Green Skills Policy Paper

What are Green Skills in Manufacturing

Green skills are becoming a central part of how manufacturers operate, but they're not about ripping up the rulebook and starting again. For most firms, the shift to a greener economy is reshaping the jobs they already have rather than creating entirely new ones. Make UK flagged this back in 2021[1], noting that the move to net zero is driving a "greening" of existing roles in the same way production processes themselves are evolving.

When a production line is digitalised to cut energy use or reduce waste, the core practical skills don't disappear – welders, engineers and technicians are still the backbone of the shopfloor. What is changing is the mix of skills needed. Alongside those traditional and foundational capabilities, manufacturers now need people who can handle data, understand cybersecurity, and work with increasingly integrated digital systems. It's an evolution, not a replacement, and it's happening at speed across the sector.

Examples of Green Upskilling

1. *For the modernisation of manufacturing processes and introduction of more 'green' skills, a welding professional might need additional understanding of robotic welding systems. Similarly, a maintenance engineer with equipment knowledge might need to additional data interpretation skills to decipher machine diagnostics.*
2. *Beyond the continued demand for electrical engineers across the manufacturing sector, there is a growing need for renewable energy systems integration – additional skills which electrical engineers are ideal candidates for taking up.*
3. *Though there is a decreasing demand for management roles in 'brown job' fossil fuel sectors, these workers have the experience to transition to 'green jobs' if they gain an understanding of how systems work in low-carbon sectors.*

Green skills in manufacturing can be grouped into three general types[2]. The first is practical skills, such as installing heat pumps or carrying out engineering works on on-site energy infrastructure. The second is enabling skills, which include things like basic digital abilities or project management. The third is understanding and behavioural skills, such as systems thinking or having a high level of scientific literacy. Specifically, the green skills gap in manufacturing includes:

[1] Make UK: Unlocking The Skills Needed for a Digital and Green Future - Unlocking the Skills Needed for a Digital and Green Future | Make UK

[2] POST: Green skills in education and employment - POST-PN-0711.pdf

a) *Technical roles in advanced manufacturing*
Examples include metal machining setters and operators, sheet-metal workers, welding trades, electroplaters, laboratory technicians[3].

b) *Managerial roles*
Managers who can lead modernisation, oversee green process changes, and manage increasingly complex production environments.

c) *Highly qualified technical specialists*
Energy-system engineers, process engineers, and other advanced technical roles critical to decarbonisation and systems upgrades.

d) *Technical roles requiring additional digital, data and automation skills*
Roles that now need competencies in robotics, systems integration, analytics, and digital troubleshooting as factories become more connected.

Across the board, demand for skilled workers continues to outstrip supply. Many of the foundational manufacturing skills already in short supply are the same ones needed to decarbonise energy production, power networks, and wider infrastructure. Employers are particularly struggling to recruit highly qualified workers (Level 7 and above). For example, welding remains one of the most in-demand trades in advanced manufacturing, but also across nuclear, engineering construction, hydrogen, offshore wind. In other words, the green transition is not replacing traditional skills, but it is increasing pressure on skills already in shortage.

Importance of Green Skills for manufacturers

1. In 2024, 14.3% of manufacturers expressed a high demand for 'green skills', with 57% having high demand for higher level technical skills[4] - critical to the green transition within and outside of manufacturing. Wider demand for green skills shows clear growth in the UK, with a ~9% rise in 'green job' adverts in 2024 despite overall job market contraction.[5]
2. European research finds the following new and emerging green skills areas to be crucial for the future of manufacturing:
    i. Product-Process Design
    ii. Big Data Analytics and Artificial Intelligence
    iii. Supply Chain Management
    iv. Circular Economy
    v. Energy Management.[6]
3. Specific skills in these areas include environmental impact assessment, waste management, data analysis, eco-design, and knowledge of renewable energy technologies.

Regulation and compliance

[3] Advanced Manufacturing Workforce Assessment - Green Jobs Delivery Group Task and Finish Group Workforce Assessments – *confidential and to be removed if shared externally*
[4] Make UK: Industrial Strategy Skills Commission 2025
[5] UK sees surge in the demand for green skills despite overall job market decline - PwC Green Jobs Barometer
[6] The future of green skills for the manufacturing sector - ScienceDirect

4. Skills in waste management and environmental impact assessment are becoming necessary for business to adhere to regulation such as ESG reporting requirements and environmental management regulation.

