchen waste.[33]

In some localities 'salvage shops' were established which sold reclaimed goods, and 'salvage stewards' were appointed from among the local populace with responsibility for encouraging their neighbours to participate in salvage schemes by pre-separating waste products.[34] Initially the government was content to rely upon exhortation and voluntary endeavour, but evidence that many local authorities were ignoring the call for salvage (in

early 1940 only 600 of the 1,050 local authorities required to make returns had established salvage schemes) eventually forced the government's hand.[35] Larger local authorities were compelled to collect salvage from the middle of 1940, and general compulsion was introduced in 1941.[36] The overall performance of salvage during the period between October 1939 and July 1947 can be seen in table 1.

Table 1. Materials recovered through local authority salvage schemes, October 1939- July 1947. Source: *Public Cleansing*, Nov. 1947, p. 120.

Materials	Tons	Income Received (£)
Waste Paper	2,141,779	12,045,210
Scrap Metals	1,585,921	3,188,121
Textiles	136,193	1,628,506
Bones	68,695	285,649
Domestic Kitchen Waste	2,368,485	5,613,869
Miscellaneous (fuel, cinder, glass, etc)	2,546,005	2,359,926
Totals	8,896,012	26,247,403

During the Second World War in particular, the language of anti-waste and thrift came to the fore. 'In war-time', *The Scotsman* proclaimed, 'it is necessary to exercise the strictest economy in the use of our resources, and the careful collection of waste materials is a humble, but useful, way of contributing to the national effort'.[37] An intense propaganda campaign encouraged the public to participate in salvage schemes, and employed all the modern apparatus of public persuasion: posters, radio broadcasts, press

notices, leaflets and cinema films. The government co-opted voluntary services and women's organisations, especially the Women's Voluntary Service, in order to make a direct appeal to housewives with a leafleting campaign.[38] In Edinburgh women's organisations canvassed 20,000 households for the local authority, encouraging participation in the salvage drive and giving helpful advice to householders on collection times and the sorts of materials sought.[39] Salvage thus became a useful way of encouraging national participation in 'The People's War', as well as of integrating the domestic economy with the struggle on the home front.[40] The Minister of Supply, Herbert Morrison, was advised on salvage organisation by a specially appointed committee of women MPs.[41]

IV

Wartime experiences promoted the re-evaluation of waste by compelling the adoption of new methods and attitudes; one expert summed up the revelation of recycling in 1922, 'In these days when we hear of salvage schemes here, and screening plants there, not only talked about, but actually in being, it is evident that burning refuse in a destructor is not the height of perfection it was once considered to be'.[42] In April 1921, *The Scotsman* enthused over 'ashbin thrift' observing that 'until quite recently few thought of doing anything with this refuse beyond burning or "tipping" it. Now, as the result of the war, schemes are being advocated whereby it may be turned towards the public utility'.[43] This change of attitude was partly founded upon the belief that large profits could be derived from the collection and sale of waste materials: claims of savings of between £15,000 and £50,000 on normal disposal expenses were made.[44] In 1919 a

correspondent to the professional journal *Cleansing Superintendent*, writing under the pseudonym 'Metro', observed that 'quite apart from the large amount of money which has been earned by salvage, it has been an eye opener to see what there was in house refuse'.[45] This now seems a rather surprising admission by someone who claimed the status of an expert in waste disposal, but it demonstrates how deeply the prioritisation of rapid disposal had embedded itself during the 'refuse revolution'. Before 1914, the exact contents of house refuse was unknown, few bothered to investigate rubbish or to look into the contents of household bins. Refuse was literally to be put out-of-sight-out-of-mind. The 'refuse revolution' had not increased the understanding of waste, though it had increased the fear of it. By encouraging the recovery of resources from waste, the First World War forced cleansing superintendents to immerse themselves in waste, to learn more about its composition and its relationship to household practices. In a very real sense, therefore, 'waste' as physical material with its own characteristics and potential uses was a wartime discovery.

This challenge to existing ideas of waste forced cleansing superintendents to consider whether many of their pre-war activities had not actually contributed to the making of a wasteful society. The question arose whether the 'refuse revolution' itself had been a mistake, or, at the least, had been misdirected. In 1919, Frederick Talbot observed:

> During the past few years no effort has been spared to improve the health and well-being of the community. Laws innumerable have been passed compelling the

> mitigation of nuisances and the removal of menaces to hygiene. These efforts are laudable, but, while they may have achieved the desired end, they have been directly responsible for many other shortcomings. The greatest of these is waste, more especially so as it affects the household'.[46]

Talbot identified the introduction of the dust-bin and the regular collection of rubbish as a key component in the creation of 'household extravagance', the bin was 'the harbour for much domestic refuse, which, under previous conditions, would never have been so summarily discarded'.[47] 'Devout worshippers of hygiene', he argued, had forced out of operation the system of dust-picking and scavenging of pre-war dust-yards and substituted incineration, the result was uncontrolled waste.[48] Talbot's reflections are revealing of an increasingly self-critical attitude taken to the role that the technology of the 'refuse revolution' had played in making a wasteful society.[49] Before 1914, both the dustbin and the dust-destructor had represented the *acme* of efficient disposal, and had contributed to creating forgetfulness of waste, an attitude of thoughtless disposal.

