

➤ **Beyond Waste:** Essential Skills for a Greener Tomorrow

Short Report | March 2023



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> About CIWM

CIWM is the leading membership organisation for professionals in the resources and waste management sector, representing and supporting over 5,500 individuals across the UK and overseas.

At CIWM, membership means more for professional life: more knowledge, more connections, more resources, more representation, more partnerships and, ultimately, more potential.

We empower our community of members to achieve success and play a vital role in shaping the future of the resources and waste management sector, ensuring our members' views are represented and that policy development is informed by theoretical and practical understanding and experience.

It is our mission to unite, equip and mobilise our community of members to lead, influence and deliver so that, together, we can achieve our shared purpose: to move the world beyond waste.

To find out more about CIWM and how you can become a member, visit ciwm.co.uk





➤ Our sector is at the heart of the green industrial revolution

It has been two years since our first sector perspective report ([Skills for the future: The journey to 2030](#)) was published and so much has happened since then. There have been some delays on key policies which hasn't helped with the expected transition, but there has been a great deal of analysis, collaboration, and preparation about how we make the transition (when it happens) as seamless and efficient as possible. We all believe in a more circular economy which delivers on our resource reduction, resource efficiency and decarbonisation agendas, we just need to work together on making it a reality.

Many of us working in the sector recognise the risks and opportunities that face our colleagues across the sector, and specifically for the members of CIWM, from a sector in rapid transition. As part of this report, we have engaged members and non-members alike from all aspects of the sector to share their experience and expertise with this timely contribution to an ongoing and critical government work programme. We welcomed their input, their honesty, and their commitment to understanding the sector's needs and planning for its successful transition.

The Circular Economy is not an option. More closed loop services, products, packaging and systems are not only inevitable but are critical for protecting the planet, supporting communities and rebuilding our economy. Our sector is at the heart of delivering the sector's ambitions for Net Zero, enabling mass scale industrial and commercial transformation of supply chains whilst empowering entrepreneurs and innovators to develop the technologies and business models of tomorrow.

We must decarbonise our sector, as well as play a critical role in supporting every other sector on their journeys. Having the right skills, the right training programmes, and right support networks in the right places at the right times is critical for delivering on this agenda. We appreciate the opportunity to contribute to the government's Green Jobs Delivery Group to ensure that our sector and all those in transition do so collaboratively, effectively, and successfully – driving the UK's green industrial revolution forward.

Dr Adam Read, Immediate Past President and Trustee, CIWM
Chief External Affairs and Sustainability Officer, SUEZ Recycling & Recovery UK



➤ Our workforce is central to the transition to a circular economy

People are the force behind our economy, our infrastructure, and our day-to-day lived experiences. They create and participate in the downfall or success of our society. People are at the heart of every business, and that is why every business should be focusing on how to support, equip and empower their people.

Understanding the current skills position and future skills needs of the people within our sector is central to achieving successful and sustainable growth not just for our sector, but for our whole economy. If we can't resource our services with the right people, with the right skills, at the right time, then the risks are both commercial and environmental. We have an opportunity to be the sector that powers the circular economy, influencing design and manufacturing decisions, at the same time as maximising resource efficiency and material reuse.

Reaching our full potential will require a workforce with a wide-ranging skillset, from communications and behaviour change to leadership, engineering, and new technologies. Identifying the exact skills, timeframes, and infrastructure needed to recruit, retrain, and upskill has been the focus of this research. This, and the fantastic work of CIWM's Skills for the Future Working Group over the last 18 months is helping us to shape our plans for the future, and ensure we remain vigilant and responsive to the ever-changing landscape.

We welcome the government's commitment to green growth, and the focus on delivering green jobs, but we also know there will be challenges ahead. This report highlights some of those key challenges, and the next steps for government, the sector, CIWM and CIWM members. We must act now, to ensure our people are ready for the transition ahead of us.

Katie Cockburn
Professional Services Director, CIWM

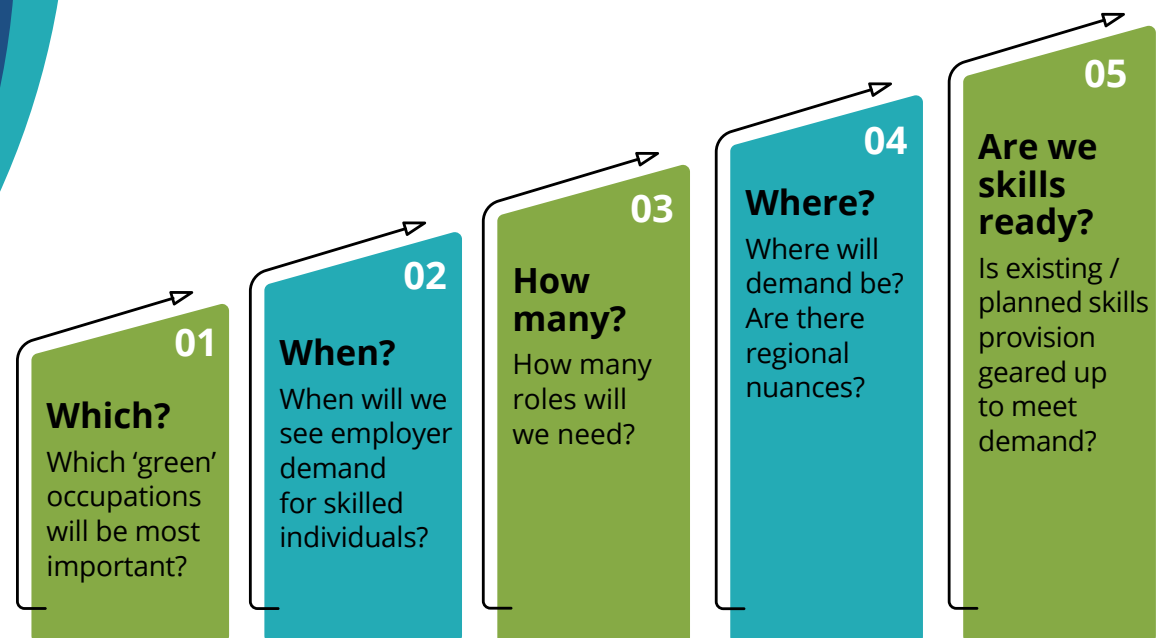
> Introduction

In June 2021, CIWM's (the Chartered Institution of Wastes Management) President (2021-2022), Dr Adam Read, launched the Institution's **Skills for the Future** report, which outlined the key skills needed by the waste and resources sector (the sector) as it approached a decade of major challenge and change, and became more circular in its approach. The report was a catalyst for action, with CIWM recognising that its members needed support to prepare for the future (from policy reforms and reporting needs to new infrastructure and services), and CIWM's voice was needed to advocate for this change and provide the sector with appropriate support.

Through Dr Adam Read, CIWM was invited to represent the sector on the UK Government's **Green Jobs Delivery Group**. Focused on sectors and skills needed primarily in England, the delivery group is the central forum through which Government, industry and other key stakeholders are working together to ensure that the UK has the workforce needed to deliver a green industrial revolution based on the **Net Zero Strategy (NZS)** and the **25 Year Environment Plan (25YEP)** set out by Government.

Each sector was tasked with providing data and insight about their own expected transitions and skills demands (scale and type) to support future Government policy decisions which would enable their targets to be hit and a green transition to be effectively delivered. Key themes to be assessed in these reports were: contribution to environmental goals; labour market transition impacts; and importance to UK economy. These themes drove five key questions (**Figure 1**), which all the identified sectors (waste and resources included) must answer.

