Employment and the circular economy

Job creation through resource efficiency in London

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LONDON SUSTAINABLE DEVELOPMENT COMMISSION

MAYOR OF LONDON

London Waste & Recycling Board

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Job creation through resource efficiency in London

Authored by Peter Mitchell, Head of Economics at WRAP, for the London Sustainable Development Commission, London Waste and Recycling Board and the Greater London Authority.

WRAP's vision is a world in which resources are used sustainably. Its mission is to accelerate the move to a sustainable, resource-efficient economy through:

- Re-inventing how we design, produce and sell products;
- Re-thinking how we use and consume products; and
- Re-defining what is possible through re-use and recycling.

WRAP works uniquely, and by design, in the space between governments, businesses, communities, thinkers and individuals – forging powerful partnerships and delivering ground-breaking initiatives to support more sustainable economies and society. Working with hundreds of businesses and local authorities, trade associations and charities to deliver change, WRAP turns thinking into action. It inspires those who have the power to effect widespread change and its influence is driven by evidence, insights and skills.

The London Sustainable Development Commission (LSDC) was established in 2002 to advise the Mayor of London on ways to make London a sustainable, world-class city. The Commission is an independent body, challenging policy-makers to promote a better quality of life for all Londoners, both now and in the future, whilst also considering London's wider global impacts. The Commission is made up of individual experts from the economic, social, environmental and London governance sectors. Commissioners give their time voluntarily, promoting sustainable development, embedding sustainability into London-wide strategies, and helping make sustainability a meaningful and understandable concept for all Londoners.

The current focus of the Commission is to support accelerated growth of decentralised energy, clean tech and the circular economy in London, as well as embedding sustainability innovation in the development of opportunity areas in the city and showcasing examples of sustainability in action.

The London Waste and Recycling Board (LWARB) brings together London's waste stakeholders and a range of partners to transform the management of waste in the capital. Its objectives are to support the production of less waste, an increase in the proportion of waste that is re-used or recycled, and the use of methods of collection, treatment and disposal of waste that are more beneficial to the environment in London through the delivery of three main programme areas:

- A three year circular economy project aimed at accelerating London's transition to a more circular economy through collaboration with the public and private sectors, and international partners;
- Resource London – a programme of support for London waste authorities jointly funded by LWARB and WRAP; and
- An infrastructure investment programme with an aim to help deliver the infrastructure that is needed to treat London's waste by providing funding in conjunction with the private sector. Funds are partly allocated to the London Green Fund (LGF).

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Contents

Foreword

Several city leagues confirm that London is the best big city to live in, to work in, and to visit – renowned for its culture, diversity, innovation and leading position in sectors such as finance and professional services. But it also has a vibrant green economy, with exceptional skills in renewable energy, carbon finance and sustainable building technologies. Indeed, a 2013 report concluded that London's Low Carbon Environmental Goods and Services[1] sector now contributes over £25.4bn to the economy, with strong growth of over 5% year on year.

I have set out a vision for London to become one of the world's most sustainable cities by 2050. So, last year, I reconfigured the London Sustainable Development Commission (LSDC), asking The Rt. Hon Lord Barker of Battle to take the chair and give it a new focus – driving the opportunities to be had from accelerating clean technology, decentralised energy and the circular economy in the capital. I believe there is huge potential in applying all of these to the planned infrastructure development in London's numerous Opportunity and Intensification Areas. I want London to showcase the art of the possible, engendering pride amongst the people who live in it, and attracting inward investment from companies wishing to locate here and learn from us.

Waste and materials, traditionally seen to be rather a dull topic, are poised for radical transformation in the capital. The principles of the so-called 'circular economy' have become better defined, and have captured the imagination of policy makers, businesses and entrepreneurs alike. It's now apparent that accelerating it could drive great benefits for the capital – increased profitability and competitiveness for business, cost savings on the city's significant waste management bills, reduced environmental impacts, and better self-sufficiency at a time of uncertain commodity markets.

The new LSDC has, over the last year, collaborated with the Greater London Authority (GLA), London Waste and Recycling Board (LWARB), and WRAP to conduct an analysis of what the circular economy would mean for employment in London by 2030. Now – as the new report highlights – we can say with confidence that, if supported in the right way, it could create jobs for thousands more of the people living here.

So how might we seize that opportunity and create those jobs? Well, in parallel, I asked LWARB to develop a route-map for the circular economy in London, defining the priorities for action. Together, this report and the route-map set out what could be achieved, and how we might go about achieving it.

I am grateful to all those involved for their tremendous work on this exciting topic. I urge central government, local authorities, businesses, developers and entrepreneurs alike to join me and to commit to making the change a reality.

Boris Johnson
Mayor of London

Summary

The United Kingdom faces substantial economic challenges in its use of labour and scarce natural resources. While the economy has significantly increased its resource efficiency in recent years, supply risks in an increasingly competitive context mean that better use of natural resources is needed.