From 1914 it became increasingly common to assert that future public cleansing should not just remove refuse, but also promote economic efficiency through some form of reuse. This was related to the presumed social and economic consequences of wasting resources. It represented a concern not present in pre-war discussion of the domestic refuse problem. Birmingham's cleansing superintendent, James Jackson, observed in 1919:

> The exigencies of the war soon constrained us to become economical in the use of means and of materials, and it would be comparatively easy to give innumerable instances of prodigal waste in almost every trade and calling. The great shortage of raw materials not only rendered it imperative that waste in all directions should be avoided, but also made us consider whether what had hitherto been regarded as waste could not be utilised for the common good.[50]

James Gair similarly observed that 'salvage or utilisation had existed in various forms before 1914, but under the stress of war conditions it became an urgent necessity, from a national point of view, that a more general and organised attempt should be made to extract all useful waste material from the house refuse'.[51] Some waste management experts also began to articulate a concern with the conservation of resources. William Mortimore argued that 'If waste materials are fully utilised, it follows that the reserves of raw materials are not unnecessarily drawn upon. Is not this utilisation a duty we owe to posterity?'[52] Talbot argued that the recovery of cinders from household waste was a potentially important energy source, the exploitation of which would lead to 'an appreciable contribution to the conservation of our coal resources'.[53] Ayr's cleansing superintendent, William Strain, reiterated the role of recycling in the national economy 'as the world-wide search for raw materials increased', and the irrationality of circumstances in which, 'we were importing thousands of tons of scrap metals from abroad, while large quantities of scrap in our own country were being buried by our own cleansing departments'.[54] This municipal concern with conservation was a new phenomenon, although concerns about future raw material supplies had been raised

previously in discussion of the imperial economy.[55] In raising the question of the conservation of raw materials, cleansing experts were probably partly influenced by the utilitarian concerns of the American conservation movement.[56] The experience of war further encouraged such developments by creating clear instances of what could be achieved through improved social and economic organisation, not merely in the employment of waste materials, but also in the reduction of waste labour and reclamation of waste lands.[57] The increasing interest of cleansing superintendents in waste utilisation thus sat in a wider context of developing ideas of social and economic efficiency.

In response to this challenge to the presumptions of the 'refuse revolution', the professional language of waste inevitably began to change. Cleansing superintendents and municipal engineers increasingly chose to articulate a sense of themselves as experts in the reclamation of resources, rather than simply as disposers of waste. J.H. Codling, recalling Palmerston's aphorism that 'there was no such thing as rubbish – it is merely material in the wrong place', observed that amongst domestic rubbish 'may be noted a variety of items which, whilst in their isolated state, are probably valueless, yet gathered together in their respective classes and distributed in the right places they become a potentially valuable source of raw material to various industries'.[58] In a further outburst of Victorianism he argued that 'the underlying motive of salvage is, of course, thrift'.[59] The advocates of salvage began to suggest that the language of the waste management process itself should be altered to reflect the changing nature of their work. James Jackson, for example, recommended renaming Destructors as 'Salvage Works' or 'Waste Reclamation Works' so that, in Palmerstonian fashion, 'the coming generation may be

further educated into the principle that "there is no such thing as waste".'[60] How far this changing professional discourse of waste actually disseminated among the general public is far from certain, though some indication of wider changes in attitude can be identified. In 1920, the *Torquay Times* carried an editorial entitled 'Wealth in the Dustbin'. Before 1914 Torquay had invested heavily in incineration as its primary waste disposal technology, in 1920, however:

> Times are wonderfully changed. What was regarded in the days before the Great War as quite the ordinary thing to do is now looked upon as decidedly wrong and deserving of the severest censure…In the old days, little account was, for instance, taken of the contents of our dust-bins. They were regarded as something extremely offensive, something to be got rid of as soon as possible, something for which there was no earthly use. Today a very different view is held, at least, by those who have to do with dustbins. It has been realized that there is wealth in them, in fact it has been clearly demonstrated that amongst the miscellaneous refuse which is cast into them, there is much that will produce cheques, treasury notes and silver, and is now looked upon by many government authorities as nothing more or less than wicked waste, to cast house refuse on the tip or into the furnaces of the destructor, before it has been sorted over, and all that will produce money extracted from it.[61]

A mere change in professional attitudes to waste was, however, insufficient to secure recycling a permanent place among waste management techniques. Embedding

recycling in waste disposal practices needed favourable technological, economic and cultural conditions. New technologies were necessary, partly to minimise labour costs, and also because a return to the conditions of the dust-yard system was unpalatable. Markets for secondary materials were essential if salvage was actually to result in financial returns for local authorities and real recycling rather than simply creating mountains of sorted waste with no further use. Public participation was important to encourage the saving and sorting of useful materials, thus reducing the overall cost of salvage programmes. At another level the creation of an attitude of thriftiness towards refuse and overcoming the health fears associated with waste was necessary to ensure public participation.

