

# Working in groups

Facilitator: Marta Trawinska (ISP)





## Skills for a greener future: a global view

This is the first global report on the implications of the transition to low-carbon and resource-efficient economies for skills, gender and occupations.

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# Energy Sustainability Scenario

- This scenario examines the employment and skills implications of pursuing energy sustainability to limit global warming to below 2°C, as stipulated by the Paris Agreement. It focuses on sectors like renewable energy, energy efficiency, and clean technology.
- **Job Creation:** Significant job growth is expected in industries focused on renewable energy (such as wind, solar, and hydroelectric power), energy efficiency, and sustainable infrastructure. Jobs will be created in areas like installation, maintenance, and energy management.
- **Skills Demand:** The transition will require new technical skills, particularly in renewable energy technologies, energy auditing, and sustainable construction. Additionally, there will be an increased need for cross-disciplinary skills that enable workers to adapt to advanced green technologies.
- **Reskilling Needs:** Workers displaced from fossil fuel-based industries, like coal and oil, will need to be reskilled to transition into these growing green sectors.



# Circular Economy Scenario

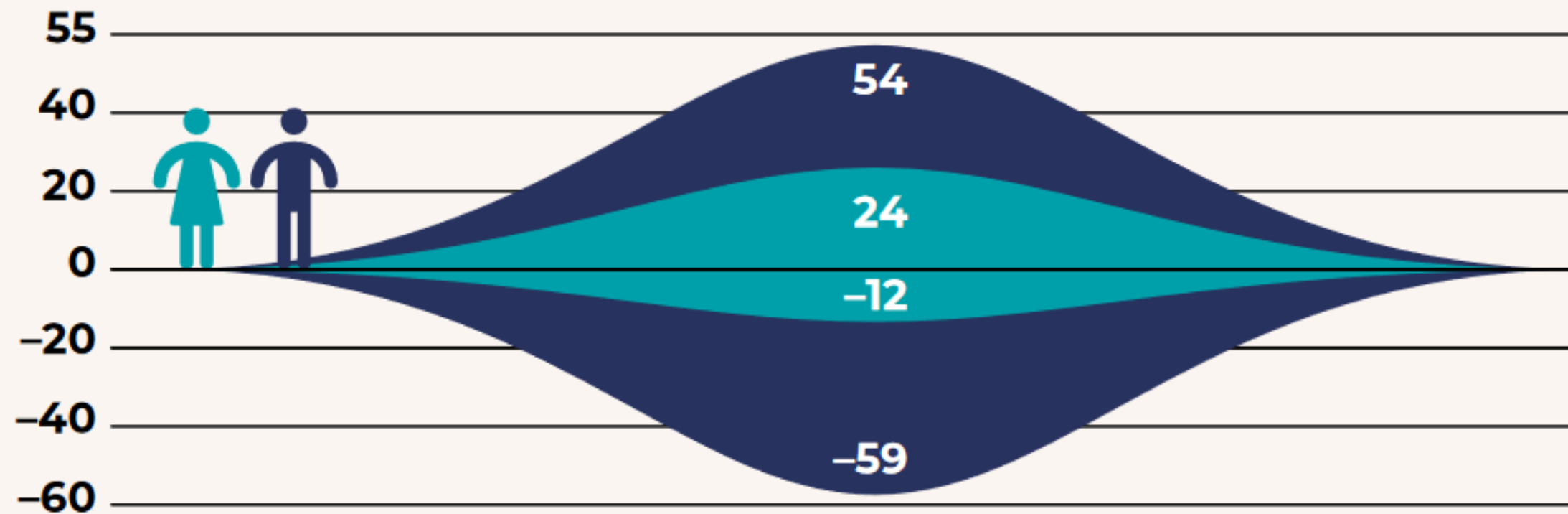
- This scenario explores the impact of transitioning to a circular economy, where recycling, resource efficiency, and waste reduction are prioritized. It is based on an annual 5% increase in recycling rates for materials such as plastics, glass, metals, and minerals.
- **Job Reallocation:** The circular economy is expected to create jobs in recycling, waste management, and sustainable manufacturing. New roles will emerge around designing products for longevity, reuse, and recyclability.
- **Skill Requirements:** Skills in areas like waste processing, materials science, and sustainable product design will be in high demand. Workers will need to understand resource efficiency principles and have the technical know-how to operate within a circular economy framework.
- **Workforce Adaptation:** Jobs in traditional manufacturing sectors may decrease, with workers needing to transition to roles that support a circular model. This may include retraining in sustainable production techniques or learning to work with recyclable materials.
- In the Circular Economy Scenario, job shifts are particularly pronounced in mid-skill occupations, and the overall success of this transition hinges on the availability of training programs that support skills in recycling, eco-design, and waste reduction processes.





