



Review

From waste to sustainable materials management: Three case studies of the transition journey



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ARTICLE INFO

Article history:

Received 29 June 2016

Revised 14 October 2016

Accepted 27 November 2016

Available online 9 December 2016

Keywords:

Zero waste

Materials

Transitions

Policy

Governance

Circular economy

Case studies

ABSTRACT

Waste policy is increasingly moving on from the 'prevention of waste' to a 'sustainable materials policy' focused agenda recognising individual wastes as a resource. In order to comparatively analyse policy developments in enhanced waste management, three case studies were selected; San Francisco's *Zero Waste Program*, Flanders's *Sustainable Materials Management Initiative* and Japan's *Sound Material-Cycle Society Plan*. These case studies were chosen as an opportunity to investigate the variety of leading approaches, governance structures, and enhanced waste policy outcomes, emerging globally. This paper concludes that the current transitional state of waste management across the world, is only in the first leg of the journey towards Circular Economy closed loop production models of waste as a resource material. It is suggested that further development in government policy, planning and behaviour change is required. A focus on material policy and incorporating multiple front runners across industry and knowledge institutions are offered as potential directions in the movement away from end-pipe land-fill solutions.

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Abbreviations: 10YFP on SCP, Rio 20+ 10-year framework of programmes on sustainable consumption and production; 3R's, reduce, reuse, and recycle; CE, circular economy; CR's, circulative resources; EEA, the European Environment Agency; EPR, extended producer responsibility; EU, European Union; GDP, gross domestic product; KPIs, key performance indicators; MFA, material flow accounts; MOEJ, Ministry of Environment, Japan; MSW, municipal solid waste; NGOs, non-governmental organisations; OECD, organisation for economic co-operation and development; OVAM, public waste agency for Flanders; SMM, sustainable materials management; SRMs, secondary raw materials; SMCS, fundamental plan for establishing a sound material-cycle society; TM, transition management; UNEP, United Nations environmental programme; ZW, zero waste.

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1. Introduction

Waste is a guaranteed component of any urbanised landscape and the management of waste has existed for centuries. Propelled by an economic philosophy of exponential growth through consumerism, the availability, complexity and rapid manufacturing of consumer products is creating highly unsustainable levels of ‘waste’ material outputs. These point to the urgent need to remodel the way waste is managed (Rootes, 2009; UNEP, 2011).

Waste management has for the most part provided end of pipe solutions, whereby increasing amounts of discarded materials are buried, dumped out at sea or turned into ash, creating the need for the extraction of further raw materials. These methodologies do not make the best use of the waste as a resource or do not deliver satisfactory environmental outcomes. The waste sector is better understood as a necessary part of the sustainability agenda, requiring more holistic solutions that take into account the concepts of sustainable production and consumption and the circular economy.

The waste industry is now recognised as an underutilised ‘resource industry’ in its own right, with increasing focus on waste having inherent economic value. Formal and informal recycling practices have emerged as a dominant force, central to most waste management programs in the developed world (Karani and Jewasikiewitz, 2007). Furthermore, increasing focus on economic innovation and entrepreneurialism during recent times of slow international growth has also seen more economic policy focus on waste management.

Significant policy innovations in waste management have emerged over the last decade to address the growing demand for materials and mounting evidence of ecological and societal impacts of our throw-away consumerist economy. Whilst some policies aim at reforming the traditionalist waste management frameworks, others fundamentally reconceptualise and reframe it altogether (Cramer, 2013; Lauridsen and Jørgensen, 2010).

The world of waste management is moving away from conventional landfill and recycling of both municipal and industrial waste towards integrated waste policy. Programs involving zero waste targets and 100% diversion from landfill are increasingly noted with rising urban densities and land prices in major cities across the world. Sustainability outcomes, sustainable production and consumption behaviours and circular economy programs all underpin new standards in governance structures and waste policy intervention. Furthermore, environmental regulations, material cost and material scarcity are also creating an awareness of eco-design benefits in linking end of life waste materials as recycled/returned inputs to earlier production stages (Andrews-Speed et al., 2012; EEA, 2014; UNEP, 2011).

Although Circular Economy thinking has shown closed loop systems can provide greater social and environmental benefits when confined to bottom-up supply-chain management systems, advantages of waste governance at multiple spatial levels can also be noted (Mazzanti and Montini, 2014; Ghisellini et al., 2016).

The following review will focus on three exemplar case studies to illustrate three different approaches to waste management across the world and the increasing value seen in the policy management of waste as a resource. Each case is considered an

exemplar of a local, regional or national enhanced waste management policy program

2. Methodology

In order to comparatively analyse policy developments in enhanced waste management, three case studies were selected; San Francisco’s *Zero Waste Program*, Flanders’s *Sustainable Materials Management Initiative* and Japan’s *Sound Material-Cycle Society Plan*. These case studies were identified as opportunities to investigate the variety of leading approaches, governance structures, and enhanced waste policy outcomes, emerging globally.

A review of academic literature as well as authoritative assessments conducted by key government bodies and research agencies produced substantive understandings of each case. Political documents, policy instruments, industry reports and published quantitative results were analysed. Interviews with relevant officials were conducted and the authors of existing case study materials were also engaged.

2.1. Case studies

2.1.1. San Francisco (Zero Waste Program): 100% diversion from landfill

In the first case study the details of the San Francisco Zero Waste program are presented. This case was selected because it is one of the more publicised and recognised recent zero waste initiatives and is often used as a zero waste exemplar. Since 2002 this city has had considerable success in driving a zero waste program having achieved their goal of 75% diversion of waste from landfill and incineration in 2010, with current estimates stating an 80% diversion rate. It is also recognised as the national leader in waste management within the US. We provide a brief overview of San Francisco’s actions, examined through publicly available government and policy documents produced and published by the San Francisco Environment department as well as building upon the work of Krausz, 2012 and other secondary academic and industry reports.

2.1.2. Flanders (Sustainable Material Management): Selective collection and recycling

A prominent example of the transition from conventional waste management to an integrated materials policy is the Flanders’s Sustainable Material Management (SMM) program. The case was selected on the premise that the initiative was one of the first regional attempts at such a policy. This case has been selected since the change trajectory has been the focus of in depth study and multiple publications (Paredis, 2013) which enabled deep insights into how the initiative took shape and the relevant outcomes that ensued. In this case study the emergence of the concept of materials in the waste discourse within Flanders is analysed and some of the activities, outcomes and future directions are outlined.

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