Green Alliance and WRAP previously explored the impact of increasing resource efficiency and moving towards a more circular economy approach on jobs and the labour market in Britain[2]. That report indicated that the development of a more resource efficient circular economy, unlike other industrial transitions, could require more labour. It also indicated that regions in the UK where unemployment tends to be higher, such as in London, the North East and the West Midlands, could see the greatest impact in job creation, especially among low and mid-skilled occupations where job losses are projected in the future. Now, the analysis in this report builds on the findings for Britain, to identify the potential of the circular economy in London.

What is a 'circular economy'?

A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extracting the maximum value from them whilst in use, then recovering and reusing products and materials. It includes a hierarchy of options, starting with the most simple and low value option of recycling waste to recover materials, and moving to the redirection of unwanted goods for reuse by new owners in second-hand markets, to remanufacturing and replacing components of a product for resale. These may require companies to create new business models or processes, with take back schemes, and redesigning products for disassembly and remanufacturing or recovery. Ultimately products may also be offered on a leased rather than an owned basis, in something known as 'servitisation', so that single assets can be used by more people, reducing the pressure on resources, embodied carbon and embodied water entailed in the materials and processes required to manufacture them.

In the period from April 2014 to March 2015 there were on average 4,259,600 people in employment in London and 308,100 unemployed people[3]. However, such headline figures mask underlying trends that pose challenges to the labour market in London. First, there are substantial differences in unemployment rates across the city. Second, there's been a steady decline in the share of jobs that are mid-range in terms of their occupation and pay.

Green Alliance/WRAP[2] outlined three scenarios of potential development for the circular economy in Britain by 2030. This report builds on that, and investigates the potential for job creation of these same scenarios in London, specifically, based on our estimate for this study that there are currently around 46,700[4] people employed in circular economy activities in London.

The first scenario analyses the effects of no new initiatives and concludes that natural growth rates would result, by 2030, in a modest 1,100 net, new circular economy jobs.

The second scenario assumes that we maintain the current development path to 2030, resulting in an expansion of circular economy which could potentially create 16,000 new jobs (gross) in London in activities such as recycling, reuse, repair and remanufacturing. This could represent a 34.9% increase in London's total circular economy jobs by 2030 and a net reduction in unemployment of around 5,500 people.

In the final, 'transformative' scenario, a more extensive expansion of the circular economy could offer even greater potential for London, providing more than 40,000 new circular economy jobs (gross), reducing net unemployment in London by around 12,000 jobs (or 0.26 percentage points), by 2030. To put this into context, it represents 12.5% of excess employment at the time of the study.

The conclusion (see Table 1) is that the transition towards a more circular economy has the potential to make a real contribution to mainstream employment in the capital. With the right investment and policy interventions,

this transition could create up to 12,000 incremental jobs and deliver lasting reductions in unemployment, especially in low-skilled to mid-skilled occupations, whilst simultaneously driving resource efficiency. This conclusion will be supported by the development of a route-map to accelerate London's transition to a more circular economy, led by LWARB, the full version of which is due to be published in Spring 2016.

The rest of this report provides detail about the methodology and inputs used to reach these results.

Table 1: Job creation potential from expansion in circular economy in London

	Scenario 1 No new initiatives	Scenario 2 Current development	Scenario 3 Transformation
Circular economy jobs in 2030[5]	50,000	63,000	87,000
Job creation (gross)	3,000	16,000	40,000
Job creation (net)[6]	1,100	5,500	12,000
Unemployment rate fall (% points)	0.02	0.12	0.26
Proportion of 2014-15 excess unemployment (%)	1.1	5.7	12.5

Analysis undertaken

Below we set out the key considerations pertaining to our analysis. First, we set out the basic premise of 'mismatch' and its influence on net job creation. Next, we explain how we created a baseline of current employment in circular economy activities for London and the three 2030 scenarios, each of which assumes different rates of development for the various activities in the circular economy. Finally we discuss how the characteristics of the labour market and the existing circular economy in London impact the probability of displacement, which underpins the estimates of 'gross' jobs, and 'net' jobs.

Mismatch in London

Green Alliance/WRAP[7] provides a comprehensive discussion of economic issues relating to job creation, unemployment and mismatch. It outlines how integrating the labour requirements of an expansion in circular economy into the overall labour market allows a distinction to be made between gross and net job creation. Mismatch can arise either because of mismatch by region, where people looking for work don't live in the places where jobs are offered, and/or occupational mismatch, where the skills and employment experience of people looking for work don't match the jobs on offer.

The focus in this report is the extent to which a mismatch of jobs to available vacancies in London can be addressed through expansion of the circular economy and, throughout, the analysis draws on the most recent data sets available at the time of the study (July 2015).