Figure 1: Jobs and skills key questions

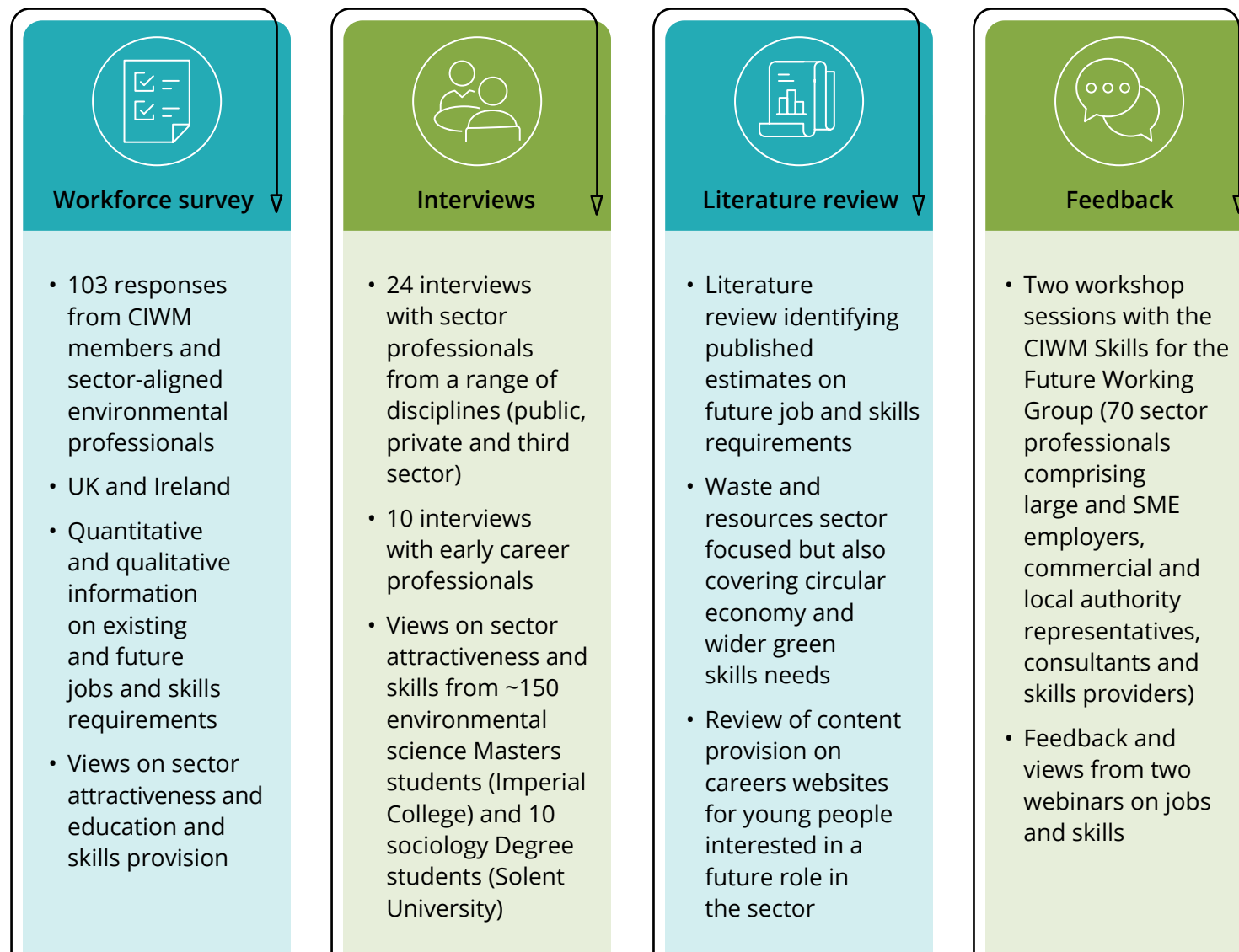


Our research

A range of different approaches have been used to collate the necessary evidence, views, and informed estimates from the sector to be able to answer the five key questions and map the transition our sector will need to undertake in the future. These approaches have included a workforce survey, structured interviews, a wide-ranging literature review and workshop feedback sessions with members of CIWM. See **Figure 2** for details of these approaches.

The geographical scope of this research has been aligned with the CIWM regions and nations where we have Centres (UK and Ireland). As such, skills requirements are included for all nations, but the sector job estimates we propose to 2040 focus on the UK only due to the differing policy environment within Ireland. This report presents the highlights from the research; the full report and appendices are available on the [CIWM website](#).

Figure 2: Research approaches



The Waste and Resources Sector today

It has always been difficult to define the boundaries of our sector because we are naturally embedded in the many sectors that we support, and this is increasingly the case as the portfolio of our services and sites has expanded. Broadly, our sector (worth ~ £78Bn¹) comprises of organisations involved in the collection, treatment and disposal of waste and resources (**Figure 3 page 8**) but this description is not sophisticated enough to encompass the full range of activities our sector has evolved to deliver in supporting the transition to a circular economy. CIWM has developed a definition (Box 1) which encompasses the current sector and how we believe it will evolve in the short to medium term future.

Defining the sector is important as it enables accurate data to be gathered on the number of organisations and people employed within the sector, which can be used as a baseline for future projections. For the UK in 2021, it was estimated that 142,800 (**Table 1**) people worked within the following Standard Industrial Classification code SIC 2007, which encompasses many (but not all) of the roles that we would describe as waste management.

Table 1: Standard Industrial Classification: SIC 2007 for Waste Management Activities

3811	Collection of non-hazardous waste
3812	Collection of hazardous waste
3821	Treatment and disposal of non-hazardous waste
3822	Treatment and disposal of hazardous waste
3831	Dismantling of wrecks
3832	Recovery of sorted materials

Box 1: CIWM definition of the Waste and Resources Sector



The Waste and Resources Sector

Our sector is at the very core of the circular economy. Without the sector, the circular economy cannot function and valuable resources are not kept in use for as long as possible.

The sector starts the moment something is discarded and finishes when something is disposed of, or when a material that can be used in the creation of a new product is passed to the manufacturer for repair, reuse or recycling.

We collect, sort, clean, grade, treat, transport and dispose of materials that have been discarded using services covering reuse, recycling, incineration of waste, biological processes such as anaerobic digestion of food waste, and landfilling of residual waste.

Current effective waste and resource management is critical for the conservation of natural resources, and so we are also at the heart of regulating and protecting the environment, supporting policy and innovation and communicating the importance of our sector.

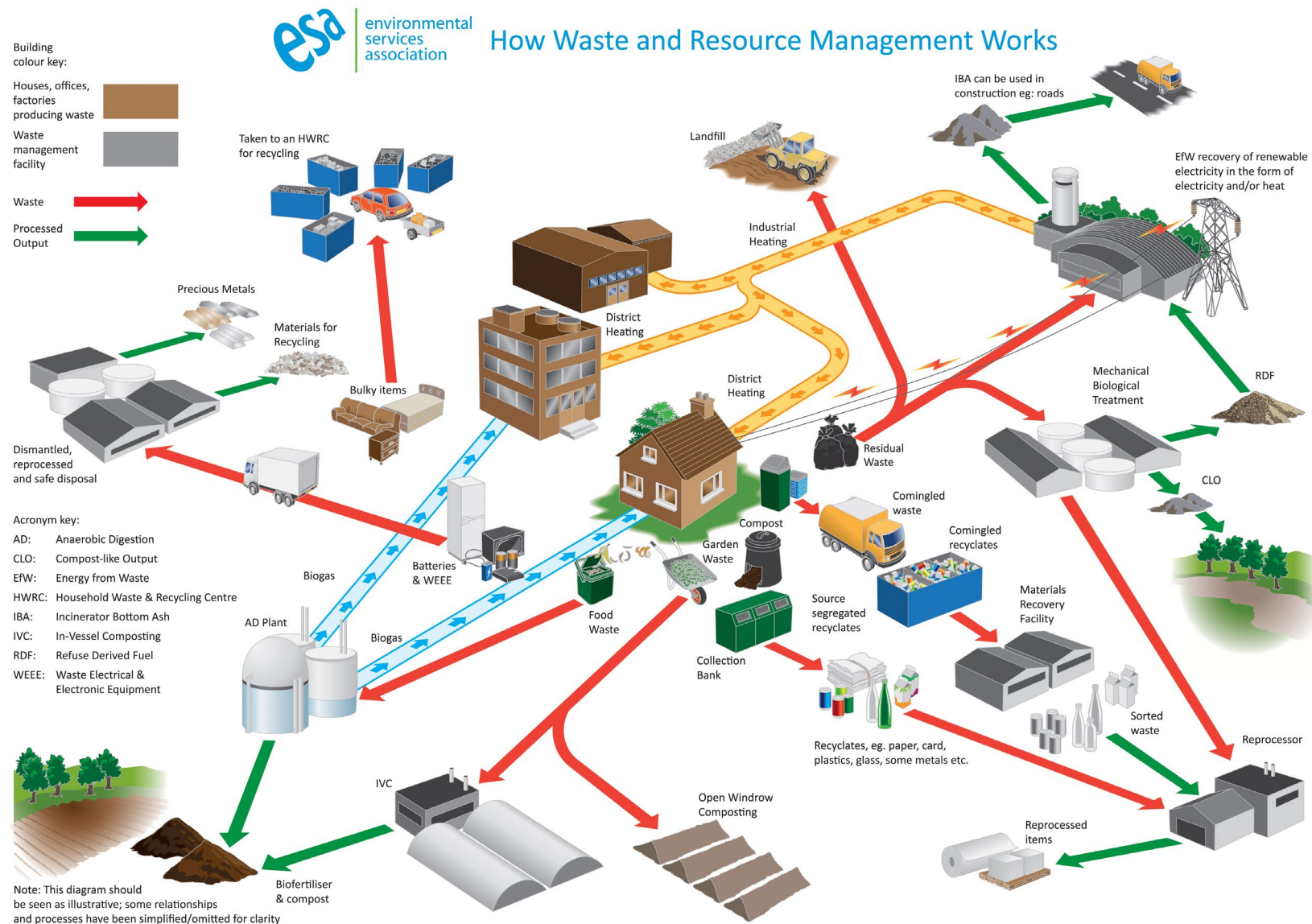
The future... A world beyond waste

In the future, to enable a truly circular economy, the waste and resource management sector will need to transition further and evolve in response to ever increasing pressure to enact positive change in the way that materials are managed.