Efficiency and cost saving

5. There are greater efficiencies, productivity increases and related cost reductions that can be achieved through the growth of greener jobs in manufacturing through material, water and energy use and waste reduction. A business may be able to save on power costs with an efficient electrified energy system, but they may also be able to cut input costs if recycling and reuse in manufacturing processes is made possible.
6. Critical to the growth of green jobs in manufacturing infrastructure, and processes are skills in efficient design and renewable technologies.

Market access

7. With the right processes and skills in place, businesses can access the growing market for products which are low-carbon and sustainable. Access to this market is a medium-term to long-term necessity as markets outside of the UK (particularly in Scandinavia and, increasingly, China) are responding to this demand faster.
8. If UK manufacturers cannot meet green procurement criteria, then they will lose contracts to European or third country businesses and be unable to compete in some green markets such as the Electric Vehicle (EV) and renewable energy sectors.
9. Business may also struggle to access the younger job market, with young vocational and technical talent increasingly being attracted to environmentally responsible companies - around 79% of young people want to work for a company committed to tackling climate change[7].

Future-proofing jobs

10. A large portion of those with the green skills needed to reach net-zero targets are already in the workforce and will be retiring before 2050 arrives[8], while the proportion of people under the age of 30 joining critical sectors is decreasing. Green jobs are manufacturing jobs, and industry are not currently projected to onboard these needed skills as quickly as they are lost.
11. As environmental responsibility becomes more ingrained across markets and policy, manufacturers - and those looking for work - will experience fewer shocks if they invest in green skills now, as these competencies quickly shift from being 'nice-to-haves' to core competencies. Some of these green competencies relate to automation as AI-led optimisation can reduce companies' carbon emissions[9].

[7] Lack of know-how stopping young people plugging green skills gaps - Learning and Work Institute
[8] Engineering UK: NET ZERO WORKFORCE An analysis of existing research - net-zero-workforce-engineeringuk-may-2025.pdf
[9] Green and intelligent: the role of AI in the climate transition - Green and intelligent: the role of AI in the climate transition | npj Climate Action

12. It is difficult to say with certainty that automation will not put any jobs at risk, particularly repetitive tasks. Some have suggested a 7% net growth in employment with automation[10], but it remains the case that the skills transition will need to be managed carefully. Some forecast that 20 million manufacturing jobs will be displaced by 2030 (worldwide)[11], so Government should support upskilling, reskilling and re-positioning to allow manufacturers to securely invest.
13. With skills investment to allow the current workforce to work competently with automation, there are well documented benefits for productivity and risk reductions for employment security:
    i. In the short-term, automation and digital technologies can help workers improve their own productivity, and therefore the productivity of the businesses. Automation can help workers to focus on higher-value tasks which are often more rewarding and better paid jobs, driving innovation and growth.[12]
    ii. In the medium-term, the productivity of a business and its risk of falling behind on environmental regulation and green market requirements will be reduced through production and process changes assisted by automation competencies. Production and process engineers are the most expected job role recruitments in the next 5 years[13], who can use automation understanding to improve the use of space and energy.
    iii. In the long-term, improved productivity and increased flexibility for process change can encourage investment in new sites, create jobs through growth and reverse the current downward trajectory of manufacturing in the UK. Strategic automation adoption could thus reverse de-industrialisation and add £150 billion to GDP by 2035[14].

Integrating Green Skills in Manufacturing

14. For jobs that are already in the workforce, manufacturers' preferred route in 2021 was to boost employment and allow learning of green skills on the job (56%)[15].
15. In today's financial climate, and particularly when thinking about the rise National Insurance Contributions, it is uncertain whether manufacturers would answer this question in the same way. Many manufacturers have previously indicated that they would respond to this type of tax increase by raising prices, cutting jobs or limiting wage increases.[16]
16. The education and private sectors indicated in 2022 that early government guidance would provide confidence to alter curricula and to invest in training.[17]