The variation in average unemployment rates across London boroughs from April 2014 to March 2015 is shown in Figure 1. It indicates areas of low unemployment (Harrow, Richmond, Kingston, Sutton, Hammersmith & Fulham, Lewisham and Bromley) with rates in the 3.9% to 5.0% range, below the average for the capital as a whole, and on a par with the lowest unemployment anywhere in the UK. On the other hand, it also highlights areas where unemployment is much higher. In boroughs located in the east of London such as Southwark, Tower Hamlets, Newham, Greenwich, Redbridge and Barking & Dagenham, it ranges from 7.8% to 12.1%. Boroughs around the Lee Valley, such as Waltham Forest, Haringey and Hackney, along with Ealing, Havering and Westminster, also have relatively high unemployment (6.9% - 7.8%). Overall, London's unemployment rate is 6.7%.

Important in this analysis, however, is our notion of 'excess unemployment', whereby we assume that the lowest level of unemployment achievable is approximated by the lowest level observable elsewhere in the UK. Between April 2014 and March 2015, this was in the South East and stood at 4.6%. The difference between this figure and the average unemployment rate in London over the same period (6.7%) is the excess unemployment rate of 2.1%. It equates to just under 96,000 of the 308,100 people unemployed in London at that time.

As we demonstrate later on in this report, an expansion in London's circular economy has the potential to address this excess unemployment through reducing mismatch, offering new job opportunities across all of London's boroughs and, importantly, in areas where unemployment is high.

Several studies have highlighted the emergence of labour market mismatch stemming from the decline in the share of jobs that are mid-level in terms of their occupations, skills and pay. The changing structure of employment in London shows a similar trend, having witnessed a steady decline in mid-level job opportunities but more job opportunities at the top end and bottom end of the labour market.

As shown in Annex 1, mid-range occupations in London (i.e. administrative and secretarial jobs, skilled trades and crafts, and process, plant and machine operatives) have seen a fall in their share of total employment by 4.6 percentage points in the ten years since 2004, which equates to a loss of around 22,000 jobs. By contrast, lower paying occupations (jobs in personal care, leisure and other services, sales and customer services, and posts in elementary occupations) have, in aggregate, seen an increase of 1.3 percentage points in the share of employment, in the same period. For the higher pay and higher skilled occupations (including managers, directors and senior officials, professionals,

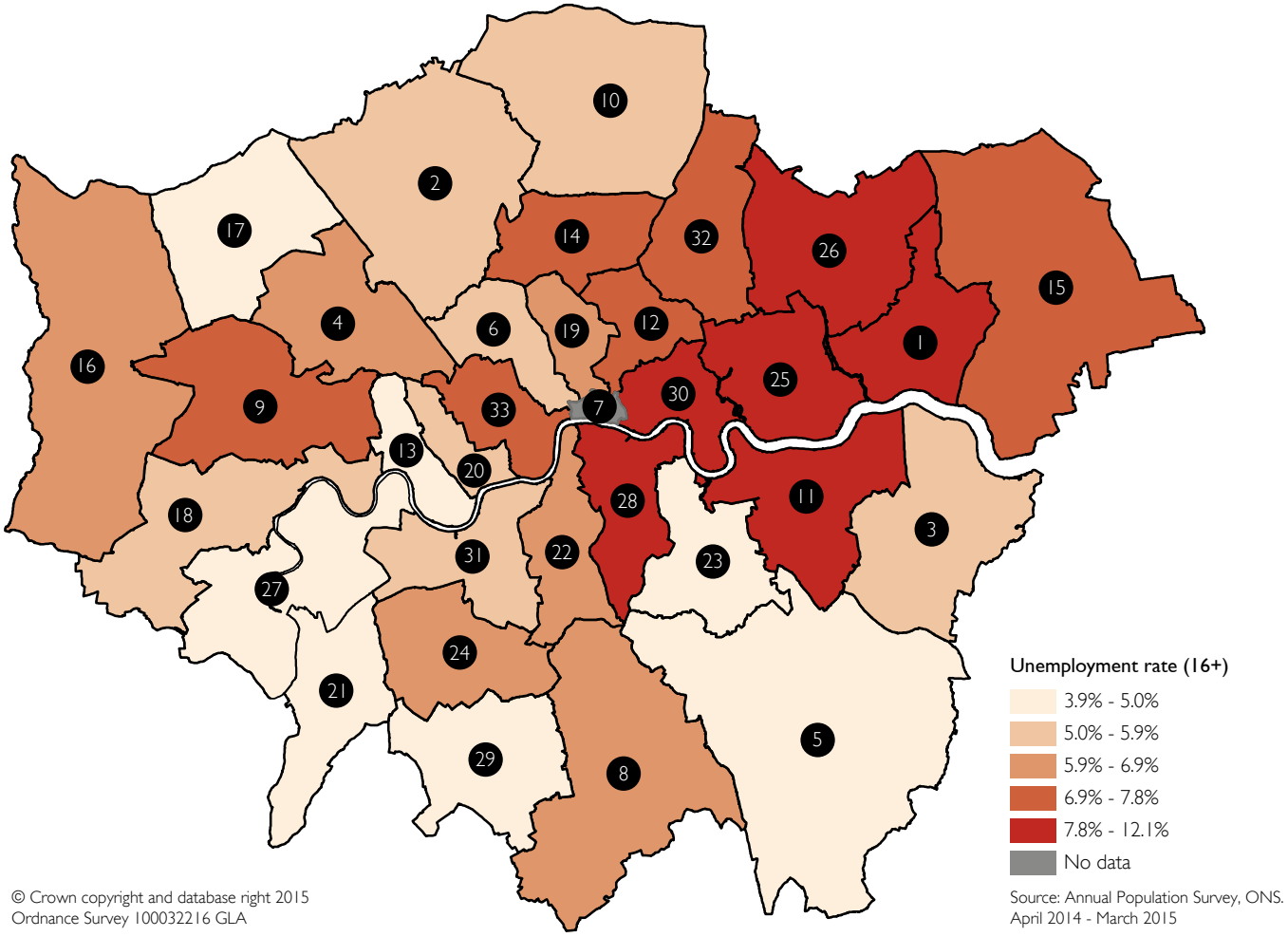
associate professionals and technical posts) the share of total employment in London has increased even more, by 3.2 percentage points.