This will need a sector that actively engages with corporate and public consumers to educate, advise and steer decision making in the design, development and consumption of materials.

It will include the exploration of new technologies, systems, behaviours and policy, and will become a sector intrinsically linked to all others.

Figure 3: Overview of how waste management works – from collection to treatment and disposal (ESA)²



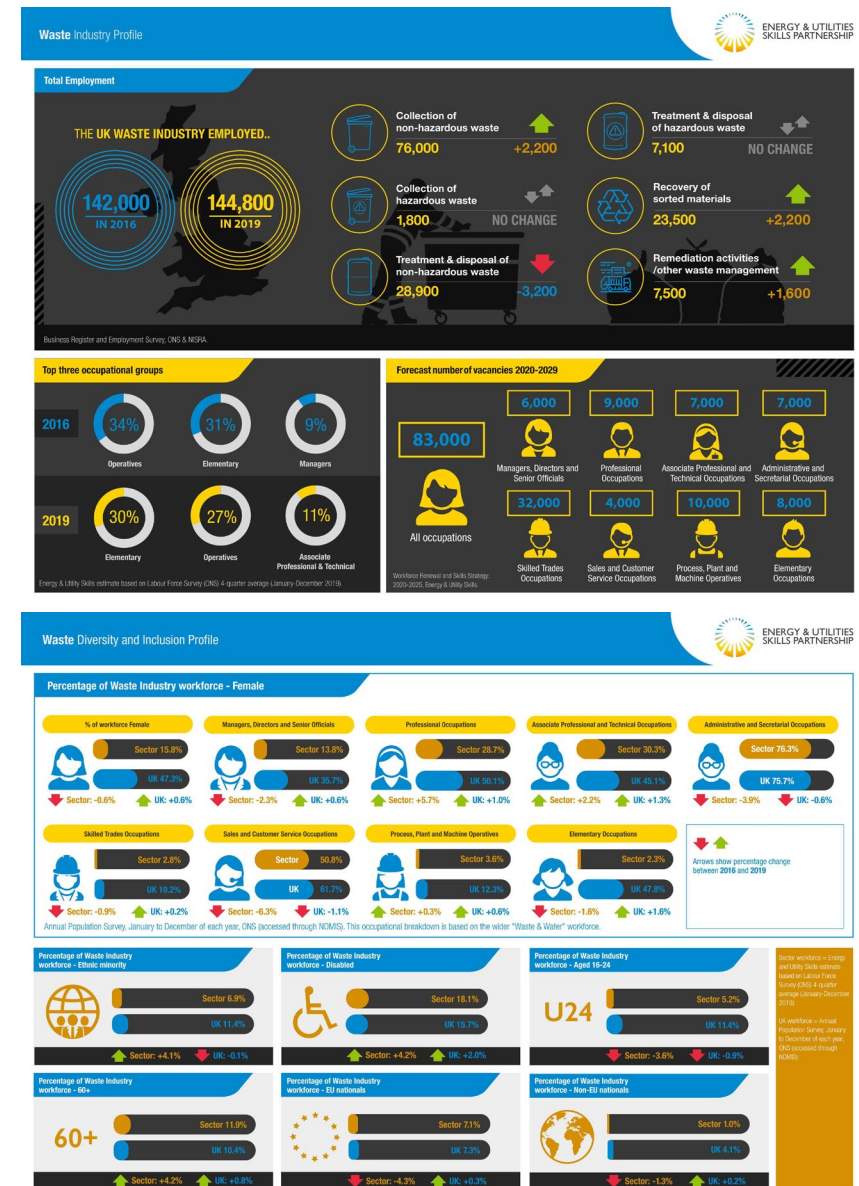
Accredited to The Environmental Services Association (ESA)

We rely on ONS data (including Labour Force Surveys and Business Register and Employment Surveys, ONS & NISRA) to understand sector performance and monitor changes over time. The Energy & Utilities Skills Partnerships provides a useful summary each year of core statistics and diversity and inclusion data (Figure 4).

Of particular note is that, within our sector, we have an ageing workforce, with 11.9% of the workforce over 60 and 5.2% aged 16-24. We also have lower levels of ethnic minority staff compared to the UK average (6.9% vs 11.4%), and we have low levels of females within the workforce (15.8% compared to the UK average of 47.3%). The percentage differences of females in the workforce is particularly stark at senior levels (13.8% vs a UK average of 35.7%) and within elementary occupations (2.3% vs UK average of 47.8%).

We clearly have work to do in attracting a diverse workforce that is reflective of wider society, CIWM has been leading the way to raise awareness of equality, diversion, and inclusion⁴ but there's always more to do, and this is everyone's responsibility if we're to attract a workforce fit for the future.

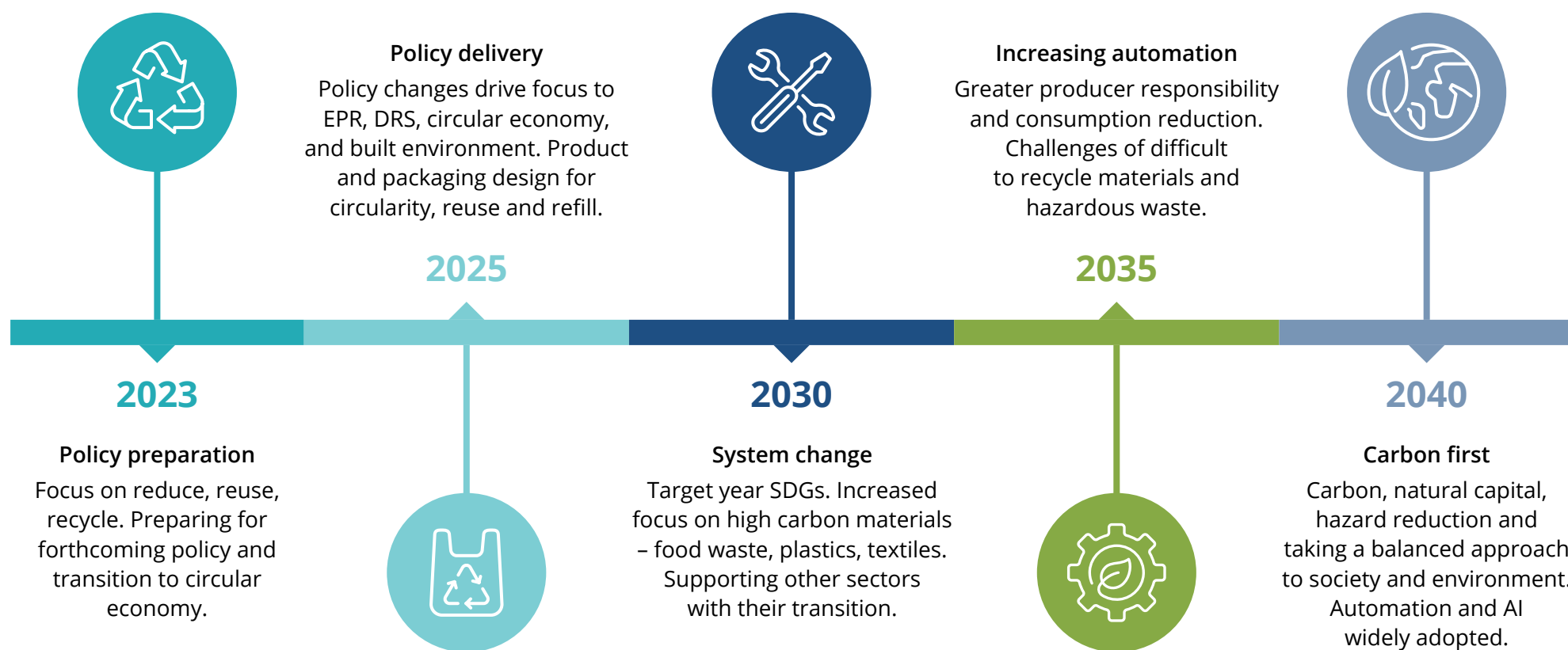
Figure 4: Waste Industry Profile – EU Skills³



A sector in transition

Official statistics don't tell the full picture of our sector though, which is one of significant transition – shifting from a linear to a more circular economy (**Figure 5**). This evolution will enable us to contribute further to the green industrial revolution, supporting the reduction of greenhouse gas emissions and consequently driving the creation and transformation of jobs and skills needs.