---

[10] Gary Livingstone White Paper - White-Paper-Robotics.pdf
[11] Oxford Economics: How robots change the world - HowRobotsChangetheWorld.pdf
[12] The mtc - How Robotics and Automation Can Improve UK Productivity
[13] Green Jobs Delivery Group Task and Finish Group Workforce Assessments – *confidential and to be removed if shared externally*
[14] Make UK & Sage: Unlocking the Skills Needed for a Green and Digital Future - https://www.makeuk.org/docs/green-skills-report/download?attachment
[15] Same as 12
[16] Make UK: Manufacturing Outlook 2025 Q2 - https://www.makeuk.org/docs/manufacturing-outlook-2025-q2pdf/download?attachment
[17] IEMA and Deloitte: A Blueprint for green workforce transformation - https://www.isepglobal.org/media/mqqhx1cw/a-blueprint-for-green-workforce-transformation-april-2022.pdf

National Government Strategy

17. Following The Green Jobs Taskforce (concluded in 2021) and The Green Jobs Delivery Group (2022-2024), the Office for Clean Energy Jobs now takes lead on energy workforce development. It plans to establish, with ministers, a formal route to engagement for industry on workforce issues. The office also has strong integration of Trade Union voice.
18. In 2022, the Department of Education launched the Local Skills Dashboard[18] to improve access to and use of skills data in a local context. The dashboard does not integrate any like data from Scotland, Wales or Northern Ireland.
19. Skills England (launched June 2022) reports highlight the difficulties for SME manufacturers to engage with skills programmes for both the energy transition or other skills gaps and recommend modular and short training courses in response.[19]
20. Skills England have developed, with RenewableUK and Offshore Energies UK (OEUK), a digital platform for Energy Skills Passports to help transition gas and oil workers to clean energy roles. The platform creates a digital profile, maps skills alignment with clean energy skills, gives training guidance on additional qualifications needed for specific roles, and offers career pathways for transition. This initiative is supported by Scottish Government, where it will be piloted first.
21. The Industrial Strategy committed £100m for engineering skills to support digital, advanced manufacturing and clean energy. It is planned that £1.2 billion of funding will be directed to skills by 2028-29.

Clean Energy Jobs Plan

22. Clean Energy Jobs Plan (19 Oct)
    i. Government plans to expand the *energy skills passport* so skills can be recognised and transferred across clean energy roles.
    ii. Over £100m confirmed over three years to support engineering training in England, including £10m for T Levels and Level 4–5 courses. (Does not cover devolved nations.)
    iii. Five new 'Clean Energy Technical Excellence' colleges planned, with delivery from April 2026.
    iv. Four regional skills pilots in Aberdeen, Cheshire, Lincolnshire and Pembrokeshire, chosen for their role in clean energy sectors.
        i. Training tailored to local industry needs.
        ii. Upgrading or creating training centres.
        iii. Better career advice and pathways into clean energy roles.

[18] department-for-education.shinyapps.io/local-skills-dashboard/
[19] Skills England: Sector evidence on the growth and skills offer - https://assets.publishing.service.gov.uk/media/6863f18b3464d9c0ad609ddf/Skills_England_-_sector_evidence_on_the_growth_and_skills_offer.pdf

23. The Clean Energy Jobs Plan suggests that manufacturing benefits
    i. When firms are part of clean energy supply chains.
    ii. When improvements to the electricity grid speed up wider energy transition plans.
    iii. Through spill over effects in skill areas that are in high demand across multiple sectors.
24. However, current gaps must be emphasised, such as
    i. Policy is heavily focused on clean energy generation and infrastructure, with far less attention on energy users — especially industrial users.
    ii. Manufacturers face strong competition from sectors like defence and digital for the same engineering skills.
25. The plan extends the Heat Training Grant (to March 2026), which
    i. Supports heat pump and heat network training for domestic and industrial settings.
    ii. However, Industry reports uneven delivery and availability.
    iii. Training is often not detailed enough for the complex systems found in manufacturing.