Moreover, these trends in the occupational structure of London's jobs are expected to continue. Labour market projections[8] for London to 2036 show employment growth in most of London's service sectors but with continuing decline in manufacturing and services such as wholesale, transportation and storage, and public administration. Professional and managerial occupations are expected to grow but with a continued decline in clerical and secretarial posts.

Overall, the projections suggest that the share of jobs in London in high-skilled occupations is expected to increase by 4.8 percentage points by 2030, whilst only posting a slight increase of 0.7 percentage points for low-skilled occupations and a further decline of 5.5 percentage points in the share of mid-skilled posts in London.

Our analysis demonstrates that an expansion in London's circular economy is likely to create a range of jobs requiring differing education, skills, and training but at least some of these job opportunities are likely to be mid-level in terms of their occupation and skill requirements, thereby offering the potential to offset the steady decline in these posts, and lower mismatch.

Figure 1: Dispersion of unemployment in London (2014 - 2015)



Source: Annual Population Survey, ONS.
April 2014 - March 2015

1. Barking & Dagenham
2. Barnet
3. Bexley
4. Brent
5. Bromley
6. Camden
7. City of London
8. Croydon
9. Ealing
10. Enfield
11. Greenwich
12. Hackney
13. Hammersmith & Fulham
14. Haringey
15. Havering
16. Hillingdon
17. Harrow
18. Hounslow
19. Islington
20. Kensington & Chelsea
21. Kingston upon Thames
22. Lambeth
23. Lewisham
24. Merton
25. Newham
26. Redbridge
27. Richmond upon Thames
28. Southwark
29. Sutton
30. Tower Hamlets
31. Wandsworth
32. Waltham Forest
33. Westminster

Current jobs in circular economy activities in London

As part of this analysis we estimated the current jobs in the circular economy in the capital to establish three things: a baseline number, a split by type of activity (and associated pay level), and an indication of where they are located across the city.

Although the nature of circular economy activities and their relative employment shares will evolve as the transition to the circular economy accelerates, the level (and trend) in employment in the capital's businesses currently operating in the repair, reuse, recycling, and rental and leasing sectors can be thought of as a useful approximation to the circular economy as it currently stands in London, and provide a baseline from which to explore our future scenarios.

Using this approach, our analysis[9] suggests that there are around 46,700 people currently employed in circular economy activities in London (see Table 2 for a summary and the Annex 2 for a detailed breakdown).

As might be expected, a substantial proportion (28.9%) of these jobs are in the waste and recycling sector, which has grown considerably over the past decade or so, as household recycling rates in London have increased from 9% in 2000/01 to around 34% today[10].

Table 2: Estimates of employment in circular economy activities in London, 2013

Activity	Number of jobs
Recycling: Waste collection, treatment, disposal and recovery of sorted materials	12,500
Recycling: Wholesale of waste and scrap	1,000
Reuse: Repair of metal products, machinery and equipment	6,500
Reuse: Repair of computers, electronics and household goods	4,800
Reuse: Retail sale of second-hand goods	4,300
Remanufacturing[11]	0
Rental and leasing activities	17,500
Total[12]	**46,700**

