Section A

Institution: Durham University

Unit of Assessment: 14 Geography and Environmental Studies

Title of case study: From waste to resource productivity

Period when the underpinning research was undertaken: Between 2008 and 2020

Details of staff conducting the underpinning research from the submitting unit:

Names:	**Roles (e.g. job title):**	**Periods employed by submitting HEI:**
Professor Nicky Gregson	Professor of Human Geography	October 2011 to October 2020
Professor Mike Crang	Professor of Human Geography	January 1994 to present
Dr Farid Ahamed	Postdoctoral Research Associate	June 2007 to June 2010
Dr Melania Calestani	Postdoctoral Research Associate	June 2007 to May 2009
Dr Sara Fuller	Postdoctoral Research Associate	January 2008 to July 2012
Dr Helen Holmes	Postdoctoral Research Associate	May 2012 to June 2012
Dr Pete Forman	Postdoctoral Research Associate	May 2018 to November 2018

Period when the claimed impact occurred: Between March 2016 and July 2020

Is this case study continued from a case study submitted in 2014? N

Section B

1. Summary of the impact

Durham University research has informed a switch in UK Government waste and recycling policy from disposal to resource recovery and a more circular economy. The research influenced the framing and conclusions of the Government's first major cross-departmental report on waste and resource recovery. Key findings from that research were translated into messages that became recommendations by the Government Chief Scientific Adviser and Defra Chief Scientific Adviser. Several of these recommendations, and aspects of the overall framing, appear in the Defra White Paper *Our Waste, Our Resources: A Strategy for England* (2018) that formed the basis for the Environment Bill, introduced to the House of Commons in October 2019. Further Durham research has informed scrutiny of the Waste Strategy, specifically its implications for local authorities, by the House of Commons Housing, Communities and Local Government Select Committee (March-September 2019). Research findings questioned the ability of local authorities to comply with the Waste Strategy, and feature heavily in the Final Report of the Select Committee (July 2019).

2. Underpinning research

The impact stems from research led by Professor Nicky Gregson and funded by an ESRC programme grant, *The Waste of the World* (2006-2011), and smaller follow-up projects. Gregson moved from Sheffield to Durham in 2011, before the end of the grant; Crang was involved as co-investigator throughout the project; and all of the relevant empirical research that underpins this case study was conducted by Durham postdoctoral researchers (Ahamed, Calestani, and Fuller). Follow-up research was conducted by two other Durham postdoctoral researchers directed by Gregson (Holmes and Forman).

Research in *The Waste of the World* examined how wastes in the Global North become resources elsewhere through international trade, with a specific focus on India and Bangladesh. It established that wastes are cheap secondary resources (reference **R1**) and defined the circumstances that are conducive to, or problematic for, resource recovery and the move to a circular economy. The project explored these issues through a focus on two resource recovery sectors: ship breaking (which underpins this case study) and textiles (which was conducted at UCL, and for which we claim no impact here). Research by Ahamed on ship breaking in Bangladesh found strong connections between resource recovery and manufacturing via the Bangladeshi steel industry (**R2**). It also demonstrated the degree to which industrial symbiosis can emerge in an economy, albeit in conditions that would not satisfy environmental standards in the Global North (**R2**). Parallel research by Calestani on an incipient ship recycling industry in the EU established the economic challenges that face materials recovery businesses trying to compete in a global market (**R3**). It highlighted the disconnect in Europe between the recovery of low-quality materials and the need for high-quality resources by an advanced manufacturing sector, providing an early indication of some of the challenges of moving

to a circular economy (**R3**). That research also flagged the continued need for disposal options for problematic toxic waste such as asbestos (**R4**), demonstrating that not all wastes can become resources.

The two strands of research on ship breaking emphasised that resource recovery is fundamentally about materials quality (**R3**). Successful recovery businesses are those that can capture the most value, by recognising and segregating the most valuable material amidst the complexity of discarded goods (**R3**). Capital-intensive technology is not necessarily competitive with labour-intensive processing, which is another reason why wastes flow from the Global North for processing elsewhere. Ethnographic research in the EU showed that ship breaking firms left the market where recovery processes produced materials that were not in demand or were too costly to recover (**R3**). Equally, firms that emphasised volume and distinguished between too few grades of materials in their recovery process produced low-quality materials and suffered from limited markets, especially in the UK (**R3**, **R4**). The research clearly established the economic fragility of this type of resource recovery in the EU (**R3**) and highlighted the challenges facing newly-derived policies such as the UK's Ship Recycling Policy (2007), which had sought to re-establish the industry within the borders of the EU (**R3**).