V

Technological solutions to environmental problems often have ambiguous consequences, often only displacing a problem or causing new and unforeseen difficulties.[62] Dissatisfaction with the environmental consequences of existing waste disposal technologies encouraged the consideration of salvage as an alternative. The principal means of waste disposal available in the inter-war period were tipping, incineration, and dumping at sea. There were many longstanding objections to tipping on account of its unsightliness, odours, risk of fire, and related health issues. It also put disposal in the hands of the contractors who owned waste disposal sites and who often operated them with little regard for the environmental and economic impact on adjoining owners.[63] Rural authorities often vigorously, and understandably, objected to dumps being sited in their areas.[64] As we have seen, before 1914 urban local authorities had been

able to reduce their dependence upon dumping by adopting incineration, but the impact of war undermined the reputation of incineration as the best technological solution to the waste problem. Environmental concerns also increased, as the incinerator was often the source of unpleasant smoke pollution, making it difficult to site one in an urban area.[65] In 1922 a conference of metropolitan borough councils observed that destructors were increasingly criticised for their expense, the inconvenience and annoyance they presented to surrounding neighbourhoods, and their occupation of sites of commercial value.[66] In short, there was a need for a new waste disposal technique that could reduce reliance on both tipping and incineration.

The result of increasing scepticism regarding existing disposal methods was the emergence, among waste experts, of a technological eclecticism that eschewed reliance upon any single method of disposal. In this context salvage was a handy means of reducing the amount of waste that required dumping or incineration, and was increasingly seen as an element of a holistic approach to waste management. The tip and the destructor could not be abandoned entirely, but reliance upon them could be reduced through the increased use of reclamation. 'There is no single panacea', argued Birmingham's chief cleansing official James Jackson in 1919, 'It is certainly true, however, that never again will all refuse be indiscriminately passed through the destructor cells and their number will therefore be considerably reduced'.[67] The most optimistic envisaged that most refuse could be reused with only a small proportion being left over for incineration or dumping.[68]

Contributing to this eclecticism was the impetus that the First World War gave to the development of recycling technologies. These technologies relied upon the fact that, before 1950, the vast majority of household refuse consisted primarily of ash, cinders and dust from household coal fires (see table 2). It was relatively easy to sift this material from the rest of the refuse and reuse it either as a fertiliser or secondary fuel source. In the later years of the Great War a few local authorities, such as Sheffield and St Marylebone, with the encouragement of the National Salvage Council, established their own specialised salvage works based on large-scale screening of household refuse. These experiments created considerable professional interest, the President of the Institute of Cleansing Superintendents wrote in 1919 that 'the development in salvage opens out a wide field of operations, and with the necessary machinery rapid strides ought to be made in collecting articles of value from the refuse'.[69] The nature of operations at a large-scale salvage plant can be illustrated through a description of Sheffield's salvage plant. Firstly, mechanical screens were employed through which refuse was passed, bulky items having been previously removed by hand. These screens removed in turn fine dust, then larger cinders. The remaining refuse was 'picked' by hand by women who removed 'useful' items like paper, rags, bones, tins, scrap iron and glass. The valuable salvaged paper and metals were sold to commercial buyers.[70] No apparent concern was expressed at the return of the female 'dust-sorter', presumably because salvage now represented a technological advance over incineration, although the effect of the war on assumptions regarding women's work undoubtedly played a part. The capital and labour-intensity of salvage inevitably led to efforts to introduce pre-sorting arrangements in order to improve the overall productivity of the process.[71] Some municipalities began to employ differently

labelled ‘ashes’ and ‘salvage’ bins in order to maintain the quality and value of the items salved and to shorten the sorting procedure.

Table 2. Analysis of 10 tons 2 cwts of house refuse by National Salvage Council. Source: *Cleansing Superintendent*, July 1919, p. 479.

Materials	Percent	Estimated total quantity per year in England (Tons)
Fine dust	56.8	5,367,600
Cinders	30.94	2,923,830
Bricks, pots, shale	8.57	809,865
Tins	1.03	97,335
Rags	0.40	37,800
Glass	0.61	57,645
Bones	0.09	8,505
Vegetables	1.30	122,850
Scrap Iron	0.12	11,340
Shells	0.08	7,560
Paper	0.06	5,670
Total	100	9,450,000

The establishment of large municipal plants was not, however, the only means of establishing an efficient salvage scheme. Torquay provides a good example of the interest

in salvage among smaller local councils and the ways in which it could be implemented. Before 1914, Torquay, attracted by the prospect of a simple solution to a growing waste problem, had invested heavily in a dust-destructor. However, the discovery of salvage considerably altered attitudes. The impact of the war and the demand for raw materials, the *Torquay Times* noted, had 'raised values to a tremendous extent, and that which was once worth nothing, has now become worth much'.[72] In July 1919 a new refuse-sorting scheme was introduced by the borough council. Refuse was sorted at the destructor works, salvaged items were pooled to be disposed of by tender and the proceeds were divided equally between the corporation and the refuse collectors. This system adapted salvage principles to the scale and resources of a smaller local authority, and represented a glorified return to the dust-yard. In the first six months a sum of nearly £320 was realized. The *Torquay Times* enthused over the potential of recycling:

> When the actual figures of six month's collection are analyzed they prove positively amazing. There was for example a total of 107,000 bottles quite apart from those bottles which are the property of the local bottle exchange, between four and a half and five tons of rags, many thousands of tins, tons of old metal and even 21 soda siphons which most people would consider of very considerable value. No difficulty whatever has been found in obtaining a market for these things, although they are considered so valueless by most people. Even the odd tins are treated by a special process and realise a good price, one lot disposed of bringing the handsome sum of £27. These hitherto "unconsidered trifles" have, as a matter of fact, become matters of concern, seeing that their sale represents

something like £600 a year, a very large proportion of which was, up to a few months ago, lost through lack of systematic collection.[73]

A number of technical options were therefore open to local authorities attracted to the possibilities of salvage. Large urban authorities could invest in specialised large-scale plant, the cost of which might be partly reimbursed through the sale of salvaged items and savings on fees to contractors for tipping, etc. A small authority could rely on a more labour-intensive form of separation, working in co-operation with their employed dustmen. Reasonable means, therefore, existed that would have enabled the widespread implementation of a recycling system after 1918. Yet despite wide interest in salvage the adoption of recycling was never wholesale, nor even widespread. Talbot stated that many local authorities were still 'wedded to the destructor in which so much of the ratepayer's money has been sunk as to be blind to improvement', and believed that only state intervention could prevent them from 'continuing to squander potential resources of raw material.[74] Cardiff's city engineer, E.J. Elford, observed in 1918 that 'very large quantities of materials having considerable potential value are still lost by being destroyed in destructors and by being buried in tips'.[75] The simple availability of recycling technology was not sufficient to make recycling universal.

VI

For advocates of recycling, economics at first appeared to present no obstacle to its widespread adoption. Indeed, the profits to be had from wartime salvage seemed to offer hard-pressed post-war local authorities the opportunity to diminish an important

cost to local government. James Gair contended that 'salvage organised on sound business principles could be of material assistance in reducing disposal costs, and this has been an incentive for the officers in charge of such work and the local authorities to examine carefully their pre-war methods of disposal in the light of more recent developments'.[76] Profitable salvage would, he thought, need to be conducted on a centralised basis by a large-scale mechanical plant. By this means a council could ensure both the maximum exploitation of available secondary materials and the efficient removal of waste from residential properties with the minimum of capital invested. This sort of optimistic evaluation was encouraged by the immediate post-war conditions of economic boom in 1919 and 1920, when prices for salvaged raw materials were maintained at an artificial high. Frederick Talbot, for example, argued that prices would remain high after the war and that, even if they were to drop, increasing demand would continue to underpin the economics of recycling.[77] E.J. Elford was similarly convinced that 'the exercise of the greatest national economy to enable the country to carry the enormous financial burden of the war' would make waste utilisation imperative.[78] Certainly some authorities were able to generate considerable sums from refuse, helping to subsidise the ever growing cost of disposal. In 1931, Glasgow made a reported return of £6,657 on manure and salvage. Of this total, £1,073 was made from the sale of clinker to building contractors; a further £2,917 came from scrap metal and £1,068 from manure.[79] However, it is notable that these profits were themselves more than wiped out by the rocketing costs of waste disposal. In the same year as it celebrated its recycling success, Glasgow saw its overall disposal costs increase by £17,464.[80]

A few optimists believed that, even if the market prices of reusable resources were to fall, 'very much lower prices would justify a policy which is calculated to reduce in a large measure the bulk of the refuse for which no further use can be found, and the disposal of which is in the nature of dead expense'.[81] In St Marylebone it was claimed that, between November 1917 and March 1921, £11,862 had been made from salvaged materials.[82] But over £5,000 of this came from waste paper sales, a market that was particularly strengthened by wartime conditions. It was unclear whether such performance could be sustained in peacetime. Indeed, there is plenty of evidence that inconsistent demand for recycled materials detrimentally affected the adoption of salvage. One Swansea councillor expressed the practical limits on local authorities recycling efforts when, 'there was very great difficulty in getting a good price for their waste products and even the present price was bound to diminish as time went on'.[83] The unique economic conditions that had made salvage so appealing during the war quickly disappeared in peacetime. As normal channels of trade reopened, producers returned to the exploitation of virgin resources. Paper manufacturers were one example of this trend; one Birmingham councillor complained that 'paper makers had a ready market for their product irrespective of the cost and they were ready to buy [pulp] from Norway at any price that was asked'.[84] He continued that the only means of inducing municipalities to take up the collection of waste paper was to give them a settled market; the government should enforce the use of a certain proportion of waste paper in exchange for the right to import pulp from abroad.