Figure 5: Broad sector transition between 2023 and 2040



The transition is being driven by a number of different factors highlighted in **Table 2**. These have been informed by responses to our survey and the interviews conducted. In the short term (to 2030), meeting forthcoming product and packaging policy will catalyse change and place a greater focus on designing out waste and designing products and systems for circularity. Jobs will grow during this time (as will new tasks for existing roles) as our sector complies with regulation and seeks to support other sectors to meet the requirements of producer responsibility and other policy. We'll also need to draw on our extensive communications experience to communicate the changes required by businesses and wider society.

From 2030 onwards, automation, digitisation and the increased adoption of artificial intelligence (AI) will accelerate change, potentially reducing (or changing) a number of jobs in these areas, such as material sorting and driving. Beyond 2030, we're looking at system change and increased investment in infrastructure and innovation which will also increase jobs. Our sector will take an active role as material custodians, using our extensive knowledge of material management to support other sectors to make their transition and facilitating material cycles.




With an increased emphasis on producer responsibility, we'll be supporting manufacturers to industrialise reuse and repair, and support high levels of recycling (e.g. extracting critical raw materials from Waste Electrical and Electronic Equipment (WEEE) at end of life). Roles currently within the waste sector, such as waste sorting and reuse, may sit within manufacturing as part of this phase of transition. We'll also be supporting sectors such as the renewables and transport sector to capture the materials they need to sustain growth (e.g. wind turbines, solar panels and batteries). We'll still be tasked with our continued role of pollution prevention, focusing on hazardous materials and currently difficult to reuse/recycle products as well as using carbon

capture, storage, and utilisation technologies. Choices will be driven by carbon, circularity, social value, and biodiversity, and will need to address the pressures of climate and supply chain resilience, delivering a just transition and restorative approaches to environmental protection.

As important as it is for our sector to transition, it's even more important that we support others. Our sector has always been an essential service and will continue to be – just one that leads the transition to a more circular economy rather than one that solely focuses on end of life.



Table 2: Drivers accelerating sector transition

 Drivers	 Impact and interdependencies	 Adoption Timeframe
Policy	Greater producer responsibility – and existing policy blockages (e.g. WEEE, batteries) unlocked. Products and packaging designed for circularity. Increased value stops the product entering the waste cycle at end of first life. Product delivery and take-back facilitated by logistics providers and brands and manufacturers – buy a product, use it, return it for repair, reuse, remanufacture, recycling. Greater focus on organics and working across the value chain to reduce food waste. Increased need for compliance and regulatory support.	Next 5 years
Costs	Cost of living crisis will continue to reduce consumption and slowly change buying habits, price of raw materials driving a greater focus on recycling/reuse/remanufacture for manufacturers and retailers. High costs of not complying with policy driving better compliance and design.	Next 5 years
Sector collaboration	Increasing numbers of organisations working together along the value chain (e.g. organics reprocessors working with farmers and supermarkets). Waste to resource – industrial symbiosis.	Next 5 years
Environmental protection	Providing pollution control to protect the environment. Addressing ‘new’ hazardous waste materials. Reducing greenhouse gas emissions.	Next 5 years
Environmental awareness	Adoption of environmental behaviours, greater awareness of eco choices, participation in circular economy models (renting, reuse, repair), social norming, greening transport, single use plastic reduction.	5-10 years
Circular business models	Product and packaging take back. Customer centric service models to provide ease of repair and rental (e.g. fashion rental, EV batteries), greater shared ownership of assets. Reuse and refill more widely adopted due to EU policy changes and brands harmonising product portfolios.	5-10 years
Artificial intelligence	Initially used to support technical delivery of advice, content creation for behavioural change, customer service support. Continued use in material sorting and waste treatment.	5-10 years
Commercial repair and Industrial reuse	Commercial tipping point reached driven by policy, costs, and resource scarcity. Product take back facilitates industrialisation of repair and reuse for new products and legacy items.	5-10 years
Emission reduction	Transitioning vehicles and fuel use to zero emission sources. Enabling carbon capture technology and delivering a zero-emissions grid to power infrastructure.	5-10 years
Automation	Greater efficiencies in material sorting. Adoption of autonomous vehicles.	10-15 years
Advanced treatment technologies	New technologies such as chemical recycling to extract greater value from waste and address difficult to recycle materials and hazardous waste.	10-15 years

> Five key questions

There are challenges ahead, and we need early identification of skills so that we can upskill existing staff to meet the scale and pace of change required.

We'll also need to attract new people into what's traditionally been perceived as an unattractive sector. This means that we may be competing with other more attractive 'green' sectors. Transition can't happen unless we're ready, and to be ready we need to understand what the five key questions mean for our sector.

Qu 1: Which 'green' occupations will be most important for driving the net zero transition in the near, medium, and long-term?

Survey responses and interview feedback provided a wide range of responses to this question, reflective of the diversity of the sector itself. Most cited were occupations/roles (or tasks within roles) that would accelerate the transition to Net Zero and the Circular Economy.

Table 3: Which green occupations will be most important for driving the transition?

Near-term 2023 – 2030	Medium-term 2030 – 2035	Long-term 2035 – 2040
Roles associated with policy development and implementation	Circular economy specialists	Net zero – carbon capture and storage
Design of products and packaging	Renewable energy specialists (materials, engineering)	Automation
Regulation and compliance	Change managers	AI
Collections and operations including drivers	Manufacturing – remanufacture	
Recycling managers	Industrial reuse and repair	
Reuse and repair operations (including volunteering roles)	Chemists and material scientists	
Material sorting		
Reprocessing (chemists and engineers)		



Of these roles, some respondents identified those they felt were most important. They were generally ones that are central to sector transition:



Circular Economy specialists

- Alternative business models (leasing & retained ownership)
- Strategy development
- Built environment
- Food systems



Design of products and packaging

- Reuse and refill
- Recycled content and recyclability design
- Alternative materials



Recycling

- Recycling managers – optimising recycling
- Material sorting
- Technology development for difficult to recycle materials



Renewable energy

- Circularity of materials for infrastructure
- Anaerobic Digestion



Change management

- Circular systems
- Behaviour change
- Transition planning and implementation

As part of the interviews, reuse and repair specialists were asked to reflect on whether there would be a significant growth in these roles in the future. Currently, these roles are often held by volunteers. It was felt that, unless the right policy and regulatory support was in place, this area would not scale as rapidly as predicted. Furthermore, commercial viability was considered to be a greater barrier to repair but supporting policy, such as extended producer responsibility, was considered helpful in driving this viability.

With increasing policy changes there's a need for more regulators and roles in compliance. This area also needs specific technical specialists (material and chemical) to deal with the potential identification of and increase in niche and potentially hazardous waste streams, as well as all the materials that will be considered 'not waste', to enable them to be remanufactured, repaired, refilled and reused, etc.

The need for greater identification and sorting of materials and extraction of value was highlighted by several interviewees with different timelines identified, specific to the role need. In the next five years, more collection operatives would be required to collect and sort materials from households and businesses. Beyond this time period, AI would continue to play an increasing role in sorting materials ranging from the broad components of municipal waste through to more specific textiles fibres for fibre-to-fibre technology in textiles recycling. Other commentators highlighted that the material flows could also apply to reusables and embedding reusable business models (e.g. take-back systems for restaurant take-out, etc).



When suggesting green occupations, respondents found it easier to identify roles (or needs) required in the short-term (to 2030) rather than beyond 2030, potentially due to current recruitment challenges but also forthcoming short-term policy drivers. They also didn't clearly differentiate between those that might be 'core' jobs and those that enable or are indirect⁵, something that may be useful when predicting when demand will occur.