Subsequent Durham research by Fuller on materials recovery facilities, and by Holmes on the anaerobic waste digestion sector, pushed these findings into further sectors of resource recovery in the UK (**R5**). Fuller's work demonstrated that the UK's material recovery infrastructure is capital-intensive and reliant on volume throughput to turn a profit, but operates with too few grades to produce quality materials (**R5**). These factors explain why the UK is heavily dependent on global export markets for a large percentage of its household waste, including relatively low-quality paper, card, and plastics. Holmes' research showed that materials quality was again compromised by a volume-focused business model, in this case shaped by government feed-in tariffs designed to promote renewable energy sources. It also flagged the considerable difficulties in getting waste-derived by-products certified as a product that can be bought and sold in the market (**R5**). In both sectors, the quality of recovered materials has been adversely affected by UK policy that has, for over 15 years, quantified success in waste management in terms of volumes diverted from landfill – favouring, for example, co-mingled household collection systems that lead to low-quality outputs. UK local authorities are locked into this weight-based policy via their current waste and recycling contracts, and recent Durham research by Forman (**R6**) has shown that these contracts will frustrate any move away from an export-dependent model and toward a more circular economy.

3. References to the research

Note: underline indicates Durham employee during the research and/or at time of publication. Citation data are from Google Scholar, updated 1 Sept 2020.

R1: Gregson, N., and Crang, M. (2015) From waste to resource: the trade in wastes and global recycling economies. *Annual Review of Environment and Resources* 40, 151-176, doi:10.1146/annurev-environ-102014-021105. *(78 citations)*

R2: Gregson, N., Crang, M., Ahamed, F., Akter, N., Ferdous, R., Foisal, S., and Hudson, R. (2012) Territorial agglomeration and industrial symbiosis: Sitakunda-Bhatiary, Bangladesh, as a secondary processing complex. *Economic Geography* 88, 37-58, doi:10.1111/j.1944-8287.2011.01138.x. *(Returned in REF2014; 65 citations)*

R3: Gregson, N., Watkins, H., and Calestani, M. (2013) Political markets: recycling, economization and marketization. *Economy and Society* 42, 1-25, doi:10.1080/03085147.2012.661625. *(Returned in REF2014; 40 citations)*

R4: Gregson, N., Watkins, H., and Calestani, M. (2010) Inextinguishable fibres: demolition and the vital materialisms of asbestos. *Environment and Planning A* 42, 1065-83, doi:10.1068/a42123. *(Winner of the Ashby Prize awarded to the most innovative paper published in Environment and Planning A during 2010, and returned in REF2014; 97 citations)*

R5: Gregson, N., Crang, M., Fuller, S., and Holmes, H. (2015) Interrogating the circular economy: the moral economy of resource recovery in the EU. *Economy and Society* 44, 218-243, doi:10.1080/03085147.2015.1013353. *(ISI Highly Cited Paper, and returned in REF2021; 354 citations)*

R6: Gregson, N., and Forman, P. (2020) England's municipal waste regime: challenges and prospects. Working paper, available at https://dro.dur.ac.uk/32354, deposited 16 Dec 2020. *(In review at the Geographical Journal)*

4. Details of the impact

UK Government policy on waste and recycling has shifted over the last three years from an emphasis on management and disposal to a focus on resource recovery and a more circular economy. This shift began with the commissioning of a report on waste and resource productivity by the UK Government Office for Science (GO-Science) and has continued through publication of strategic documents by the Department for Business, Energy, and Industrial Strategy (BEIS) and Defra. Durham University research has informed both the development of this policy framework and its subsequent scrutiny by the House of Commons. These three areas of policy impact are described in turn.