Post-16 Skills Strategy

26. The government is expanding Technical Excellence Colleges, with 14 new institutions focused on digital, clean energy, and advanced manufacturing, building on previous launches in construction and defence. These colleges are designed to provide high-quality technical training directly linked to employment opportunities in green and growth sectors.
27. The reforms are backed by over £1 billion in investment to equip people with in-demand skills, especially in sectors like digital technologies and construction, which are central to the green transition.
28. Targeted maintenance grants will be offered to disadvantaged students pursuing courses that support green and manufacturing missions, funded by a levy on international student fees.
29. The Government is also consulting on proposed changes to the post-16 education landscape, including reforming qualifications to include a new selection of A Levels, V Levels and T Levels.

Policy in Wales

30. Green Personal Learning Accounts (PLAs) offer free, flexible part-time courses in green sectors (e.g. renewables, retrofit, EVs, heat pumps) which are open to employed/self-employed adults earning under £34,303 (with no salary cap for green/digital courses).
31. PLA courses are delivered via FE colleges and coordinated with Working Wales, and the initiative supports career change, upskilling, and progression in net zero sectors.

Make UK Policy Position

Remaining policy challenges

32. Green skills investment is heavily directed toward clean energy and digital sectors, but advanced manufacturing and SMEs receive less targeted support for energy transition.
33. As engineers and technicians are also in high demand across clean energy and digital, this creates excess recruitment pressure on manufacturing. No policy mechanism exists to protect manufacturing's access to these critical skills.
34. There is a mismatch between what employers want and what the training market provides – in 2021, Make UK found that only 49% of manufacturers "were confident that the education and training market could deliver the skills they needed to manufacture in a more sustainable way."
35. New post-16 reforms could fail to deliver the green skills manufacturing urgently needs unless the Government clarifies the value of new Level 2–3 technical pathways, preserves the value of T-levels, guarantees provider capacity, and embeds employers in qualification design rather than consulting them late.
36. Regional delivery of programmes like the Heat Training Grant is inconsistent and often not tailored to complex industrial systems.
37. As of July 2025, University College Union found that FE colleges were still facing funding and instructor shortages - in particular for retrofit and low-carbon heat.[20]
38. Engagement from government with manufacturers, at a local level, throughout implementation of training reform has been lacking.
39. The points-based immigration system will continue to cause problems as the requirements are too stringent for many businesses (particularly SMEs) to participate in. Currently, additional costs often fall on the employer including a health surcharge, immigration skills charge and visa costs.
40. Though local initiatives are sometimes filling gaps, a lack of nationally coordinated support for SMEs means they are still struggling to access green training according to the green alliance.[21] The admin costs alone may disincentivise SMEs from upskilling staff on accredited green courses.

[20] The_Green_Gap_-_SOS-UK_and_UCU_-_July_2025.pdf
[21] Closing_the_UKs_green_skills_gap.pdf

Policy recommendations

42. Government should ensure consistency, access and clarity in the roll-out of the Lifelong Learning Entitlement (LLE), supporting employers to encourage their employees to pursue further training and upskilling.

43. Ensure that manufacturing jobs in extreme shortage are included as a priority on the Temporary Shortage List and that the Immigration Skills Charge is ringfenced for investment in skills for priority sectors.

44. Provide more effective support through the tax system for investment in training across their workforce. Make UK's most recent data shows that nearly three quarters of manufacturers (74%) cannot recruit because of skills shortages. The Government should formally evaluate the existing corporate tax deduction for work-related training with a view to consulting on enhanced relief for training relevant to industrial strategy occupations.

45. Consider the benefits of a passport for Green Skills in manufacturing. With learnings from the Energy Skills Passport, a manufacturing passport with specificity around green skills development could be beneficial to encourage upskilling as manufacturing transitions from brown to green.

46. Introduce a Help to Grow Green program for managers and leaders to support training in sustainability. Training would include net-zero and climate finance literacy. This would also allow a smoother transition of management roles from brown to green sectors as demand shifts.

47. Consider creating a national, digital platform to connect workers and businesses to green skills and training in their local areas – such a platform could integrate or direct users to combined authority platforms.

48. Consider giving a greater role to the Circular Economy Taskforce in leading on the circular economy aspect of green skills planning.

49. Introduce additional measures to the Clean Energy Jobs Plan to ensure that the wider manufacturing sector will not lose their current supply of skilled workers in the pipeline (particularly in areas of shortage like engineering) to clean energy generation and its supply chains.