“ There will be automation (within the textiles recycling sector), but this won't take away jobs in sorting for re-use. It will improve sorting efficiency for recycling grades and increase opportunities to supply more material for reprocessing to the emerging applications in a more cost-effective manner. In turn, this will help to create more jobs in the recycling and manufacturing phases. ”

Alan Wheeler, CEO, Textile Recycling Association, the UK trade association for collectors and processors of used clothing and textiles.

Figure 6: Definitions of role types within the circular economy – Circle Economy⁶



Core circular jobs

are all jobs that ensure the closure of raw material cycles, including jobs in repair, renewable energy, waste and resource management.

They form the core of the circular economy.



Enabling circular jobs

are jobs that remove barriers for and enable the acceleration and upscaling of core circular activities, including jobs that arise in leasing, education, design and digital technology.

They form the supporting shell of the circular economy.



Indirect circular jobs

are jobs that indirectly uphold the circular economy. These jobs occur in other sectors that do not play a direct role in furthering the transition to the circular economy but can still adopt circular strategies.

They include jobs that provide services to core circular strategies, including jobs in information services, logistics and the public sector.

Qu 2: When will we see employer demand for skilled individuals?

Over 60% of survey respondents indicated that their organisation had struggled to recruit for specific roles in the last year. This chimes with trade news highlighting sector vacancies and was echoed by several interviewees. EU Skills⁷ also forecast that the sector will have 89,000 vacancies between 2020 and 2029. There's a demand for skilled individuals across a broad range of roles now.

When asked a follow-on question regarding the roles that respondents were struggling to recruit for, there were some widely reported examples cited such as drivers and operatives, but also others that have not been as well publicised.

For drivers and operatives, the loss of staff as a consequence of EU Exit and the competition within the logistics sector for (delivery) drivers has had an impact on the sector. The consultancy market is changing rapidly and anecdotally it's been reported that there's movement of staff to 'client side' organisations or to other related disciplines, such as carbon or ESG (which are often better paid). Some local authorities have highlighted that, when they're going out to tender for specific support, they're getting a low number of bids returned compared to previous years.

These immediate pressures have influenced the views on when our sector will see employer demand for skilled individuals. When survey respondents were asked whether their organisation was conducting workforce planning, 45% stated that they were, with 31% stating they didn't know and just over 24% stating they weren't.

“We're seeing recruitment challenges across all geographical areas of local authorities in Wales. We need front-line service staff but there's a lot of competition. Unless we get these roles filled, we will struggle to deliver the essential services we provide as we move beyond recycling. Services such as new and expanding reuse and repair facilities can struggle to fill volunteer and paid roles. The visibility of opportunity in attracting persons with multiple skill sets is critical to our beyond recycling future.”

James Kay, Resource Efficiency Wales



To deliver the roles outlined in **Table 3** in the timeframes suggested, we also need to consider lead-in times and what core or enabling roles might be required. For example, if an Energy from Waste Facility is required to be operational by 2030, the process to support its development will already have been started and will have included roles such as local authority waste officers, consultants (waste modelling and forecasting, carbon), planning specialists, procurement officers, designers and architects, stakeholder engagement and consultation specialists, amongst others – before planning consent has been granted and any ground has been broken. These roles will be a mix of new and existing roles, some core (waste officer) and some enabling (designers etc.).

The construction phase will see the majority of jobs (indirect roles), while the operational phase will require fewer roles but will require specific skills. For example, the Peterborough EfW project⁸ generated approximately 250 jobs during the construction phase and only 28 for the operations phase. It's also recently been reported⁹ that up to 60 jobs are being created in Aberdeen by Biffa as part of the recycling centre infrastructure required to deliver Scotland's Deposit Return Scheme (DRS). Jobs range from multi-skilled operatives and drivers to administrators, supervisors, and managers.

Some of the demand can be addressed through upskilling of existing employees but, for specialist roles, our sector needs to consider whether we should be identifying where these roles exist in other sectors or whether we can work with universities to develop a pipeline of graduates with relevant skills. As an example, SUEZ worked with Sunderland University to co-design a course on Energy from Waste Operations after recognising that there was a skills gap in plant engineers for its new portfolio of facilities during the initial design stages of its earliest plants.

SUEZ created a rolling programme to support its pipeline of facilities throughout the UK which were in development and to ensure successful commissioning and having the right teams on each site during the build to iron out any snags before taking over the facility and running it on day one of the new contract. Almost all of SUEZ's EfW staff across its multiple sites and solutions have been through this industry-leading course, which is now widely utilised by other operators too.



Qu 3: How many roles will be needed?

The most challenging question to answer is how many roles will be required in the future. Numbers will be influenced by policy, new technology, commerciality of services, other sector activities and a range of other factors relating to local job markets and population increases. A wide range of studies have been published which reference future job scenarios for the transition to a more circular economy. It can be difficult to compare these studies given different definitions used, scope, timeframe and regionality, however they do provide a good indication of the scale of job need.

Often job estimates include indirect or enabling jobs as well as core jobs. For example, for the development of an EfW there could be a ratio of 250 jobs involved in the construction to 30 in operation, or a similar ratio for a biogas plant which may have 12 staff in operations but many more involved in design and construction. According to a report by the CCS¹⁰ (Carbon Capture and Storage Association), each large-scale plant would create about 1,000 to 2,500 jobs in the construction phase, though only a few hundred while in operation. For the DRS recycling facility, the jobs highlighted ranged from multi-skilled operatives and drivers, to administrators, supervisors, and managers. Essentially the development of green infrastructure has significant economic benefits and creates jobs within the local economy as well as employing skilled technical specialists.

For the waste and resources sector, the majority of roles currently sit within frontline operations – the staff that are collecting waste and recycling and taking it onwards for treatment and disposal. As described earlier, the journey our sector is on will mean that, to 2030, we will need more resource in this area so that materials are segregated to optimise value and food waste is collected from residents and businesses. As greater policy measures are introduced there may be a shift in operations as more end of life products and packaging is looped back for remanufacturing, reuse, and reprocessing. This may mean a transition in where staff are needed to support this approach.



The other major shift predicted is around reuse and repair. Keeping products circulating around the economy for longer is one of the central tenants of the circular economy, however to date there have been a number of barriers to this, including economics, perceptions of second-hand goods, ease of repair and refurbishment, convenience and ease of access to services. Depending on the goods involved these services are often provided by local authorities and charities and can rely heavily on volunteer support. To scale, the system needs to change. Policy support and commercial models will be required, however this will drive the need for significant employment. Within the Manchester Renew Hub¹¹ (outlined in the next section), the 30-40 volunteers and staff from other sites and services that transferred over have been upskilled to meet the demands of their role (upholstery, bike repairs, electrical testing, logistics, upselling, etc.) and are now permanent employees.



If every household in the UK had 2 items per year that were sent for reuse/repair/remanufacture then 56.2 million items would enter the system each year. If we estimated each item was 250g (the weight of an average mobile phone), then using the ratios that RREUSE¹² put forward below (based on feedback from their membership) the 140,500 tonnes could stimulate between 8,430 and 19,650 jobs (if only WEEE) or around ~10,000 jobs on average.

- Textile re-use: 20 – 35 jobs / 1,000 tonnes
- Multi household-product re-use: 35 – 70 jobs / 1,000 tonnes
- Electronic and Electrical Equipment re-use: 60 – 140 jobs / 1,000 tonnes
- On average, a social enterprise creates 70 jobs per 1,000 tonnes collected with a view of being re-used

The figures above are based on reuse organisations and use tonnage as the metric for estimations (a traditional metric for the waste and resource sector), however we also need to rethink what moving to a more industrialised model would be like, with dedicated technical specialists for reuse, repair, and refurbishment. This would need to consider a 'per item' estimate.

- if everyone in the UK returned 1 item per year for repair, and it takes 60 minutes to do the repair properly by technical specialists
- 56 million hours = 35 hours per week for 45 weeks = 35,600 employees needed
- whilst for 2 items this could increase to 71,200 employees
- this would cost £1.3 billion – to cover wages and on-costs (based on minimum wage levels etc).

Based on the estimations there is a significant number of jobs available within reuse and repair if the commercial model can be optimised to cover jobs and supporting infrastructure. The more items we can circulate into the reuse/repair/remanufacture loop, the more jobs we can create. Supportive policy is a must for new job creation.

Our estimates

Estimates were made of whether the number of roles would change for a given role group (either aligned to ONS SIC codes or wider thematic areas) for 2030, 2035 and 2040.

For all areas to 2035, it was felt that the number of roles would either increase (blue up arrow), increase significantly (Green up arrow) or stabilise (blue side arrow).