Figure ES 5. Jobs created and destroyed in a global circular economy scenario, by gender, 2030 (millions)

### Job change by gender



Note: For detailed information on the methodology see ILO, 2018a, pp. 39, 162–170.

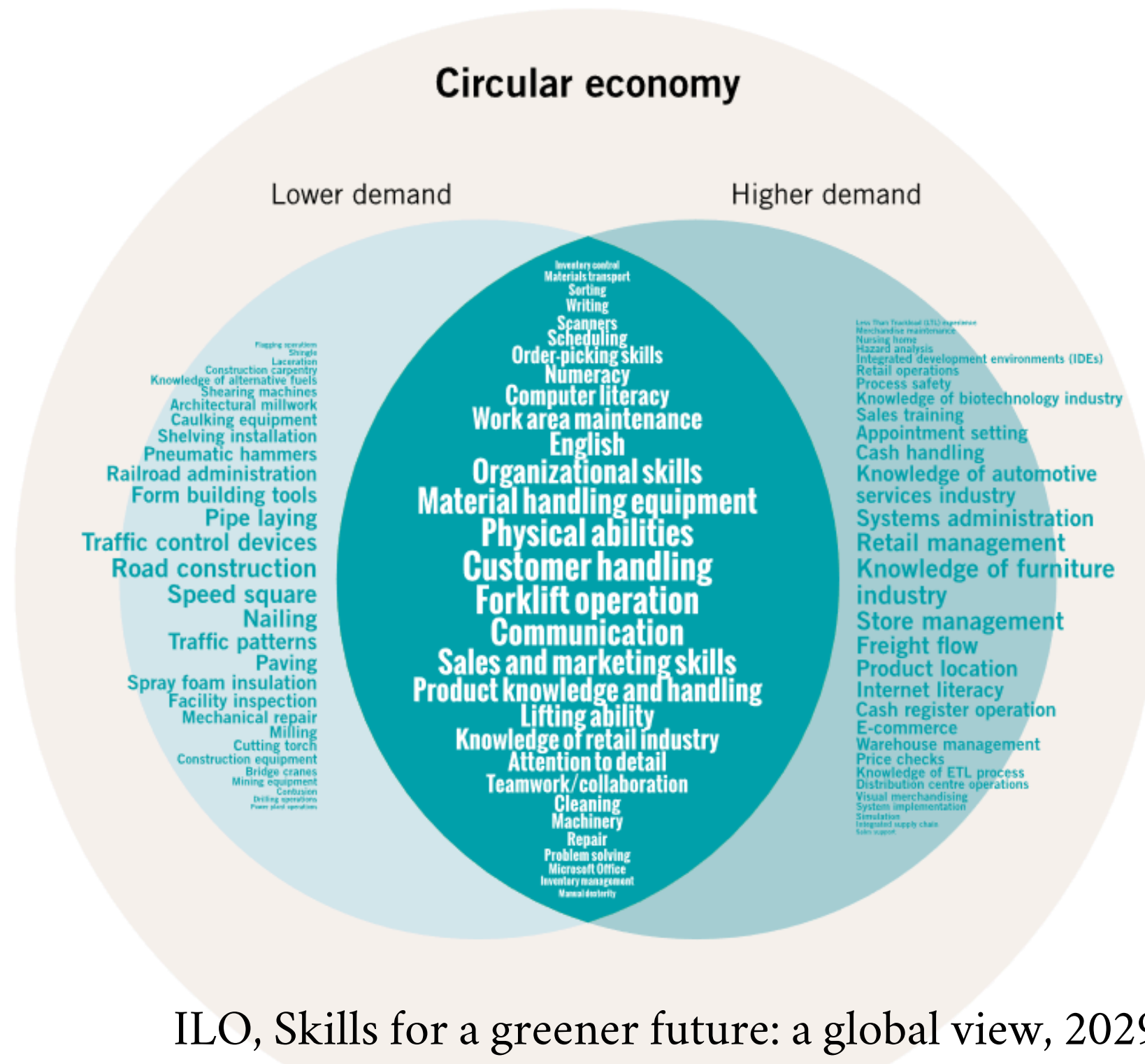
Source: ILO calculations based on EXIOBASE v3 and national labour force surveys.