Source: ONS BRES, 2014

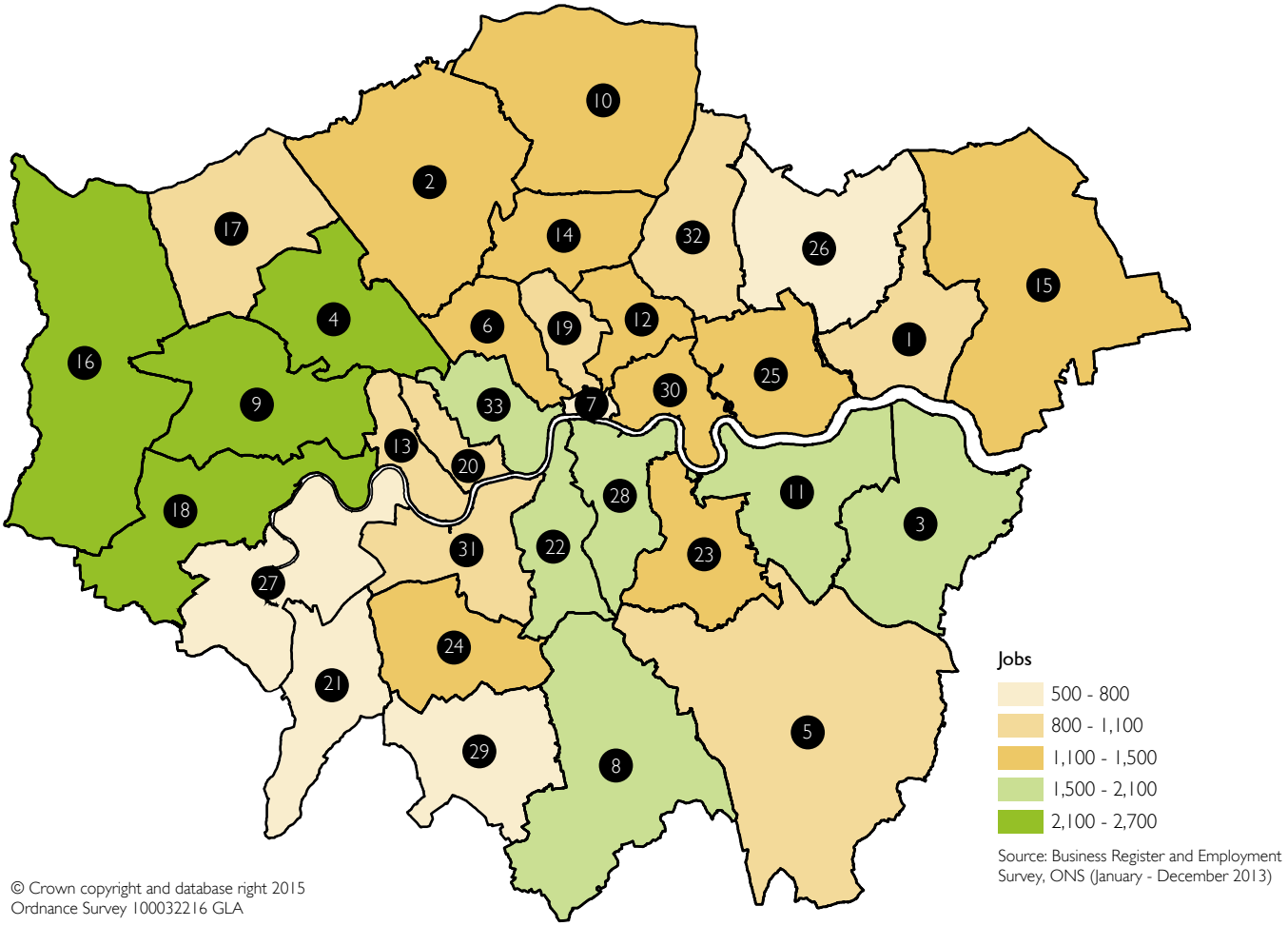
It's also worth noting that almost 38% of the current jobs are in rental and leasing activities. At present these are mostly in the traditional markets such as leasing of vehicles, machinery, household or sports goods but it is envisaged that the nature of 'products' delivered via such rental/leasing activities will evolve towards the more innovative, as resource-efficient business models and the newer 'sharing economy' business approaches expand.

Meanwhile, the level of remanufacturing in London is assumed to be low, in part because original manufacturing is not as prevalent in London as in other regions of the UK, and in part because there is no regional data on activity in this type of circular economy activity at present so it is excluded in the baseline, in line with the conservative principles of the analysis as a whole.

The Green Alliance/WRAP[2] report set out the distribution of circular economy jobs across different pay grades, and showed how these span across high, medium and low-pay grades. This was confirmed in our London-focussed analysis, as set out in Annex 3.

Finally, our analysis indicates that the current jobs are more or less dispersed across all of the boroughs in the capital (see Figure 2), suggesting that growth in circular activities could benefit all boroughs. That said, it is interesting to see that there are concentrations of circular economy activity in boroughs with high unemployment such as Greenwich, Southwark, and Ealing and that some of them are in priority Opportunity Areas[13], such as Brent, Ealing and Bexley, suggesting that the circular economy could be integrated into the planning for these Opportunity Areas.

Figure 2: Dispersion of current jobs in circular economy activities in London



1. Barking & Dagenham
2. Barnet
3. Bexley
4. Brent
5. Bromley
6. Camden
7. City of London
8. Croydon
9. Ealing
10. Enfield
11. Greenwich
12. Hackney
13. Hammersmith & Fulham
14. Haringey
15. Havering
16. Hillingdon
17. Harrow
18. Hounslow
19. Islington
20. Kensington & Chelsea
21. Kingston upon Thames
22. Lambeth
23. Lewisham
24. Merton
25. Newham
26. Redbridge
27. Richmond upon Thames
28. Southwark
29. Sutton
30. Tower Hamlets
31. Wandsworth
32. Waltham Forest
33. Westminster

Scenario analysis

From the baseline estimates, our analysis estimates the 2030 job creation potential of expanding the circular economy in the capital. Starting with the gross number of jobs envisaged as a result of the assumptions in the three 2030 scenarios[14] developed for Britain, in Green Alliance/WRAP[2], our analysis apportions a share of these to London, based on its current share of the UK-wide total. A full description of the assumptions in the scenarios is set out in the report for Britain, but the key characteristics are included below in Table 3.