For a timeline beyond 2035 and 2040, it was felt that new technology may drive efficiencies within the sector that could further automate processes (causing a potential reduction in roles). Beyond 2030, it's also likely that waste management roles will be embedded in other sectors supporting them to transition to a more circular economy. This may require a rethink of sector data and definitions going forward.

Table 4: Job growth per role group (arrow denotes direction, green arrows denote significant increases) – ONS waste categories

Group	2030	2035	Comments
Collection of non-hazardous waste	↑	↔	Policy changes drive collection changes (EPR, DRS, food waste, additional materials from households etc.). Increased collection of some materials from businesses. Minor reduction in C&D waste – focus on refurb.
Collection of hazardous waste	↑	↑	Minor increase – POPs, PFAS and new hazardous materials / waste streams (batteries). NHS focus on reducing hazardous waste.
Recovery of sorted materials	↑	↑	Greater focus on material sorting and reprocessing.
Treatment and Disposal of non-hazardous waste	↔	↔	Some material reduction and circular business models.
Treatment and Disposal of hazardous waste	↑	↑	Minor increase – POPs, PFAS and new hazardous materials / waste streams (batteries). NHS focus on reducing hazardous waste.
Remediation activities / other waste management	↔	↔	Asbestos removal.

Table 5: Job growth per role group (arrow denotes direction, green arrows denote significant increases)
 – other sector roles supporting the circular economy

Group	2030	2035	Comments
Collection, sorting and recovery of sorted materials	↑	↔	Increased demand to 2030 mainly focussed on greater segregation of materials. Post-2030, jobs may transition into other sectors, increased use of AI, some increases for hazardous waste.
Reuse and Repair	↑	↑	Increase in voluntary sector initially. Industrialisation driven by regulation creates further paid jobs in remanufacture.
Consultancy / Professional Services	↑	↑	Increasing need to provide advisory to sectors outside of our own.
Communications and behaviour change	↑	↑	Linked with EPR and increased regulation.
Design	↔	↔	Input into design and manufacturing.
Business support	↑	↑	Increased need for businesses to upskill and take on more staff (in addition to consultancy support) to respond to forthcoming policy.
Regulation	↑	↑	Increasing need for regulation.
Facilities Management	↔	↔	Changing role of the workplace.
Vehicles manufacture, repair, ELVs	↑	↑	Electric vehicles driving need for increase in skills.
Textiles	↑	↔	Consumer and business interest. Future EPR driving change. Some role for AI.

Group	2030	2035	Comments
Circular economy business models e.g. reuse and refill	↑	↑	Slow increase to 2030 driven by changes in Europe (reuse and refill policy), Rapid increase beyond 2030 due to widespread adoption.
Technical Infrastructure development – treatment and disposal	↑	↑	Slow increase to 2030 due to long lead in times for infrastructure and wait for investable conditions. Greater progress beyond 2030. Development of chemical recycling, waste to fuel etc.
Construction and demolition	↑	↑	Increased focus on design for a circular economy creating jobs through the supply chain from waste planners through to C&D audits to identify opportunities for reduce and refurbishment.

Translating the direction of travel to more specific role numbers is more challenging. The majority of people currently employed within the sector work in collections, followed by treatment and disposal. The policy changes on the horizon will require additional staff to work in all of these areas to make sure that materials are collected, sorted and reprocessed. However, the real growth area in terms of scale of jobs is in reuse and repair (currently voluntary roles at best), and other activities aligned with new circular economy business models.

Sector estimates were conducted for England which looked at local authority run services, including switching to source segregation from households. The estimates indicate that, if additional materials are collected at the kerbside and services are rolled out to businesses so that they are required to collect recycling and food waste, this will increase the number of roles to 15,200, with additional supporting roles in bulking and haulage, communications and also on-site HWRC reuse provision.

The Waste Scotland Regulations are driving businesses to recycle more and collect food waste. Local authority services could be optimised for better source segregation, and greater reuse supported by local authorities could be delivered. It's estimated that 700 staff would be required to optimise services with an additional 300 employed in supporting roles in Scotland.

Within Wales, source segregation is more advanced than England and mandatory food waste collections for businesses will start in Autumn 2023. Money is available to invest in behaviour change and transitioning to a more circular economy. It's estimated that 300 staff would be required to optimise services and support food waste collections and an additional 150 staff would be employed in supporting roles. Similar figures are predicted for Northern Ireland of 450 new roles in total.

Table 6: Estimates indicating the scale of jobs required (UK)

Theme	Total estimate – new roles by 2030	Total estimate – new roles by 2035	Total estimate – new roles by 2040	Aggregated total of new roles on top of today's baseline
Collection, sorting, treatment and disposal	18,100	2,000	1,000	21,100
Reuse and repair	20,000	40,000	80,000	140,000
Consultancy / Professional Services	5,000	2,000	2,000	9,000
Communications and behaviour change	5,000	2,500	1,500	9,000
Design	1,000	100	100	1,200
Business support	1,000	1,000	500	2,500
Regulation	5,000	1,000	500	6,500
Facilities Management	100	100	100	300
Vehicles manufacture, repair, ELVs	5,000	5,000	5,000	15,000
Textiles – across all roles	10,000	3,000	1,000	14,000
Circular economy business models e.g. reuse and refill	1,000	5,000	5,000	11,000
Technical infrastructure development	2,000	2,000	2,000	6,000
Construction and Demolition	1,000	1,000	1,000	3,000
Total	74,200	64,700	99,700	238,600

Over 74,200 new roles will be required in the waste and resources sector by 2030 with existing policy interventions and a transition to industrialised reuse.

Qu 4: Where will demand be?

As a universal service, waste is collected from every household and business in the UK. It also arises on construction sites, manufacturing facilities, from vessels and aircraft, at hospitals, from nuclear power stations and from farms, amongst many other equally as diverse sources. This means that demand can also be universal (frontline staff collecting waste and recycling are required in every local authority area). It is, however, closely aligned with centres of population or clusters of infrastructure or activity and can be material or product specific. Infrastructure is also linked with the needs of the value chain, which can include local offtake markets or industries, strong transport links, centres of population, grid connections or suitable land.

There are several examples of 'eco-parks' within the UK where a number of different waste treatment facilities and manufacturers that benefit from reprocessed material exist. For 'hard-to-recycle' soft plastics for example, a new facility¹⁵ has been opened in Fife which will process a mix of plastics including film into reusable materials. The facility is co-owned by Morrisons and recycling plant specialists Yes Recycling, with Ecosurety and a number of other organisations including Nestlé UK & Ireland and Zero Waste Scotland involved in the development.

Policy demands such as mandatory food waste (or flexible plastics collections) provide confidence to investors that supporting infrastructure is likely to be commercially viable. Organic treatment demand, for example, may be aligned to more rural areas with local offtake, so organic material that is composted or treated via anaerobic digestion may then be used as compost / digestate / energy or growing new crops. This can be a challenge, however, and natural symbiosis can face

blockers such as investment costs and planning. The Suffolk energy-from-waste facility operated by SUEZ, for example, has a farm located nearby which could benefit from the heat generated by the plant. This would require a pipe connection which would need upfront investment from the farm which is a challenge. If regulators, farmers, planners, and the waste industry worked together to learn and identify solutions, this symbiosis could be repeatable and a number of farms could benefit from heat, fertiliser, etc.

Although Eco-parks tend to be co-designed with symbiosis and offtake opportunities in mind, we're not maximising the opportunities with agriculture and, with 2M tonnes of food waste needing a home, we need to make this happen. Similarly, all EfW facilities are CHP ready but very few are connected. How can we realise the potential for these to be hubs rather than end destinations?



In Scotland, the first wind turbines are coming to end of life (10 – 15 years after installation). Circular economy solutions are in place for refurbishment and being identified for recycling by Renewable Parts Ltd¹⁶ (Lochgilphead, Scotland), supported by the Knowledge Transfer Partnership and the University of Strathclyde.

New infrastructure for materials bulking, storage and recycling are also being developed in Scotland as part of the forthcoming DRS launch in August 2023.

There are opportunities for reuse and repair in every large town and city, ranging from reuse shops and repair events¹⁷ through to reuse hubs such as the Renew Hub in Manchester where SUEZ, in partnership with Greater Manchester Combined Authority and nine local authorities are delivering re-use on an industrial scale.

In the West Midlands, the West Midlands Combined Authority chose the industry and manufacturing sector as a priority area for their circular economy route map, given the West Midlands' strong manufacturing base and existing circular economy expertise and projects within this sector. Industrial symbiosis initiatives are already underway with partners ranging from manufacturers to academic centres of excellence.