Yet, in the absence of the administrative stomach for dramatic interventions in the secondary material market, demand for waste paper and other materials remained erratic.[85] Consequently, the ability of local authorities to exploit recycling continued to depend upon local economic conditions. Birmingham, a leading recycling town, had the advantage of local brickfields which provided a constant market for sifted dust.[86] Thus, while there remained those who, like E. Hobson the cleansing superintendent of Leicester Borough Council, believed that 'it is possible to at least get equal if not better and more economic returns out of the refuse than we did under the fictitious values produced by the war', many of the waste management profession quickly became more realistic.[87] By the late 1920s professional waste management manuals, such as *Modern Public Cleansing Practice,* tended to play down the anticipated profits from waste utilisation schemes. They emphasised that factors such as local market conditions, the amount of waste to be treated, and the location and size of the town were all problems to be addressed in assessing the viability of a recycling effort.[88] In many areas either partial or complete salvage systems operated in parallel with incinerators that could reduce unmarketable residues. A.L. Thompson observed that 'the principle of utilisation has strongly interwoven itself with the fabric of modern public cleansing, but it is not one to be blindly followed in all and every circumstance'.[89]

Similar difficulties were apparent in the aftermath of the Second World War, which briefly reinvigorated the recycling effort. The post-war Labour government's economic policy ensured that recycling maintained some economic viability for longer than after 1918. The need to minimise dollar exports resulted in the continuation of

recycling as a means of preserving shipping space and minimising imports. The Labour government supported a post-war continuation of the wartime salvage drive. Sir Stafford Cripps, the mastermind of austerity, attended the Waste Paper Recovery Association's annual luncheon in 1946 in order to congratulate assembled merchants on paper collections as 'an added step to our economic salvation'.[90] Recycling was 'in the national interest' and secondary resources such as waste paper were 'material of national value'.[91] However, if the economic foundations of salvage were apparently stronger after 1945 than after 1919, it was largely as a consequence of government economic policy. When that policy changed in the 1950s, the economic basis of recycling was removed. Austerity simply did not last long enough to embed recycling in the normal economic channels of British life.

VII

An additional difficulty facing recycling practices was that of public attitudes. Whereas the approach of public cleansing officials and local authorities was transformed by war, the willingness or ability of householders to co-operate in schemes of recycling was less obviously altered and reveals a complex set of responses. Centralised recycling schemes offered a degree of comprehension, but some at-source sorting usually remained desirable in order to ensure that organic and inorganic refuse was not mixed together, potentially reducing the recovered valued of items like paper or rags. Most local authorities without large-scale specialised recycling plant were compelled by wartime imperatives, or the simple lack of money, to rely primarily on at-source separation and voluntary collection schemes. The co-operation of householders was critical to the

success of such salvage efforts. The experience of such reliance encouraged the development of a professional attitude that the popular view of waste needed to be changed. James Jackson thought that 'the obvious moral, namely, that nearly one half of this 'refuse' has a distinct value, must be brought home to the cleansing official, the householder, and in particular to the housewife, so that, as far as possible, waste may be checked at its source'.[92] The perceived need to raise public participation in recycling schemes encouraged professionals to challenge the idea that waste was something that needed to be disposed of quickly and hygienically. However, they had to undo many of the assumptions created by the work of public health experts during the 'refuse revolution'. Public education and propaganda were increasingly seen as central aspects of waste management activity. For example, in 1919 Alderman Roberts thought that the involvement of schools would be necessary in the education of the young in good salvage practice.[93] Alderman Pendleton, the Mayor of Nottingham, was willing to rely on 'the ultimate good sense of the common people', but still believed that civic education was required in order to get people recycling. '[H]e would like to see the elementary school curricula so altered that every child should be taught that to act in a matter contrary to the interests of the public health was as big a crime as stealing. If they had to effect improvement in the people they had to start with the children'.[94]

Yet, while public cleansing officials attempted to mobilise the civic spirit of householders, particularly women, in order to work their salvage schemes successfully, there was plenty of evidence to suggest that people continued to throwaway refuse without regard to the appeals of the experts. For such ethical transgressions the public

could expect little sympathy, despite the fact that their behaviour was in line with everything the propagandists of the 'refuse revolution' had taught them was good practice. In June 1940, at the height of the wartime crisis, *The Scotsman* excoriated 'Some Laggards in Edinburgh' who were 'not pulling their weight' in the salvage drive.[95] 'The attempts to save wastepaper in many households were half-hearted…the Cleansing Department officials are not convinced that every housewife or citizen is "salvage-conscious." The amount of litter on the streets and the large tonnage of soiled paper is still extracted from the refuse bears this out'.[96] Glasgow's Lord Provost compared the failure to save waste materials to 'a social crime against the welfare of the country, and those who continued to waste materials might unconsciously be acting as silly fifth-columnists, weakening the defences of the nation and helping the cause of dictatorship'.[97] Particular difficulties were experienced in promoting household sorting and the use of a separate bin system. Councillor Blackburn, the chairman of the Leeds Cleansing Committee, believed that it would be very difficult to get the householder to use a two-bin salvage system, 'unless they had some method of compulsion'.[98] Glasgow's Cleansing Superintendent argued that men like James Jackson were in 'Dreamland' if they believed it would be easy to gain the co-operation of householders: 'All had had experience of appeals to householders and he was afraid that the effect had not been very pronounced'.[99]