Table 3: Characteristics of the circular economy development scenarios to 2030

Assumptions	Scenario 1 No new initiatives	Scenario 2 Current development	Scenario 3 Transformation
Recycling rate (all waste streams)	55%	70%	85%
Remanufacturing	No change	Rises to 20% of total UK manufacturing activity	Rises to 50% of total UK manufacturing activity[15]
Reuse	Slight growth (10%)	Slight growth (10%)	Significant growth (25%)
Servitisation	Limited growth (5%)	Modest growth (30%)	Substantial growth (100%)

In each case, the likely expansion of the various activities allows an estimate of the potential circular economy jobs (gross) by 2030. Although many of these jobs will be filled by displacement from existing employment, net jobs are created where unemployment due to mismatch is reduced. A displacement probability factor (based on the degree of excess unemployment in each scenario) is applied to the gross jobs to estimate the number of net jobs created. In our analysis, these probabilities for London are set at 60%, 62% and 67% respectively for scenarios 1, 2 and 3. The increase in the probability of displacement in the more expansive scenarios reflects the fact that, as the circular economy grows and labour demand increases, excess unemployment reduces and it is more likely that new jobs will displace existing ones. The gross to net calculation also allows for the fact that some jobs may be filled by people migrating to the UK.

The first scenario assumes that there are no new initiatives undertaken but that there is some advancement in circular economy activities, mostly in the recycling sector and the repair and reuse sectors, but no advance in remanufacturing and limited development in the adoption of servitisation approaches. It suggests an increase by 2030 in employment of around 3,000 jobs (gross) in circular economy activities in London, with a net reduction in unemployment of around 1,100 (see Table 4).

The second scenario considers a continuation of current trends in the development of circular economy activity, in which recycling, repair and reuse see higher increases than in the first scenario, and there is also moderate progress made in remanufacturing and servitisation. The estimates in this scenario indicate that by 2030 there is potential to create over 16,000 jobs (gross) in London, with net creation of around 5,500 jobs.

The third assumes that there is a much more extensive development of circular economy activity with recycling reaching high levels, significant progress in repair and reuse and substantial advancement in remanufacturing and servitisation activity. The indicative results in this scenario suggest that by 2030 employment in circular economy activities in London could increase to 87,000 (growth of 83%), creating around 40,000 jobs (gross) and reducing unemployment by around 12,000 people.