Chemicals are a focus in the northeast¹⁸ with a number of polymer reprocessing facilities and chemicals plants taking the products developed from waste materials. Also planned for the area is a tyre recycling plant¹⁹ which is predicted to provide 100 skilled jobs when operational in 2024. The plant will convert end-of-life tyres (ELTs) into useful commodities, including biofuels and carbon black, which can then be reutilised in processes such as alternative fuel or raw materials for the production of new tyres or other products.

Opportunities for industrial symbiosis and maximising the value of the material value chains should be explored further as this may lead to regional skills centres where practical training can be provided, as well as formal qualifications.

“

Over the two years since the Renew hub and associated shops launched in Greater Manchester, our team has grown as we've learned more about the range of skills that support and deliver a regional reuse operation. Retail expertise is a key part of our team including customer service, merchandising, stock control, online sales and digital marketing; we have creative trades spanning interior design, photography, upholstery, carpentry and cycle repair; and we have the logistics to support the operation such as warehouse staff and drivers and the management team behind the operation who continue to evolve our offer and develop our network of regional partners. Alongside the SUEZ team, we have Recycling Lives, Patch Perfect and Manchester Bike Kitchen working out of the hub, sharing their skills and expertise with the wider community, delivering apprenticeships and supporting one another in this unique but replicable ecosystem.

Our team continues to grow as we develop our reuse offer with GMCA, creating now opportunities in an ever-expanding range of roles way beyond the traditional boundaries of waste management and embracing fully the skills that sit at the heart of the circular economy and drive greater resource productivity. ”

Dan Carolan, Regional Manager, SUEZ

Qu 5: Are we skills ready?

Is existing/planned skills provision geared up to meet demand?
The answer here is yes and no.

We generally have skills provision available for existing sector needs, but we're playing catch up on provision for the new skill requirements.

Survey respondents and interviewees highlighted a range of skills gaps. For existing roles, examples cited included support for businesses and public sector in complying with forthcoming environmental policy and additional support for frontline service staff training. In 2012, it was estimated that 18% of the UK resources and waste sector workforce held no qualifications (Energy and Utility Skills, 2012), and there is no evidence that this has changed in more recent years.

Evolution in sector practices increasing recycling and recovery have also created greater labour demand for individuals to be qualified at Levels 6 or above (i.e. requiring a degree or degree equivalent technical qualification). This demand has been linked to the increasing need to test, sample, and analyse waste streams/outputs, as well as a greater focus on processing, recycling, and energy recovery (Energy and Utility Skills, 2017). This demand is expected to grow significantly in the next 5 to 10 years as more of our waste streams are segregated for secondary and tertiary use.

It is likely that the UK resources and waste sector will continue to require more multi-skilled workers as businesses diversify into other areas such as energy generation, power production, plus fuels, chemicals, and nutrient provision. However, this could prove challenging as the ageing profile of the workforce suggests that the UK resources and waste sector has the potential to lose valuable technical knowledge and skills in the coming years unless careful succession planning is put in place. It's important that this knowledge and experience is harnessed, and these staff could be used as mentors or even (with support) trainers and assessors within further education organisations to help drive the green skills transition and to pass on their expertise and know-how.



CIWM²⁰, following its merger with WAMITAB, is a nationally recognised and regulated awarding organisation that develops qualifications for those working in resource management and recycling; cleaning and street cleansing; facilities management and parking, from operative through to management level. It currently has 57 commercial qualification centres delivering qualifications, with over 250 qualified professionals offering training, assessment, and quality assurance services. We also recognise that there are universities, employers and other providers offering these services across the UK. Using a ratio of 1 trainer/assessor to 30 learners in the sector and, based on the predicted number of jobs our sector will need by 2030 and the differing skills required, we expect to need between 1,000 and 2,473 qualified professionals with experience of working in these types of roles and in new materials that are better aligned with the skills and competences required in these new roles. The existing workforce will also need to ensure they remain up to date with transitioning practices and new technologies. This will require significant investment, including the potential for new or significantly expanded CIWM (WAMITAB) qualification centres to be developed across the UK to meet specific regional requirements.

For new skills requirements, new provision is required. The interviews conducted highlighted a need for practical repair skills, technical skills to address a broad range of areas including chemical recycling, treatment of carbon fibre, EV battery recycling, EV mechanics and carbon and circular economy upskilling required across all facets of the sector.

Learning styles have also changed and 42% of the survey respondents noted that they'd undertaken self-learning in last year, possibly driven by changes during the pandemic influencing this style of learning but also potentially the need to stay up to speed within a rapidly changing sector.

Several survey respondents and interviewees mentioned apprenticeships and how the disparity of approach between the nations was causing challenges. The sector apprenticeship for England is not fit for purpose (they can cost organisations more and are not flexible) and rates of completion are low compared to other nations where different approaches are being used (e.g. Wales). In Wales, where a dual qualification approach is used and assessment is carried out throughout the journey of the apprenticeship, rates of completion and achievement are higher. In England, where assessment occurs at the end of the apprenticeship, completion rates are lower. There is also only an operative level apprenticeship (Level 2) in England, compared to Level 2, 3 and 4 options in Wales. Having different systems in place across the UK can also make it difficult for organisations operating in many nations.

Another key challenge identified has been the backfilling of apprentice roles whilst the apprentice is in mandatory off-job training (typically 20% of working hours). This can be an effective model where most apprentices are school-leavers, on reduced apprentice salaries. As noted in this research, the percentage of under-25s in the sector is minimal, and apprentices in our sector are typically older established employees. Backfilling the roles of these employees can prove a costly and logistically challenging exercise for frontline service roles. In addition, the 'apprenticeship' terminology used to upskill existing and experienced staff can be a barrier to access or interest.

Inadequate skills provision will hold the sector back, so it's essential that the skills provision gaps are plugged, and that further support is made available to address new skills.

> Our asks

The research has highlighted some critical blockages that government can support us with unlocking between now and 2030 to increase sector jobs and skills development, including the following which are outlined further below:

- Attracting more people into the sector and championing its green credentials
- Providing our sector with the tools and support we need for collective success
- Creating a Green Skills Fund to pump prime the transition

There are, however, some **immediate needs** that we need to address, including the vacancy rates across the industry. We're an essential service and not being able to fill roles has a direct impact on frontline services and making sure that bins are collected, materials are managed, and the environment is protected.

- **Drivers**

Due to the increased competition for delivery drivers which started with EU Exit and was compounded by the Covid-19 pandemic

- **Collection operatives**

Including loaders who are critical for effective segregation

- **Technical consultants**

To provide specialist advice and support short-term resource needs as we plan for new infrastructure and contracts

- **Regulators**

To support and regulate the implementation of forthcoming policy changes

The short-term demand is for ~1,000 roles across the UK, with over half being drivers and operatives.

Although we need more support in reuse and repair as mentioned earlier, this is still heavily reliant on volunteers and is not yet at a point of commercial viability for many items. It does, however, provide a good training ground for skills development and more employment routes are being made available.



For operatives in particular, there are no minimum entry requirements in the sector at present, so this type of role would be accessible for a large number of people. However, we want a safe and healthy workforce and it's important that the right training and support is provided to make sure staff can perform their role safely but are also prepared for future changes (e.g. increased segregation of materials at the kerbside), understanding of how their jobs will evolve. There are a number of specialist trainers (including CIWM) that can support health and safety training and could be mobilised rapidly.

Drivers require a CPC (Certificate of Professional Competency) which can require an investment by the individual or organisation. As movement of goods and materials increases, drivers will continue to be in demand.

We would welcome speaking further with the Green Jobs Delivery Group and Department for Work and Pensions on whether there are opportunities to address these immediate needs through appropriate boot camps and other mechanisms in key locations.

Increasing sector attractiveness

Fundamentally, our research has shown that we need more people working in the sector and, for this to happen, we must tackle sector attractiveness. Our sector is struggling to recruit staff and to source the technical support we need. We're also not a sector that is representative of the UK and we need to nurture diversity in the new talent we attract.

We would like government to support us in championing the green credentials of our sector and others and encouraging everyone from school leavers to job seekers to consider a job in the waste and resources sector. Research conducted with students and early career professionals has indicated that the sector is not often seen as an attractive option for future careers. This is partly due to the perceptions of working with 'waste', but also because of a lack of understanding of what the sector delivers and the breadth of roles available. Current careers advice at all levels does not highlight the

range of roles available or how important our sector is to delivering environmental commitments. We've also identified that content provision across national government funded career websites differs. For example, circular economy is referenced in Scotland^{21, 22} but not England²³. We need a common language to communicate jobs in the sector.