The real depth of public indifference to recycling was demonstrated with the end of the imperatives to resource thrift created by the war crisis. Waste paper collection fell by 38 per cent between 1942 and 1945 and there was general pessimism about the ability

to maintain the level of collections after the war.[100] The editor of *Public Cleansing and Salvage* was disconcerted by this 'Anti-Social Development' noting: 'It is not only farcical, but tragic, that resort should be necessary to importing waste paper from other countries while we are burning or discarding it in dust-bins at home'.[101] The decline in householder co-operation in recycling initiatives was to be pinned on 'plain laziness' and the declining effectiveness of salvage publicity through advertising and film among a blasé public.[102] Tottenham's cleansing superintendent saw the decline in salvage returns as 'a natural reaction after six weary years of war, but a dangerous element which must be dispersed at a time when a gigantic national effort is necessary if we are to survive as a leading nation, in fact if we are to survive as a nation at all'.[103] What, he asked, had given the nation such an impulse to recycle in the past? The answer was fear of national survival, and the rekindling of such fear, he believed, was necessary to revive salvage in the present.

VIII

The rediscovery of recycling between 1914 and 1950 was short lived. A reasonably effective system of recycling emerged in some urban areas between 1914 and 1950, although major investment in new plant and collection systems was largely confined to larger metropolitan areas such as London, Birmingham, Sheffield, Edinburgh and Glasgow. However, most local authorities continued to rely upon incineration and tipping systems. This was partly due to large investments tied up in existing disposal infrastructure, and partly to the limits to recycling imposed by unstable market conditions. Even where salvage was adopted it was not necessarily possible for all, or

even most, materials to be reused and tipping remained an important means of dealing with surplus waste. The 'golden eras' of salvage were associated with the unique economic conditions of war, demonstrating the tenuous position of recycling within the overall economic framework of disposal.

However, the failure of recycling also had roots in the inability of professionals to overturn the cultural attitudes towards waste that they had done so much to develop before 1914. The 'refuse revolution' had established hygiene and the rapid removal of domestic waste as the first duty of both householders and cleansing officials. The dust-bin and the incinerator had been among the means by which a nascent 'throwaway' culture was created, reinforced by the fear of disease. These throwaway practices were strongly imbibed by householders before 1914. Wartime salvage depended upon patriotism and thrift as a set of counter values that helped to challenge the throwaway ethic. However, in the wake of war it quickly became apparent that public perceptions remained strongly rooted in a view of waste as something that needed to be got rid of quickly, and the attitudes of the 'refuse revolution' reasserted themselves. Allied, especially after 1945, to the desire to pursue more affluent styles of living, the revival of the throwaway ethic dealt a permanent blow to the prospect of establishing recycling on a more extensive basis

After 1945 the culture of consumption and waste anatomised in Vance Packard's *The Waste Makers* developed in Britain.[104] Faced with a rapid increase in domestic refuse (14 million tons of household waste was collected in 1968 against a pre-war average of

about 8 million tons) and a rapid change in the waste stream, including the rise of plastics, local authorities increasingly turned to 'controlled tipping' to cope with waste for which there was neither a market nor an apparent use.[105] By 1968, 1,226 local authorities disposed of the majority of their domestic waste through some form of tipping, as against a mere forty-seven who continued to employ recycling methods.[106] This second refuse revolution was an understandable response to the immediate problem of what to do with waste, but it represented a failure to deal with the social and economic roots of waste generation. Only the emergence of environmentalist criticisms of capitalism and the consumer society, and, subsequently, a new sense of crisis, would eventually revivify the impulse to recycle.

[1] My thanks are due to John Clark, Tineke D'Haeseleer, Bill Luckin and John Scanlan, who all read and commented upon earlier drafts of this article.

[2] For example, see *The Politics of Consumption: Material Culture and Citizenship in Britain and America*, eds. M.J. Daunton and M. Hilton (Oxford, 2001), M. Hilton, *Consumerism in Twentieth-century Britain: The Search for a Historical Movement*. (Cambridge, 2003), C. P. Hosgood, 'Mrs Pooter's purchase: lower-middle-class consumerism and the sales, 1870-1914', in, *Gender, Civic Culture, and Consumerism: Middle-class Identity in Britain, 1800-1940*, eds. A.J. Kidd and D. Nicholls (Manchester, 1999), pp. 146-63, J.K. Walton, 'Towns and consumerism', in, *The Cambridge Urban History of Britain 1840-1950*, ed. M. Daunton, vol. III, (Cambridge, 2000), pp., 715-44.