Table 4: Job creation potential from expansion in circular economy in London

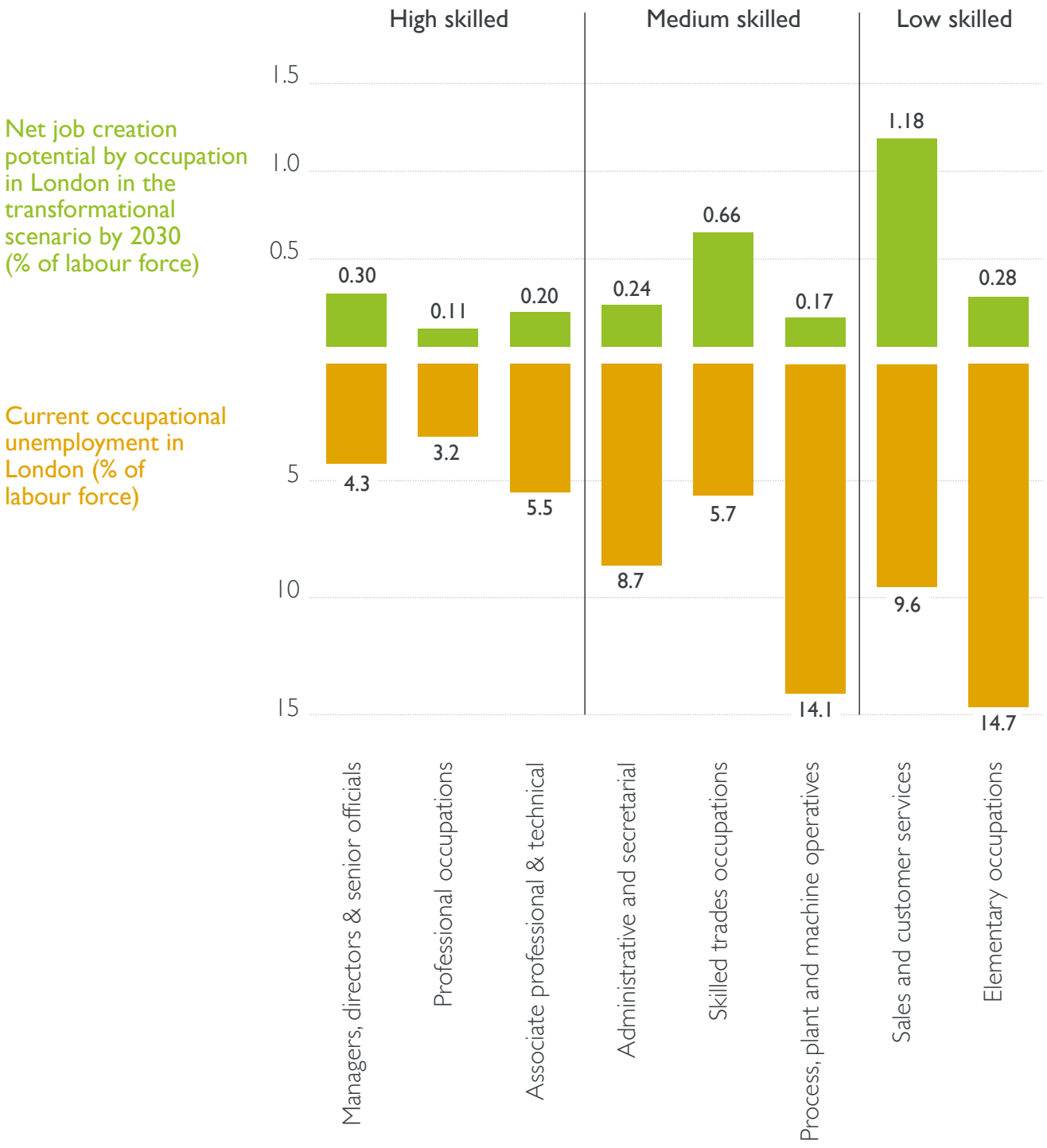
	Scenario 1 No new initiatives	Scenario 2 Current development	Scenario 3 Transformation
Circular economy jobs in 2030[16]	50,000	63,000	87,000
Job creation (gross)	3,000	16,000	40,000
Job creation (net)[6]	1,100	5,500	12,000
Unemployment rate fall (% points)	0.02	0.12	0.26
Proportion of 2014-15 excess unemployment (%)	1.1	5.7	12.5

A growing circular economy in London offers the potential to create a range of jobs in a variety of occupations and with differing education, skills, and training requirements. Importantly, with at least some net job opportunities from an expansion in circular economy in London being mid-level in terms of their occupation and skill requirements, it can offer the potential to create posts in occupations where unemployment is currently high and which are expected to see continued decline in future.

Figure 3 illustrates the potential for net job creation by each occupation, by skill/pay-grade, in the transformative scenario. It shows that expansion in circular economy can make a positive contribution to both low-level and mid-level skills, where unemployment is the highest, in particular for people working in sales and customer service or skilled trades and occupations. While the chances of being unemployed in London are much lower for high-skill occupations (managers, professionals, associate professional and technical posts), expansion in London's circular economy offers net job creation opportunities in these occupations, too.

In summary, the results of this analysis suggest that – with the right investment and policy interventions – the circular economy could potentially provide 40,000 jobs in the capital, with up to 12,000 of these being net, additional jobs. This would reduce unemployment by 0.26 percentage points, or 12.5% of our estimate of London's excess unemployment.

Figure 3: Net jobs created by occupations/skill level by 2030 in London



Annex 1

Occupational structure of employment in London: change in employment share January 2004 to December 2014

	Share of employment	Change in share of employment	Average wage
	%	% point	£/hr
High-wage occupations			
Managers, directors & senior officials	11.8	0.5	34.71
Professional occupations	23.9	1.9	24.69
Associate professional & technical	18.1	0.7	21.44
Total		**3.2**[12]	
Mid-wage occupations			
Administrative and secretarial	10.7	-3.2	14.48
Skilled trades occupations	7.6	-1.0	13.19
Process, plant and machine operatives	4.2	-0.4	13.30
Total		**-4.6**	
Low-wage occupations			
Personal care, leisure and other services	7.5	1.0	10.86
Sales and customer services	6.9	-0.3	10.01
Elementary occupations	9.4	0.6	8.97
Total		**1.3**	

Source: ONS APS, ASHE, 2015, WRAP calculations

Annex 2
Employment in circular economy activities in London[17]