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Figure ES 6. Overlap of core and technical skills for workers in mining, construction, manufacturing and transport, in declining and in growing industries (circular economy scenario)



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Figure ES 7. Overlap of core and technical skills for science and engineering professionals, in declining and in growing industries (energy sustainability scenario)

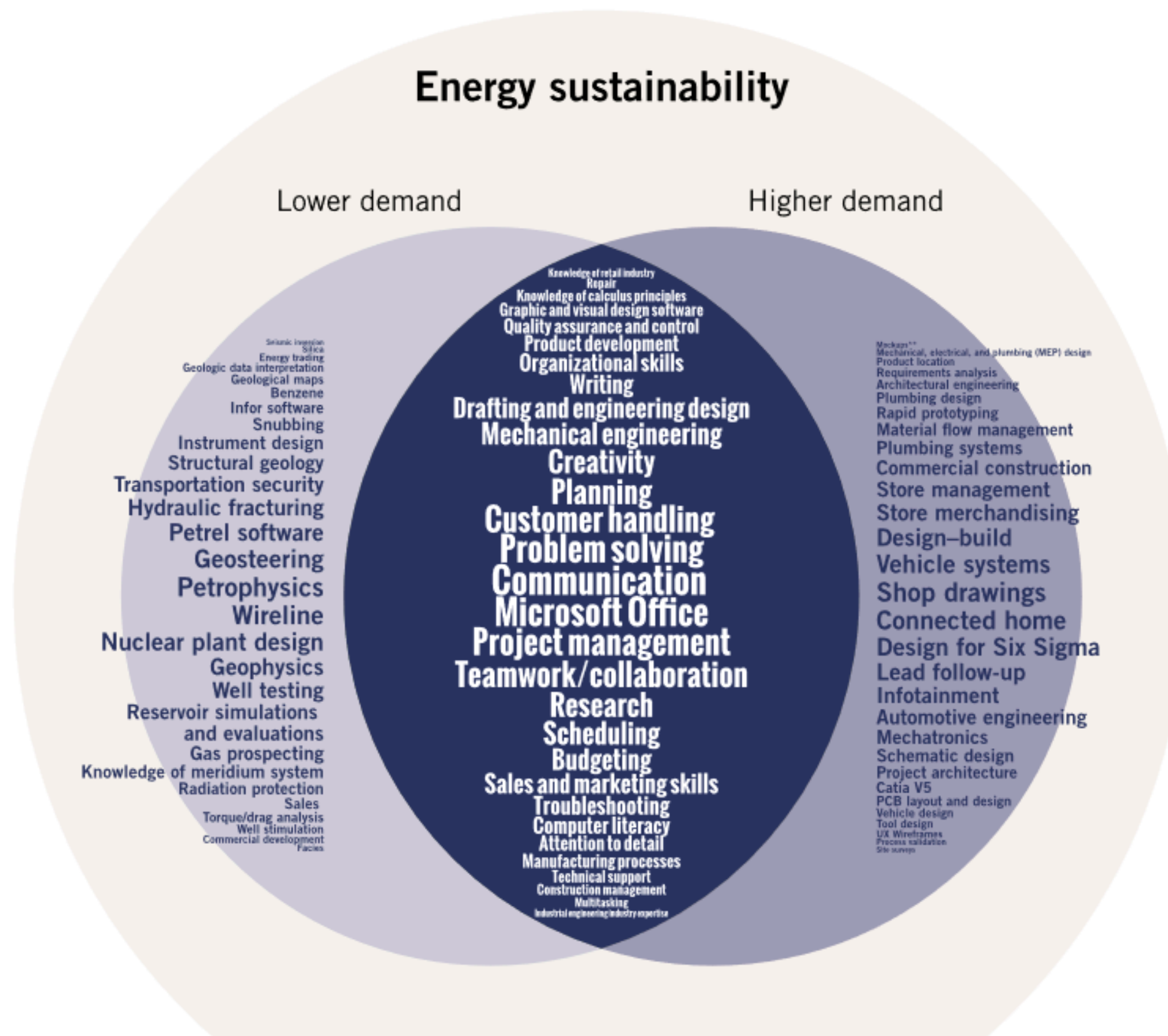




Figure ES 8. Top skills needed in high-, medium- and low-skill occupations  
(energy sustainability and circular economy scenarios)