Area 1: Direct impact on the GO-Science Report on Waste and Resource Productivity

GO-Science works across UK government departments under the direction of the Government Chief Scientific Adviser, producing annual two-part reports that give scientific evidence and policy recommendations on a chosen area of UK policy. Part I, the Summary Report, is written by the Chief Scientific Adviser and appropriate department Chief Scientific Advisers, and provides key messages for policy makers; Part II, the Evidence Report, is written by a group of experts. The body of research described in Section 2 led to Gregson being invited by GO-Science to a scoping event on 1 March 2016 on Waste and Resource Productivity (evidence source **E1**). That event brought together 53 UK experts who could produce the evidence base to underpin the report. Gregson's contributions to the scoping event led to an invitation to be lead author, along with Professor Catherine Alexander (Anthropology, Durham), of Chapter 1 of the Evidence Report, entitled '*What is waste?*' (**E2**). This chapter provided the framing and scope for the full Evidence Report, and was developed between May and September 2016. The full Evidence Report was published in December 2017.

Chapter 1 of the Evidence Report (**E3**) draws heavily on the Durham research described above. Sections 2-4 of the chapter synthesise the key findings from that research to provide a framework for a policy audience, and those findings underpin the chapter's key messages in Section 6. The chapter grounds the report by highlighting (1) that there will always be waste, as an inevitable consequence of all that we do; (2) the continued need for disposal options, particularly for toxic and hazardous materials such as asbestos and nuclear waste (drawn from **R5**); and (3) the changes in waste volume and material composition from archaeological beginnings through to the present day (**R1**). The chapter describes what must change if the UK is to transition to a more circular economy, in which wastes become resources. The need to improve the quality of materials recovered for recycling (**R5**) is flagged, as is the connection between poor materials quality and (i) UK waste policy that has measured success in terms of weight and percentage diversion from landfill; (ii) co-mingled household collection systems (**R5**); and (iii) the UK's reliance on global export markets and the global trade in wastes (**R1**). The Durham research on EU ship breaking is used to emphasise the need for clarity in materials specification relating to products from which those materials are being recovered (**R3**). Similarly, Durham research on recycling clusters in Bangladesh (**R2**) is used to argue that the resource recovery sector must have a better understanding of the type, quality, and volume of materials required by UK-based manufacturers.

The chapter closes (**E3**, pp. 23-24) with a set of key policy messages, five of which are grounded in the underpinning Durham research: (i) that enhanced recycling requires improving the quality of materials recovered; (ii) the allied need for closer dialogue between manufacturers and resource recovery firms; (iii) the need for greater awareness of sustainable design principles in education, research and innovation, and manufacturing; (iv) the potential for increasing resource efficiency

through reuse; and (v) the continued need for disposal options. The framing of Chapter 1 and the key messages are reproduced on pp. 10-12 of the Summary Report (**E4**).

Area 2: Impact of the GO-Science Report on Government policy and legislation

Following publication of the GO-Science Report, the framing and key messages outlined in Chapter 1 of the Evidence Report have had further impact on subsequent UK policy in both BEIS and Defra. Specific impacts include:

- **BEIS, Industrial Strategy White Paper** (November 2017, **E5**): This commits the government to move toward a regenerative circular economy, to *'raising the resource productivity of businesses, including through the promotion of recycling and strong secondary markets where products are designed with efficiency and recyclability in mind'* (**E5**, p. 148), and to a new strategy on resource and waste. The emphasis on material recovery and the need for strong secondary markets and material recovery stem directly from the Durham contributions to Chapter 1 of the GO-Science Evidence Report.

- **Defra, A Green Future: Our 25 Year Plan to Improve the Environment** (January 2018, **E6**): The government commits to making sure *'that resources are used more efficiently and kept in use for longer to minimise waste and reduce its environmental impacts by promoting reuse, remanufacturing, and recycling'* (**E6**, p. 83). There is a commitment to develop a national Resource and Waste Strategy to maximise the value of products across their entire life cycle (**E6**, p. 84). The government also commits to the use of recycling collection to return *'high-quality materials back to the economy'* (**E6**, p. 84), and a recognition that this will support both UK markets and exports of secondary materials abroad. Finally, the government commits to ensuring greater consistency in the materials that are collected in order to increase the quality of the materials (**E6**, p. 88). All of these points are derived directly from the key policy messages in the Evidence Report.

- **Defra, Our Waste, Our Resources: A Strategy for England White Paper** (December 2018, **E7**): This strategy rewrites UK waste policy, which previously emphasised waste management and the need to reduce, reuse and recycle, to see waste as a resource in line with circular economy principles. It stems directly from the key messages of the Evidence Report. Chapter 3 has as its key messages that there will always be waste; recognition of the need to improve the quality of materials recovered for recycling; and acknowledgement that weight-based policy targets are incompatible with improving materials quality (**E7**, p. 67) – all drawn directly from the Durham contributions to Chapter 1 of the Evidence Report. The opportunity for wide-ranging dialogue after Brexit is recognised (**E7**, p. 68), and there is support for a product passport system (**E7**, p. 82), as recommended in Chapter 1 of the Evidence Report. Text extracts and Figure 1 from Chapter 1 of the Evidence Report are reproduced in the Strategy's supporting Annex (**E8**, p. 106).

