



GREEN SKILLING INVESTMENT AND EMPLOYMENT DEMAND IN THE NET-ZERO TRANSITION

HRM Variable: Green Learning-and-Development (L&D) Investment → Economic Outcome: Labour Demand

Dr. N Subbukrishna Sastry¹, Dr. Manjula Mallya M²

¹Professor, School of Management, CMR University, Bangalore, Karnataka, India. ORCID ID: 0009-0009-0460-7057,

²Associate Professor & Head, Dept. of Economics, Government First Grade College for Women Balmatta Mangalore, Karnataka, India. ORCID ID: 0009-0005-8812-6912,

ABSTRACT

The transition to net-zero emissions is simultaneously a technological, regulatory and human-capital transition. Firms and national skilling systems are being asked to fund green learning-and-development (L&D) programmes years before the labour-demand payoff of that investment is visible in wage or hiring data. This paper synthesises the present evidence on the ESG (green) employment premium and sets it against the labour-demand projections that accompany net-zero transition pathways, in order to ask whether current green L&D investment is calibrated to where demand is actually forming. Drawing on linked employer-employee wage data, global hiring and skills-supply indices, and sectoral employment projections to 2030 and 2047, the paper finds a persistent and quantifiable gap: green-skill hiring is growing roughly 1.8 times faster than green-skill supply, the measured green wage premium (6.6 per cent, net of worker sorting) is less than half the brown-occupation premium it is meant to eventually displace, and India's projected green workforce would need to expand more than twenty-fold between 2024 and the late 2040s to match stated policy ambition. The paper develops a conceptual framework linking six green L&D investment levers to labour-demand transmission channels, and situates the analysis within a six-strand literature review spanning green human resource management, labour economics of green skills, wage-premium econometrics, decarbonisation labour-market policy, talent and leadership readiness, and India's skilling infrastructure. It closes with implications for HR investment sequencing, education-training provider capacity, and policy design, and identifies the data limitations that currently prevent a causal estimate of the L&D-to-labour-demand elasticity.

KEYWORDS: Green Human Resource Management, Green Skilling, Learning and Development Investment, ESG Employment Premium, Net-Zero Transition, Labour Demand, Human Capital

1. INTRODUCTION

Net-zero commitments convert a climate target into a labour-market instruction: economies must reallocate workers, at scale and at speed, from carbon-intensive to low-carbon activity. The instruction reaches firms first as a human resource management (HRM) problem — what to teach, whom to redeploy, and how much to spend on green learning-and-development (L&D) before the market rewards it — and only later as an aggregate labour-market outcome. Two bodies of evidence describe this problem from opposite ends. One measures what the labour market currently pays for green skills and green jobs — the "ESG employment premium." The other projects what net-zero pathways will demand of the workforce over the coming years and decades. The two bodies of evidence are rarely read together, and when they are, the picture that emerges is uncomfortable for HR investment planning: current green-skill supply is growing more slowly than green-skill demand even in advanced labour markets, the measured wage return to green employment is smaller and more heterogeneous than commonly assumed, and the sectoral demand projections that justify large-scale green L&D spending stretch out to 2030, 2047 and 2070 — horizons well beyond a typical corporate training budget cycle (Godøy & Isaksen, 2025; World Economic Forum, 2025; LinkedIn Economic Graph, 2025).

This paper treats "green L&D investment" as the HRM variable of interest and "labour demand" as the economic outcome, and asks a narrower, more tractable question than the literature's usual "does green HRM work?": is the present ESG employment premium — the signal firms and workers currently observe — consistent with the labour-demand trajectory that net-zero pathways project? If the premium understates future demand, green L&D investment is currently under-priced by the market and firms that invest ahead of the curve should expect to capture scarcity rents; if the premium is a poor predictor of where demand will concentrate (by skill level, by sector, by geography), then L&D investment guided purely by current wage signals will misallocate training capital. The paper draws this comparison using verified secondary data — linked employer-employee wage-premium estimates, global hiring and skills-supply indices, and net-zero employment projections to 2030 and beyond — and situates it within the author's own accumulated line of research on skill diversification, talent readiness, leadership and organisational design under labour-market disruption, alongside the wider green-HRM and environmental-economics literatures.