We would like to work more closely with the Department for Education on curriculum and careers advice so that we can inspire the next generation and attract young people into the sector and/or to pursue further studies that will support the sector. We'd also like to work with the Department for Work and Pensions and with the Green Jobs Delivery Group to increase sector attractiveness and encourage more people to choose work in a green industry.

Tools and support for collective success

We can move further and faster with the right tools and support. We need investable conditions for our sector and clear timeframes for policy implementation to allow us to invest in people, services and systems and to secure the sites we need to transition to a more circular economy. Our sector has committed to invest £10Bn over the next decade to make the recycling process more efficient and continue to decarbonise (ESA). With certainty, we can invest more.

Accelerating policy development will catalyse our transition. It will also enable our sector to support others. We would like government to continue facilitating our interactions with other sectors and to consider further investment in policy development and the regulation required to support implementation.

Creating a Green Skills Fund

The research has showcased how motivated our sector is to develop the skills required for the future; however, we need further support. If we are to attract new people to the sector to fill vacancies and grow, then we need to unlock funding support. This is particularly important for Level 2 entrants to the sector. Lifting the funding moratorium would help employers to showcase the investment government is willing to make in skills development and greening the UK, with the right education products to enable this.

Creating a green skills fund would allow government to pump prime the transition. The fund could be used flexibly for apprenticeship provision, other approved qualifications and training, for careers advice to inspire the next generation and for regional hubs of excellence (such as NICER²⁴ for circular economy) to ensure we have the technical skills (and innovation) required to deliver complex change.

Money provided today will deliver results tomorrow. CIWM and the wider sector would relish working with government on these initiatives.



The research findings are already helping the executive team at CIWM to identify evidence-based learning development priorities, such as new training courses²⁵, qualifications²⁶ and apprenticeships needed by the sector. The research will also set a clear direction of travel for the Skills for the Future Working Group, who will contribute to these learning programme developments.

Interviewees and Skills for the Future Working Group members have provided career case studies that will be made available in due course.

As part of the implementation of the Learning and Development Strategy, CIWM's Skills for the Future Working Group has developed a competence framework for the sector, which will be updated to ensure the full range of skills identified in the research are represented. CIWM is currently developing assessments against this framework to support members to assess their skillset in each key area. In parallel, CIWM is developing learning materials and content that aligns to this competence framework and delivers on the skills needs identified in the research.

Plans for 2023 include courses covering climate change adaptation, new policy implementation (such as pEPR and DRS impacts), and contextualising waste awareness for waste producing sectors. A prevalent theme in the research findings is that we must look to work more closely with the whole value chain to influence the more sustainable use and management of resources.

CIWM will also take the research findings to the Green Jobs Delivery Group and continue to champion the sector across government and particularly with DEFRA, DESNZ, DFE and DWP. We will also seek to work more closely with other sectors so that we can support them on their individual transitions.

> CIWM members

Invest in yourself²⁷. Take the time to do a skills audit and identify what skills you will require for the future. Understand how your section of the sector will evolve in the future to identify specific technical skills you might need. Encourage your organisation to conduct workforce planning and consider the skills and competencies required. Recruitment and retention of a skilled workforce should also be a consideration. Lastly, consider how you can pass on your skills and knowledge to others in the sector by joining a working group or signing up to become a CIWM mentor²⁸.

“

I would strongly encourage anyone and everyone to consider signing up to have a mentor, whether you have one specific objective you want to meet or a broad idea of something you'd like to explore. Having someone independent to talk to and learn from is really helpful. ”

Alice Burrows, Ricardo²⁹



> Summary

Our sector is expecting to go through a huge transition over the next two decades. The scale of the change required is expected; however, it's evident that we're not prepared.

The research outputs contained in this report identifies which skills we'll need to prepare us for this evolution and estimates the number of roles required to achieve this. Our sector is already struggling to recruit to roles and isn't perceived to be attractive, so we must take this seriously or we will not be able to deliver our statutory collection services, let alone provide support to other sectors for their transition.

This is far too large an opportunity to miss. We're looking at almost a 100% increase in job needs to 2035. Employment opportunities are increasing, however sector attractiveness remains a barrier, and we're competing with other sectors that are better paid and may have better employment conditions.

If we don't make changes then we run the risk of the disruption of our value chain and potentially losing some of our sectoral structure as material flows are diverted and managed by others. We are best placed to manage the materials in circulation at end of first life and can support their journey back through reuse and repair loops.

Next steps

We need further sector input to validate these research outputs, provide further data so that we can create the most robust assessment possible, and to identify ways that we can work together to address this challenge. We also need to identify and address the immediate needs of the sector so we can plug the recruitment gaps. We need to put a plan in place urgently so that we remain at the heart of the green transition.

[Appendices are available here.](#)



> Sources

- ¹ [ESA-Net-Zero-Full-Report.pdf \(esauk.org\)](#)
- ² [Industry at a Glance: ESA \(esauk.org\)](#)
- ³ [Waste-Industry-Profile.pdf \(euskills.co.uk\)](#)
- ⁴ [CIWM's EDI Strategy \(ciwm.co.uk\)](#)
- ⁵ [Circular Jobs \(circular-jobs.world\)](#)
- ⁶ Categorisation developed by Circle Economy and used as part of the Circular Jobs Monitor joint UNEP initiative
- ⁷ [Waste-Industry-Profile.pdf \(euskills.co.uk\)](#)
- ⁸ [Peterborough Energy-from-Waste \(EfW\) Plant, Eastern Industrial Estate \(power-technology.com\)](#)
- ⁹ [60 jobs created in £7.7m Deposit Return Scheme in Aberdeen | Circularity Scotland Ltd](#)
- ¹⁰ [www.ccsassociation.org](#)
- ¹¹ [Renew – Recycle for Greater Manchester : Recycle for Greater Manchester](#)
- ¹² [Job creation in the re-use sector: Data insights from social enterprises | RREUSE](#)
- ¹³ Based on SUEZ estimates
- ¹⁴ Repair café estimates that the goal is to fix an item in less than two hours (one session) About – Repaircafe
- ¹⁵ [Ecosurety supports first of its kind soft plastic recycling site in Fife – News – Ecosurety](#)
- ¹⁶ [Looking at decommissioning: regulation and legislation \(renewable-parts.com\)](#)
- ¹⁷ [Upcoming Parties – The Restart Project](#)
- ¹⁸ [Industry Sectors – Nepic](#)
- ¹⁹ [100 jobs at Sunderland site for £100m tyre recycling plant – Nepic](#)
- ²⁰ [CIWM \(WAMITAB\) Qualifications \(ciwmquals.co.uk\)](#)
- ²¹ [Green Jobs Workforce Academy | My World of Work](#)
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- ²⁵ [Waste Management Courses \(ciwm.co.uk\)](#)
- ²⁶ [CIWM \(WAMITAB\) Qualifications \(ciwmquals.co.uk\)](#)
- ²⁷ [CIWM Professional Development \(ciwm.co.uk\)](#)
- ²⁸ [CIWM Mentoring](#)
- ²⁹ [CIWM Mentoring: My Experience, Two Years Later \(circularonline.co.uk\)](#)

CIWM would like to thank the many contributors who have given their time, expertise and insight to support the development of this report:

- The 70 members of the CIWM Skills for the Future Working Group
- Dr Jane Beasley, Beasley Associates
- Dr Brian McDonough and the Sociology BA students, Solent University
- Dr Maria Vinogradova and the Environmental technology MSc students, Imperial College
- Joe Kingston and Karen Marks, City of London
- Andrew Lappage and Jon Hastings, ELWA
- James Kay, Resource Efficiency Wales
- Alan Wheeler, Textiles Recycling Association
- Stuart Henshaw, Jon Uttley and Lena Moule, Integrated Skills
- Alice Burrows, Ricardo
- Sam Reeve, Resource Futures
- Izzie Eriksen, ApparelXchange CIC
- Brian Mayne, Brian Royson Mayne Ltd
- Fiona Dear, The Restart Project
- Anna MacMahon, Lindsey Hepburn and Lorna Conway, Zero Waste Scotland
- Lisa Keane, Keep Britain Tidy
- Sioned Thomas, Recorra
- Simbarashe Nzozi, Sunderland City Council
- Mike Tregent, Environment Agency
- Tracy Sutton, Hannah Worthington, ROOT

Report author

Sarahjane Widdowson, Director, Intelisos Ltd

Contact Us

To find out more about CIWM and our work on skills for the future, please contact us at qualifications@ciwm.co.uk.

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