The principles articulated in these policy documents entered legislation as the Environment Bill 2019-21, introduced to the House of Commons in October 2019. At the time of writing the Bill is paused at the Public Bill Committee stage in the House of Commons, having been delayed by the 2019 general election and the Covid-19 pandemic.

Area 3: Direct impact on the scrutiny of Government policy

The Defra White Paper *Our Waste, Our Resources* (**E7**) was the focus of scrutiny by the House of Commons Housing, Communities and Local Government Select Committee from March to September 2019. Of particular concern was its implications for local authorities. Evidence was *'sought on the financial consequences for local authorities and whether these had been adequately addressed by the Government, including the likely effect on existing contracts for waste collection and disposal. We asked for views on whether there should be greater consistency in waste services across England, and if the proposals put forward by the Government would lead to higher recycling rates'* (**E9**, p. 7, para 6). Written evidence submitted by Gregson to the Select Committee drew on the findings of recent Durham research to highlight the contractual base currently underpinning England's waste and recycling infrastructure and its relation to recycling performance (**R6**). The evidence emphasised the likely need for contract renegotiation if future targets are to be met. Gregson's oral evidence reiterated those findings (**E9**, p. 29, para 88) and was used to inform questioning of other witnesses to the Select

Committee. Those witnesses confirmed these findings in independent testimony (**E9**, p. 29, para 90). As a direct result, the Final Report of the Select Committee states that

'It is highly likely that some existing long term contracts will need to be renegotiated if local authorities are going to implement the Government's Waste Strategy proposals. The need to renegotiate existing contracts is one of the main unknown costs of the new system that the Government is proposing. Private sector contractors should commit to covering the cost of those contact amendments, but where this cannot be agreed, the Government should do so' (**E9**, p. 4).

Gregson provided supplementary written evidence to the Select Committee, following oral evidence and questioning. This included a map of local authority recycling performance in England from **R6**, subsequently reproduced in **E9** (p. 30, para 92). The importance of geographical differences in recycling performance across different local authorities is highlighted in the Final Report and in a letter sent to the then-Minister for Local Government (Rishi Sunak MP) by Committee Chair Clive Betts MP in which he states:

'in determining how often waste should be collected, the number of recycling bins, or what services should be charged for, the government appears to have forgotten that what works in rural areas may not be suitable for cities' (**E10**).

5. Sources to corroborate the impact

E1: Letter of invitation from GO-Science to Professor Nicky Gregson to attend scoping event for Evidence Report, 21 January 2016.

E2: Letter of invitation from GO-Science to Professor Nicky Gregson to co-author framing Chapter 1 of the Evidence Report.

E3: UK Government Office for Science (2017) Chapter 1: What is waste?, in *From Waste to Resource Productivity. Part II, Evidence Report and Case Studies.*

E4: UK Government Office for Science (2017) *From Waste to Resource Productivity*. *Part I, Summary Report from the Government Chief Scientific Adviser and the Defra Chief Scientific Adviser.*

E5: Department for Business, Energy, and Industrial Strategy (2017) *Industrial Strategy: Building a Britain Fit for the Future.*

E6: Department for the Environment, Food, and Rural Affairs (2018) *A Green Future: Our 25 Year Plan to Improve the Environment.*

E7: Department for the Environment, Food, and Rural Affairs (2018) *Our Waste, Our Resources: A Strategy for England.*

E8: Department for the Environment, Food, and Rural Affairs (2018) *Our Waste, Our Resources: A Strategy for England, Evidence Annex*.

E9: House of Commons Housing, Communities and Local Government Select Committee – Implications of the Waste Strategy for Local Authorities Inquiry (March-September 2019). The Final Report is available at https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/2071/2071.pdf.

E10: Letsrecycle 17 July 2019: *MPs question strategy 'flexibility' and funding*. Available at https://www.letsrecycle.com/news/latest-news/mps-question-strategy-flexibility-and-funding