8(a). Circular economy scenario



High-skill  
occupations

8(b). Energy sustainability scenario



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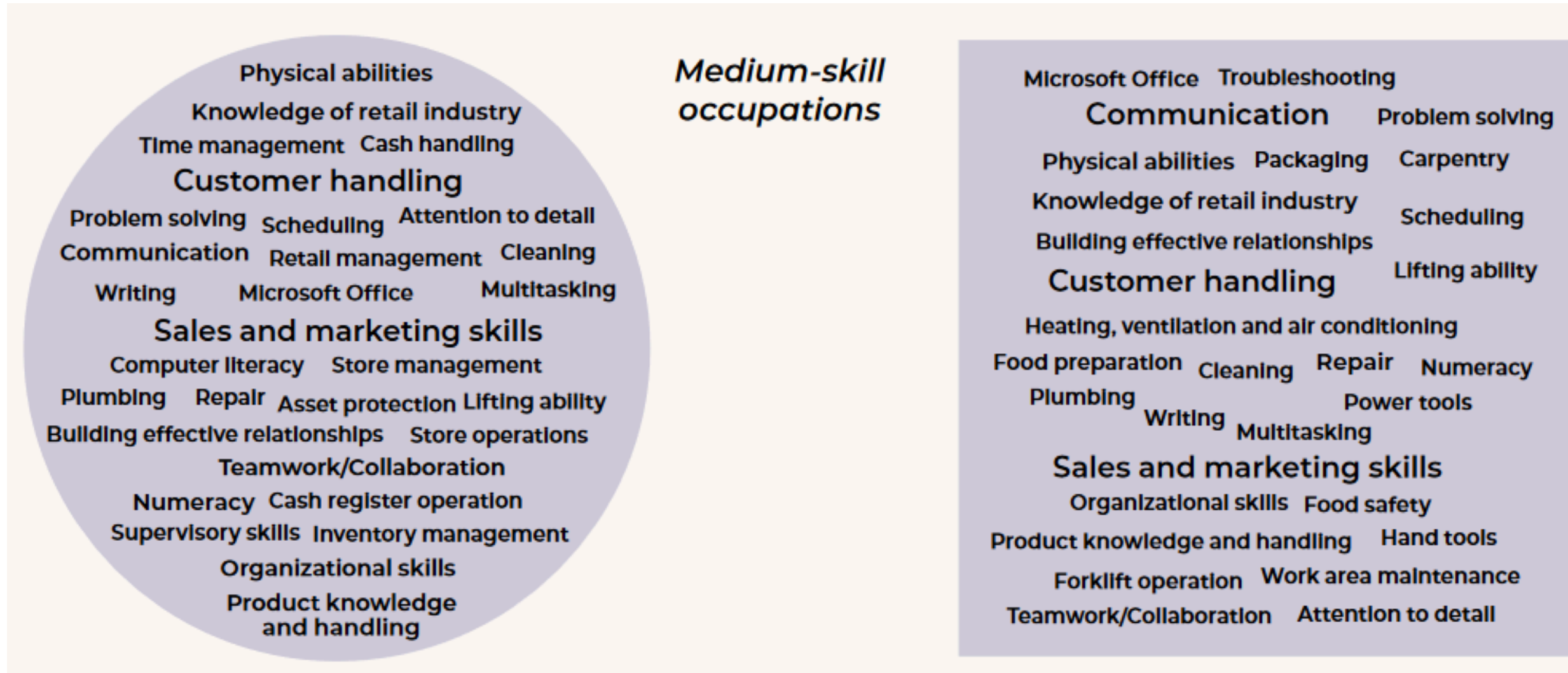




Figure ES 8. Top skills needed in high-, medium- and low-skill occupations  
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8(a). Circular economy scenario