	London	Great Britain
Repair of machinery & equipment	**6,500**	**97,400**
Repair of fabricated metal products	100	6,900
Repair of machinery	2,100	32,900
Repair of electronic and optical equipment	100	5,000
Repair of electrical equipment	300	6,000
Repair and maintenance of ships and boats	-	6,500
Repair and maintenance of aircraft and spacecraft	700	16,900
Repair and maintenance of other transport equipment	1,300	9,400
Repair of other equipment	1,900	13,800
Waste collection, treatment, disposal & recovery of sorted materials	**12,500**	**122,000**
Waste collection	9,000	59,800
Waste treatment & disposal	2,500	35,200
Recovery of sorted materials	1,000	26,900
Wholesale of waste and scrap	**1,000**	**11,900**
Retail sale of second-hand goods	**4,300**	**32,600**
Rental & leasing	**17,500**	**147,600**
Renting and leasing of cars and light motor vehicles	5,200	41,600
Renting and leasing of trucks	600	11,100
Renting and leasing of recreational and sports goods	1,400	6,800
Renting of video tapes and disks	500	2,900
Renting and leasing of media entertainment equipment	900	2,600
Renting and leasing of other personal and household goods	2,600	11,700
Renting and leasing of agricultural machinery and equipment	100	1,300
Renting and leasing of construction and civil engineering machinery and equipment	1,900	33,900
Renting and leasing of office machinery and equipment (including computers)	300	2,100
Renting and leasing of passenger water transport equipment	-	500
Renting and leasing of freight water transport equipment	100	400
Renting and leasing of passenger air transport equipment	100	300
Renting and leasing of freight air transport equipment	-	200
Renting and leasing of other machinery, equipment and tangible goods	3,700	32,200
Repair of computers, electronics and household goods	**4,800**	**49,500**
Repair of computers and peripheral equipment	3,300	31,200
Repair of communication equipment	400	3,400
Repair of consumer electronics	200	3,300
Repair of household appliances and home and garden equipment	200	3,900
Repair of footwear and leather goods	300	2,000
Repair of furniture and home furnishings	200	2,300
Repair of watches, clocks and jewellery	100	1,300
Repair of other personal and household goods	200	1,900
Total	**46,700[17]**	**461,000**

Source: ONS BRES, 2014. Figures are for 2013.

Annex 3
Average gross hourly pay in circular economy activities in London

Activity	Pay
Waste collection, treatment and disposal activities; materials recovery	£13.19/hr
Repair of metal products, machinery and equipment	£20.58/hr
Repair of household goods	£17.37/hr
Rental and leasing activities	£13.69/hr

Source: ONS, ASHE 2014

Notes

1 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/224068/bis-13-p143-low-carbon-and-environmental-goods-and-services-report-2011-12.pdf

2 Green Alliance/WRAP (2015a) Employment and the circular economy: job creation in a resource efficient Britain, Julian Morgan (Green Alliance) and Peter Mitchell (WRAP).

3 ONS Annual Population Survey (April 2014 to March 2015), all employed and unemployed aged 16+. Figures are the latest available at the time this study began. More recent figures for the capital show 4,319,000 people in employment and 297,000 people in unemployment (ONS Regional Labour Market Statistics, July to September 2015), suggesting that the former are acceptable as an indicative headline summary of London's current Labour market situation.

4 Employment figure rounded to the nearest 100.

5 Employment figures rounded to the nearest 1,000 for 'Circular economy jobs in 2030' and 'Job creation (gross)'

6 Total jobs created directly, less any jobs lost in displaced activities. No indirect or induced employment is included.

7 Green Alliance/WRAP (2015b) Opportunities to tackle Britain's labour market challenges through growth in the circular economy, Julian Morgan (Green Alliance) and Peter Mitchell (WRAP).

8 Labour market projections for London, GLA Economics, 2013.

9 Estimates for London are based on a mapping of employment in circular economy activities from official statistics which is described in detail in Green Alliance/WRAP (2015a). While this approach clearly has limitations, it is an approach which uses the best available information from official statistics and is useful in that, given a lack of any alternatives, it is an attempt to quantify the current level of employment in circular economy activities and provides an indicator to establish broad trends and track progress in employment in businesses currently operating in sectors with a high propensity towards circular economy activities, namely the repair, reuse, remanufacturing, recycling and rental & leasing sectors.

10 The 2012/13 household recycling rate in London is 33.9% see http://data.london.gov.uk/dataset/household-waste-recycling-rates-borough.

11 Baseline figures for jobs in London's remanufacturing sector are not available and are therefore, conservatively, assumed to be zero.

12 Due to rounding figures do not sum to the total.

13 https://www.london.gov.uk/priorities/planning/opportunity-areas

14 The quantification of labour market impacts in these scenarios is based on cautious assumptions, and therefore should be considered illustrative rather than definitive, particularly as the nature and pace of future technological change is highly uncertain.

15 Dr G Lavery, N Pennell, S Brown and Professor S Evans, (July 2013), The Next Manufacturing Revolution: Non-Labour Resource Productivity and its Potential for UK Manufacturing. Report envisages 50% of manufacturing will be in remanufacturing by 2030, making a total of 312,000 remanufacturing jobs in UK, versus current UK wide rate of 1%. Scenario 3 uses this estimate. Scenario 2 assumes a less ambitious increase in remanufacturing.

16 Employment figures rounded to the nearest 1,000 for 'Circular economy jobs in 2030' and 'Job creation (gross)'.

17 All figures are rounded to the nearest 100 jobs. Sub totals may not sum, due to rounding.

MAYOR OF LONDON