



Contents lists available at ScienceDirect

## Waste Management

journal homepage: [www.elsevier.com/locate/wasman](http://www.elsevier.com/locate/wasman)

## Explaining the differences in household food waste collection and treatment provisions between local authorities in England and Wales

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## ARTICLE INFO

## Article history:

Received 4 March 2017

Revised 27 July 2017

Accepted 3 September 2017

Available online xxx

## Keywords:

Food waste

Local authority

Collection

Recycling

Greenhouse gas

Municipal solid waste

## ABSTRACT

Separate household food waste collection for anaerobic digestion is one method used in the sustainable management of biodegradable municipal solid waste (MSW). Recycling of food waste contributes to the UK's reuse, recycling and composting targets and can help local authorities boost plateauing rates whilst encouraging landfill diversion. This study explored the reasons for differences in the provision of food waste collections, using two comparable local authorities, one with a collection in Wales (Cardiff), and the other absent of such service in England (Southampton). A PESTLE analysis investigated the political, economic, social, technological, legal and environmental impacts of separate food waste collections. The greenhouse gas impacts of the collection and treatment systems of MSW in both cities were estimated for 2012/13. Results showed significant policy and legislative differences between devolved governments, that separate food waste collections can save local authorities significant sums of money and substantially reduce greenhouse gas impacts. A survey of one hundred respondents in each city aimed to understand attitudes and behaviours towards recycling, food waste segregation, cooking and purchasing habits. The number of frequent recyclers and levels of satisfaction were higher in the authority which provided a separate food waste collection. In the area which lacked a separate collection service, over three-quarters of respondents would participate in such a scheme if it were available.

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### 1. Introduction

Householders in the UK generate 7.2 million tonnes of food waste annually, costing each household over £480 a year (WRAP, 2013). This significant amount of wasted food poses not only the problem of wasted resources, water and energy in production, transportation and sale, but also in disposal. Degradation of food waste in landfill contributes to climate change through greenhouse gas (GHG) release, leachate production which has the potential to contaminate groundwater sources, and other issues such as odour and attraction of vermin (Smith et al., 2014). The ethical implications of food waste are also significant when, globally, 30–50% of all food produced is discarded without ever reaching a human stomach (IMechE, 2013).

The recent surge in campaigns to raise awareness and target the prevention of food waste at a consumer level, such as WRAP's 'Love Food, Hate Waste' and 'Hugh's War on Waste' are such strategies of challenging the wasteful practices of householders (Questa et al., 2013; Williams et al., 2015). Whilst the prevention of avoidable

food waste should be the primary focus in its management in accordance with the waste hierarchy, there will always be the generation of an unavoidable fraction such as preparation residues, peelings and bones (Smith et al., 2014). This fraction has the potential to be recycled and can boost plateauing recycling rates to help the UK deliver on the EU target of 50% recycling, reuse and composting (RRC) rate by 2020 (WRAP, 2013). It is estimated this target is unlikely to be met with current waste strategies and an absence of separate food waste collections (Waite et al., 2015; Parliament, 2016), prompting the recent launch of the 'Food Waste Recycling Action Plan for England' (WRAP, 2016a). The local authorities (LAs) in England and Wales which have the highest recycling rates are, uncoincidentally, ones which offer a separate food waste collection service (WasteDataFlow, 2016). Currently, only 10% of household food waste is captured and recycled, with 16% of households in the UK offered a separate collection (DEFRA, 2016). 3.5 million tonnes of food waste is collected as residual waste, contributing to the increasing collection costs borne by LAs and the costly and unsustainable disposal in landfill.

Current research on household food waste focusses mainly on generation/composition (e.g. Rispo et al., 2015; Girotto et al., 2015; Edjabou et al., 2016; Chalak et al., 2016), prevention

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(e.g. [Quested et al., 2013](#); [Cole et al., 2014](#); [Graham-Rowe et al., 2014](#); [Smith et al., 2014](#)), effectiveness (e.g. [Shearer et al., 2017](#)) and collection efficiency (e.g. [Edwards et al., 2016](#)). There is a need to recognise the sustainable management of unavoidable fractions ([Papargyropoulou et al., 2014](#); [Williams et al., 2015](#)). Under the Environmental Protection Act (1990) Waste Collection Authorities (WCAs) are tasked with the role of collecting municipal solid waste (MSW) and it is therefore in the interests of policymakers to ensure collection systems are at their optimal design, efficiency and cost-effectiveness ([WRAP, 2016b](#)). In particular, a key challenge for LAs is to maximise resource efficiency whilst simultaneously reducing its GHG emissions ([Turner et al., 2015](#)). There are a few studies which critique food waste policy and strategies at both a central and local government level considering the entirety of the UK ([Bulkeley and Gregson, 2009](#); [Farmer et al., 2015](#); [Waite et al., 2015](#); [Hogg et al., 2016](#)), with some studies using specific LAs as a focus ([Barr et al., 2005](#); [Bull et al., 2010](#); [Cole et al., 2014](#); [Turner et al., 2016](#)) and socio-demographic characteristics ([Rispo et al., 2015](#)).