[3] Other research also supports the view that recycling was an important part of material culture before the twentieth century. See N. Goddard, '19th-century recycling', *History Today*, XXXI, 6 (1981), pp. 32-6, '"A mine of wealth"? The Victorians and the agricultural value of sewage', *Journal of Historical Geography*, XXII (1996), pp. 274-290, E. Mårald, 'Everything circulates: Agricultural chemistry and Recycling theories in the second half of the nineteenth century', *Environment and History*, VIII (2002), pp. 65-84, J. Sheail, 'Town wastes, agricultural sustainability and Victorian sewage', *Urban History*, XXIII (1996), pp. 189-210. The widespread reuse of old-clothes through the second-hand clothes trade has received considerable attention from textile historians. See M. Ginsburg, 'The second hand clothes trade, 1700-1978', *Costume*, XIV (1980), pp. 121-35, M. Lambert '"Cast-off wearing apparel": The consumption and distribution of second-hand clothing in northern England during the long eighteenth century', *Textile History*, XXXV (2004), pp. 1-26, B. Lemire, 'Consumerism in Pre-industrial and early

Industrial England: The trade in second hand clothes', *Journal of British Studies*, XXVII (1988), pp. 1-24. The commercial recycling of industrial by-products and domestic waste was also a widespread activity. See D. Woodward, '"Swords into ploughshares": Recycling in pre-industrial England', *Economic History Review*, 2nd Ser, Volume XXXVIII (1985), pp. 175-191.

[4] R. Church and C. Clark, 'The origins of competitive advantage in the marketing of branded packaged consumer goods: Colman's and Reckitt's in early Victorian Britain', *Journal of Industrial History*, III (2000), pp. 98-119.

[5] J. Scanlan, *On Garbage* (2004).

[6] M. Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (1966); M. Thompson, *Rubbish Theory* (Oxford, 1979).

[7] B. Luckin, 'Pollution in the city', in *Cambridge Urban History*, III, p. 221.

[8] *Economic Journal*, X (1900), p. 411.

[9] *The Times*, 4 Aug. 1883, 10b.

[10] *Journal of the Institute of Sanitary Engineers*, X, 1 (1906), p. 37.

[11] *Municipal Journal*, 9 Sept. 1904.

[12] *Ibid*.

[13] B. Khwaja, 'Female casual and unskilled labour in the 1880s: South London dust women, fur pullers and jam makers', *South London Record*, IV (1989), pp. 22-30.

[14] W.F. Goodrich, *Economic Disposal of Towns' Refuse* (1903), p. 21.

[15] *Economic Journal*, X (1900), p. 416.

[16] *Ibid*, p. 415.

[17] See R. MacLeod, *Government and Expertise: Specialists, Administrators and Professionals, 1860-1919* (Cambridge, 1988), S Szreter, 'The importance of social intervention in Britain's mortality decline c.1850-1914', *Social History of Medicine*, I (1988), pp. 1-37.

[18] I am grateful to Dr J.F.M. Clark for allowing me to view a copy of his forthcoming article, '"The incineration of refuse is beautiful": Torquay and the introduction of municipal refuse incineration', *Urban History* (forthcoming, 2007). This provides a detailed analysis of the role of new technologies in the 'refuse revolution'.

[19] *Municipal Journal*, 18 Jan. 1901, 15 March 1901, 8 Nov. 1901, 8 Apr. 1904, 17 Aug. 1906, 29 Apr. 1904.

[20] For the connection between Progressivism, moral regeneration and local government see S.D. Pennybacker, *A Vision for London, 1889-1914: Labour, Everyday Life and the LCC Experiment* (1995). On the connection between technology and moral regeneration see C. Otter, 'Cleansing and clarifying: technology and perception in nineteenth-century London', in *Journal of British Studies*, XXXXIII (2004), pp. 41-2.

[21] My italics. Goodrich, p. 23.

[22] *Ibid,* p. 24.

[23] *Practitioner*, XXXXVII, 4 (1891), p. 306.

[24] *Ibid*.

[25] *Journal of the Royal Sanitary Institute*, XXXXII (1921-2), p. 251.

[26] *Weekly Dispatch*, 17 June, 1917.

[27] For instances of this see *The Scotsman*, 15 Aug, 1914, p. 8; 27 Jul, 1917, p.3.

[28] The National Salvage Council was under the chairmanship of the Secretary of State for War, Lord Derby, and formed from representatives of the War Office, the Admiralty, the Ministry of Munitions, the Local Government Board and the Ministry of Food. *Proceedings of the Institution of Municipal Engineers*, XXXXIV (1917-18), p. 328, *The Times*, 8 March 1918, 6b.

[29] *The Times*, 2 March 1918, 3f.

[30] *Public Cleansing and Salvage*, Nov. 1947, p. 120.

[31] *The Scotsman*, 20 Nov. 1939, p. 6.

[32] *Ibid*.

[33] *Public Cleansing and Salvage*, Nov. 1947, p. 120.

[34] *Journal of Institution of Municipal Engineers*, LXVIII (1942), p. 368-369.