8(b). Energy sustainability scenario



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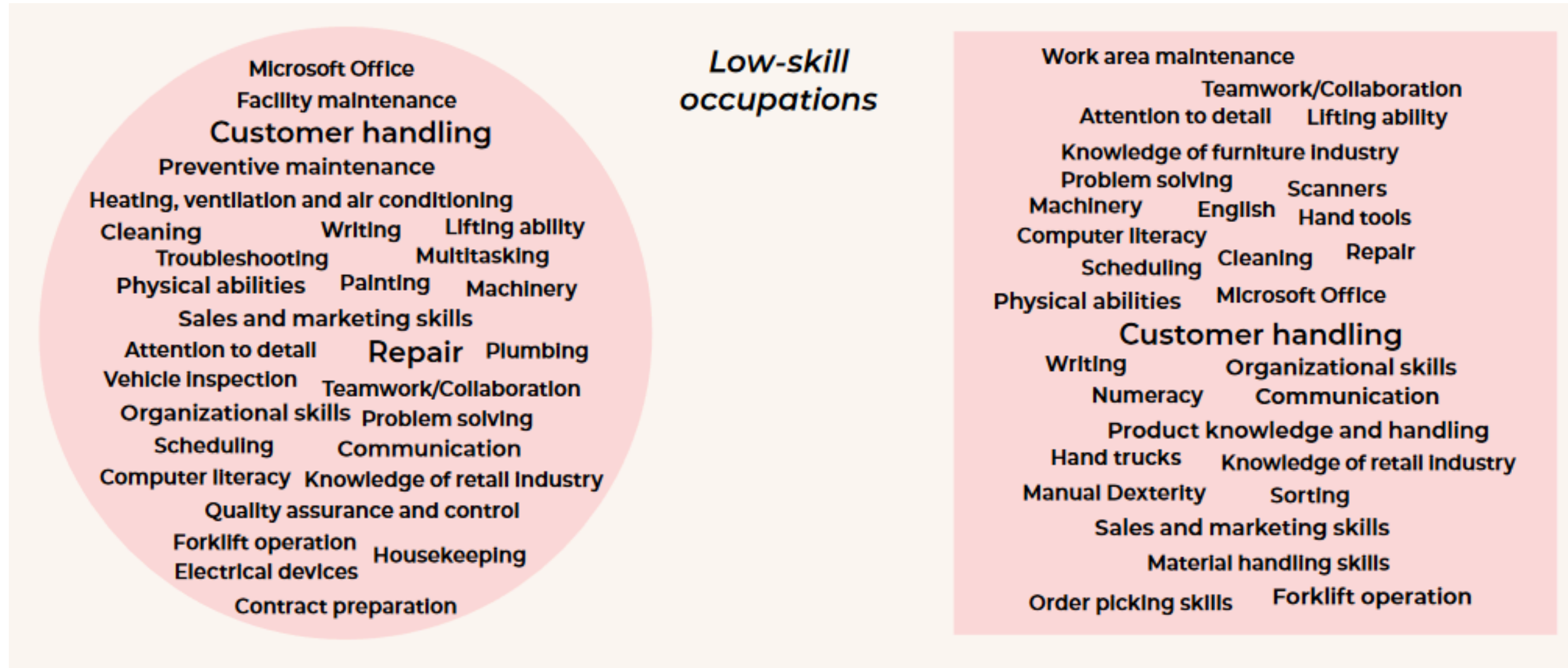
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Table ES 1. Changes in skills required, by skill level of occupation

SKILL LEVEL	NATURE OF CHANGE	TYPICAL SKILLS RESPONSE	EXAMPLE OCCUPATIONS
<b>Low-skilled occupations</b>	Occupations change in a generic way, e.g. requiring increased environmental awareness or simple adaptations to work procedures	On-the-job learning or short reskilling and upskilling programmes	Refuse/waste collectors, dumpers
<b>Medium-skilled occupations</b>	Some new green occupations Significant changes to some existing occupations in terms of technical skills and knowledge	Short to longer upskilling and reskilling programmes; TVET courses	<i>New occupations:</i> wind turbine operators; solar panel installers <i>Changing occupations:</i> roofers; technicians in heating, ventilation and air conditioning; plumbers
<b>High-skilled occupations</b>	Locus of most new green occupations Significant changes to some existing occupations in terms of technical skills and knowledge	University degree; longer upskilling programmes	<i>New occupations:</i> agricultural meteorologists, climate change scientists; energy auditors, energy consultants; carbon trading analysts <i>Changing occupations:</i> building facilities managers; architects; engineers

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**Table ES 2. Main core skills required for green jobs, by skill level of occupation**