Although some studies have investigated the differences in national recycling rates ([Abbott et al., 2011](#)), and attempted to classify them by LA accordingly ([Parfitt et al., 2001](#)), few (if any) studies have attempted to explain the variations of household food waste collections between developed nations. This study is a specific response to the call by the IWWG's Task Group on the Prevention of Food Waste ([www.tuhh.de/iue/iwwg/task-groups/food-waste.html](http://www.tuhh.de/iue/iwwg/task-groups/food-waste.html)) to "quantify and evaluate the financial, environmental and social impacts" of food waste collections (see [Williams et al., 2015](#)). Consequently, this paper aimed to critically evaluate the reasons why there are differences in the provisions of separate food waste collections between LAs, using Southampton (England) and Cardiff (Wales), as case studies. The specific objectives were to:

- Critique and quantify the differences between household food waste collection systems using a PESTLE (political, economic, social, technological, legal and environmental) analysis.
- Examine householders' attitudes, motivations and behaviours towards recycling and separate food waste collections.

## 2. Methodology

### 2.1. Areas of study

Cardiff and Southampton were selected for having broadly similar population densities, transient populations, coastal location and socio-economic characteristics. However, the cities operate different collection systems, yielding significantly different RRC rates as a result of varying waste management policies at local and central government levels. These differences provide a framework to critically analyse the management of household food waste.

Cardiff and Southampton are ranked, respectively, as the eleventh and fourteenth most densely populated areas of the UK. The cities' coastal location draws transient populations through tourism and maritime activities, further contributed to by large student populations ([NOMIS, 2016](#)). As urban areas are more densely populated, the waste management issues in Cardiff and Southampton may be globally illustrative of those likely to be faced by LAs with high rates of population flux and high population densities in future, especially university cities ([Timlett and Williams, 2009](#)). Cardiff, the capital and largest city in Wales, is culturally significant, hosting major tourist attractions, theatres and national sporting venues. Southampton is the largest city in southern England (outside of London) and its reputation as a regional centre for tourism, arts and sport is comparable to Cardiff.

No comparable index of multiple deprivation exists between English and Welsh LAs, although average property prices, mean

annual household incomes and unemployment rates are similar ([Table 1](#)).

The household waste collection systems of each city vary. Southampton City Council (SCC) is both a collection and disposal authority and is part of Project Integra, a consortia of Hampshire's 14 LAs (11 WCAs, 1 WDA and 2 Unitary Authorities) which has been widely praised for its approach to the integrated management of MSW since the implementation of the Environmental Protection Act (1990) and high rates of landfill diversion ([Lisney, 2002](#); [Bull et al., 2010](#)). LAs in the consortia operate their own collection systems and frequencies, for example Eastleigh Borough Council is the only LA in the consortia to offer a separate food waste collection system ([HCC, 2013](#)). SCC's disposal is operated via a tripartite agreement with Portsmouth and Hampshire County Councils. SCC is one of five WCAs in the consortia offering weekly residual waste collections which is only viable as the recipient of a Department for Communities and Local Government (DCLG) grant, however this funding expires at the end of 2016 ([HCC, 2013](#)). Residual waste is primarily thermally treated with ca.10% landfilled. Recyclables are collected two stream (dry-recyclables and glass) in separate refuse collection vehicles (RCVs) fortnightly ([HCC, 2013](#); [SCC, 2014](#)).

Cardiff City Council (CCC), as a unitary authority, manages both collection and disposal of household waste. CCC is also part of a waste disposal consortia, Project Green, of five neighbouring LAs in south-east Wales which manages the treatment of residual waste primarily through landfill disposal (ca. 70%) and energy-from-waste (EFW) (ca. 30%) ([StatsWales, 2016](#)). Household residual waste is collected fortnightly and dry-recyclables (co-mingled) collected weekly. All households are provided with a kitchen caddy for food waste which is collected weekly in a separate RCV and treated via AD ([CCC, 2015](#)). RRC rates in 2014/15 were 53.4% in Cardiff and 26.1% in Southampton. The UK average was 44.9% for the same period ([WasteDataFlow, 2016](#)).

### 2.2. PESTLE analysis

Unlike a SWOT analysis which identifies issues in generalised categories of strengths, weaknesses, opportunities and threats (i.e. SWOT), a PESTLE analysis classifies aspects as political, economic, social, technological, legal and environmental ([Zalengera et al., 2014](#)). This provides the framework for a repeatable and comparable critical evaluation of household food waste management in each city.

#### 2.2.1. Political

It is difficult to quantify waste management policies as there is no particular functional form to measure the relationship between

**Table 1**  
Socio-demographic comparison of Southampton and Cardiff ([NOMIS, 2016](#); [SCC, 2016](#); [StatsWales, 2016](#)).

|  | Cardiff            | Southampton        |
|--|--------------------|--------------------|
| Land area  | 76 km <sup>2</sup> | 52 km <sup>2</sup> |
| Population                                       | 357,160            | 253,700            |
| Population density (people per km <sup>2</sup> ) | 5900               | 4916               |
| Dwelling stock                                   | 135,796            | 97,217             |
| Number of university students                    | 50,700             | 33,900             |
| University students (% of total population)      | 14                 | 13                 |
| Median gross weekly income (per capita)          | £510               | £502               |
| Mean property price                              | £191,173           | £160,911           |
| Working age unemployment                         | 2.3%               | 1.5%               |
| Local authority status                           | Unitary authority  | Unitary authority  |

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