[35] *The Scotsman*, 3 Feb. 1940, p. 11

[36] *The Scotsman*, 24 June 1940, p. 7.

[37] *The Scotsman*, 3 Feb. 1940, p. 8.

[38] *Public Cleansing and Salvage*, Nov. 1947, p. 120.

[39] *The Scotsman*, 30 Aug. 1940, p. 3.

[40] A. Calder, *The People's War: Britain, 1939-1945* (1986 edn.), p. 345-7.

[41] *The Scotsman*, 24 June 1940, p. 7.

[42] *Cleansing Superintendent*, July 1922, p. 271.

[43] *The Scotsman*, 12 Apr. 1921, p. 6.

[44] *Ibid*.

[45] *Cleansing Superintendent*, June 1919, p. 460.

[46] F.A. Talbot, *Millions from Waste* (1919), p. 141.

[47] *Ibid*.

[48] *Ibid*, p. 142.

[49] The dustbin has been described as 'a revealing indicator of waste relationships within society'. See H. Chappells and E. Shove, 'The dustbin: a study of domestic waste, household practices and utility services', *International Planning Studies*, IV (1999), p. 267.

[50] *Cleansing Superintendent*, July 1919, p. 481.

[51] *Cleansing Superintendent*, July 1919, p. 249.

[52] *Cleansing Superintendent*, July 1920, p. 213.

[53] Talbot, p. 145.

[54] *The Scotsman*, 14 Oct. 1937, p. 7.

[55] W.S. Jevons had already raised questions over the future coal supplies in his *The Coal Question: An Inquiry Concerning the Progress of the Nation and the Probable Exhaustion of our Coalmines,* (1865). The role of empire in the emergence of 'conservation' as a principle has been extensively illustrated by R. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860* (Cambridge, 1995).

[56] G. Pinchot, *The Fight for Conservation* (1910).

[57] A good instance of this is H.J. Spooner, *Wealth from Waste: Elimination of Waste - A World Problem* (1918).

[58] *Journal of the Royal Sanitary Institute*, LVIII (1937-8), p. 415.

[59] *Ibid.*

[60] *Cleansing Superintendent*, July 1919, p. 486.

[61] *Torquay Times*, Friday 16 Jan. 1920, p. 5.

[62] J.A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, 1996).

[63] *Cleansing Superintendent*, Apr. 1922, p. 183.

[64] *Ibid*.

[65] *Ibid*.

[66] *Cleansing Superintendent,* Feb. 1922, 139.

[67] *Cleansing Superintendent*, July 1919, 483.

[68] *Cleansing Superintendent,* Apr. 1922, p. 183.

[69] *Cleansing Superintendent*, Jan. 1919, p. 235

[70] *Ibid*, p. 340

[71] M. Gandy, *Recycling and the Politics of Waste* (1994), p. 24.

[72] *Torquay Times*, Friday 16 Jan. 1920, p. 5.

[73] *Ibid*.

[74] Talbot, p. 154.

[75] *Proceedings of the Institution of Municipal Engineers*, XXXXV (1918-19), p. 304.

[76] *Cleansing Superintendent,* July 1921, p. 249.

[77] Talbot, p. 151.

[78] *Proceedings of the Institution of Municipal Engineers*, XXXXV, (1918-19), p. 304.

[79] *The Scotsman*, 21 Nov. 1931, p. 8.

[80] *Ibid*.

[81] *Cleansing Superintendent*, Apr. 1922, p. 183.

[82] *Cleansing Superintendent*, July 1921, p. 249.

[83] *Cleansing Superintendent*, July 1920, p. 221.

[84] *Ibid*.

[85] *Cleansing Superintendent*, Feb. 1921, p. 127.

[86] *Cleansing Superintendent*, July 1920, p. 221.

[87] *Cleansing Superintendent*, July 1922, p. 271.

[88] A.L. Thompson, *Modern Public Cleansing Practice*, (1928), p. 131.

[89] *Ibid*.

[90] *Public Cleansing and Salvage*, May 1946, p. 459.

[91] *Public Cleansing and Salvage*, March 1946, p. 332.

[92] *Cleansing Superintendent*, July 1919, p. 479.

[93] *Ibid*, p. 486.

[94] *Ibid*, p. 487.

[95] *The Scotsman*, 6 June 1940, p. 3.

[96] *Ibid*.

[97] *The Scotsman*, 3 July 1941, p. 3.

[98] *Cleansing Superintendent*, July 1919, p. 485.

[99] *Ibid*, p. 486.

[100] *Public Cleansing and Salvage*, May 1946, p. 459.

[101] *Public Cleansing and Salvage*, March 1946, p. 332.

[102] *Ibid*, p. 333.

[103] *Public Cleansing and Salvage*, May 1946, p. 459.

[104] V. Packard, *The Waste Makers* (1960).

[105] F.L.D. Flintoff, 'Refuse, scrap and litter', *Journal of the Royal Society of Arts*, Aug. (1968), p. 752.

[106] *Ibid*.