REQUIRED ACROSS THE LABOUR FORCE	REQUIRED IN MEDIUM- TO HIGH-SKILLED OCCUPATIONS
<ul style="list-style-type: none"> <li>• Environmental awareness and protection; willingness and capability to learn about sustainable development</li> <li>• Adaptability and transferability skills to enable workers to learn and apply the new technologies and processes required to green their jobs</li> <li>• Teamwork skills reflecting the need for organizations to work collectively on tackling their environmental footprint</li> <li>• Resilience to see through the changes required</li> <li>• Communication and negotiation skills to promote required change to colleagues and customers</li> <li>• Entrepreneurial skills to seize the opportunities of low-carbon technologies and environmental mitigation and adaptation</li> <li>• Occupational safety and health (OSH)</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical thinking (including risk and systems analysis) to interpret and understand the need for change and the measures required</li> <li>• Coordination, management and business skills that can encompass holistic and interdisciplinary approaches incorporating economic, social and ecological objectives</li> <li>• Innovation skills to identify opportunities and create new strategies to respond to green challenges</li> <li>• Marketing skills to promote greener products and services</li> <li>• Consulting skills to advise consumers about green solutions and to spread the use of green technologies</li> <li>• Networking, IT and language skills to perform in global markets</li> <li>• Strategic and leadership skills to enable policy-makers and business executives to set the right incentives and create conditions conducive to cleaner production, cleaner transportation</li> </ul>

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**Table ES 3. Nature and extent of occupational change in key sectors**



SECTOR	NATURE AND EXTENT OF OCCUPATIONAL CHANGE TO DATE	EXAMPLES OF NEW AND CHANGING OCCUPATIONAL PROFILES
<b>Renewable energy</b> 	<p>One of the most significant sectors for development of new occupational profiles, spreading into closely related existing trades (solar energy systems installation)</p>	<p><b>MSL:</b> solar photovoltaic/wind turbine/ biomass systems: installers, technicians, plant managers, quality engineers</p> <p><b>HSL:</b> engineers and system designers (overlap with manufacturing)</p>
<b>Environmental goods and services, including water and waste management</b> 	<p>Significant occupational change in waste and recycling, including R&amp;D functions to create new or improved waste management and recycling</p> <p>New occupations of environmental consulting and environmental auditing</p>	<p><b>MSL:</b> environmental engineering technicians; soil, waste and water engineers (conservationists); environmental science and engineering technicians; health and other protection technicians</p> <p><b>HSL:</b> atmospheric and space scientists; soil and water conservationists; landscape architects; environmental engineers (restoration planners, certification specialists, economists); climate change analysts; industrial ecologists; energy managers (auditors)</p>

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SECTOR	NATURE AND EXTENT OF OCCUPATIONAL CHANGE TO DATE	EXAMPLES OF NEW AND CHANGING OCCUPATIONAL PROFILES
<b>Construction and building services</b> 	<p>Mainly skills being added on to and/or adapted by existing occupations; all main trades and professions likely to be affected in some way, and increasingly, across all countries</p>	<p><b>MSL:</b> carpenters, plumbers, electricians, heating engineers, roofers, painters and decorators, plasterers, building services technicians</p> <p><b>HSL:</b> facilities managers, architects, engineers, energy auditors and energy consultants (overlap with environmental goods and services)</p>
<b>Manufacturing</b> 	<p>New skills are needed related to reduction of environmental impacts and this may involve new occupations, e.g. pollution control officers</p> <p>Most strongly affected are manufacturers involved in design and manufacture of products for the “greenest” sectors, e.g. renewable energy and green construction</p>	<p><b>MSL:</b> occupations related to reducing environmental impacts, e.g. pollution control officers, energy auditors (overlap with environmental goods and services)</p> <p><b>HSL:</b> occupations related to design and production of new products and systems, e.g. product designers, production engineers</p>

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## Agriculture and forestry



Mainly skills being added on to and/or adapted by existing occupations. Greatest occupational effects likely to be felt at higher skill levels where new occupations are in demand

**MSL:** adoption of organic farming techniques; agricultural technicians involved in crop diversification, application of improved technologies.

**HSL:** soil and water conservationists; environmental restoration planners (certification specialists, economists); water resource specialists and water/wastewater engineers' agricultural meteorologists

## Transportation services



Mostly changing existing occupations through addition of knowledge and skills, e.g. use of electric vehicles; conversion of existing vehicles to new technologies and compressed natural gas

**MSL:** occupations related to use, conversion (greening) and maintenance of existing vehicles

**HSL:** R&D occupations related to design of greener transport systems, e.g. engineers, systems analysts

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## Tourism



Mostly changing existing occupations through addition of knowledge and skills, e.g. eco-tourism

**MSL:** occupations related to eco-tourism

## Extractive industries



Mostly changing existing occupations through addition of knowledge and skills. Evidence of widespread effects to date lacking

**HSL:** R&D occupations related to design of greener extractive processes systems, e.g. engineers

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