The remainder of the paper is organised as follows. Section 2 reviews six strands of relevant literature. Section 3 develops a conceptual framework mapping green L&D investment levers to labour-demand transmission channels. Section 4 sets out the method — a secondary-data synthesis and comparative-statistics approach rather than a new primary estimation. Section 5 presents the present-day ESG employment premium evidence. Section 6 sets out projected net-zero labour demand, globally and for India. Section 7 discusses the gap between the two and its HRM implications. Section 8 draws out policy and managerial implications, and Section 9 concludes with limitations and a future research agenda.



2. LITERATURE REVIEW

2.1 *Green Human Resource Management and the Learning-and-Development Function*

Green human resource management (GHRM) research established, over a decade ago, that environmental performance is mediated through ordinary HRM sub-functions — recruitment, training, appraisal, reward — rather than through a separate "sustainability department." Jackson, Renwick, Jabbour and Muller-Camen (2011) framed GHRM as the point at which environmental management and HRM practice converge, and Renwick, Redman and Maguire (2013), in the field's most cited review, showed that green training and development is consistently identified as the practice with the strongest observed link to pro-environmental employee behaviour, ahead of green recruitment or green reward. More recent empirical work has confirmed the mechanism rather than merely restated it: Al-Sabi, Al-Ababneh, Al Qssem, Afaneh and Elshaer (2024) find that GHRM practices raise firm environmental performance mainly by first raising job satisfaction and pro-environmental behaviour, i.e. training effects are indirect and behaviourally mediated rather than immediate.

This indirect-effects finding matters for how green L&D investment is planned, because it implies that the organisational scaffolding around training — how departments are structured, how much discretionary energy employees have left after ordinary role demands — determines how much of an L&D rupee converts into behaviour change and, eventually, into demand for green-skilled labour. My own earlier empirical work on departmental structure found that task achievement varies systematically with how responsibilities are partitioned across units, independent of the resources supplied to any one unit (Sastry, 2024a) — a structural precondition that GHRM's training-effectiveness literature generally leaves implicit. Delegation and resource provision compound the same effect: employees who are given genuine decision authority alongside the resources to act on it show measurably higher initiative and follow-through (Sastry & Ravish, 2025), which is precisely the behavioural channel through which green training is meant to convert into environmental performance. And because sustained behaviour change requires a workforce with the psychological capacity to absorb new demands, burnout is not a peripheral HR concern for green-skilling programmes but a binding constraint on them: my work on leadership approaches to workforce burnout shows that unmanaged burnout suppresses the discretionary effort on which any new training initiative — green or otherwise — ultimately depends (Sastry, 2024b). Read together, this subsection suggests that green L&D investment which ignores departmental structure, delegated authority and burnout risk is investment made against organisational headwinds that the GHRM literature has documented but rarely costed.

2.2 *The Economics of Green Skills and Human Capital Formation*

Environmental economics has developed an independent, more skill-taxonomic literature on what "green" work actually requires in human-capital terms. Consoli, Marin, Marzucchi and Vona (2016), using US occupational data, show that green jobs are not simply existing jobs with an environmental label attached — they demand a distinct bundle of skills, weighted toward engineering, science and monitoring competencies, and this bundle commands higher requirements for cognitive and technical skill than the average occupation. Vona, Marin, Consoli and Popp (2018) extend this by showing that the skill content of green jobs responds endogenously to environmental regulation: tighter regulation raises the demand for green-specific skills within existing occupations, not only the count of green job titles, which implies that skill formation must anticipate regulatory tightening rather than follow it. Bowen, Kuralbayeva and Tipoe (2018) complicate the optimistic "green jobs are good jobs" narrative often used to justify L&D spend, finding that the greening of workforce composition in the United States has been accompanied by only modest net employment effects and meaningful heterogeneity by region and skill level — a caution against assuming that green skilling investment translates linearly into aggregate labour demand.

This economics-of-skills literature is where the paper's own labour-market-dynamics work sits most directly. My analysis of skill diversification, labour market dynamics and technology disruption argues that resilience against demand shocks — whether from automation or, by direct extension, decarbonisation — depends on firms diversifying the skill portfolios of their existing workforce ahead of the shock rather than hiring narrowly defined "green" specialists after it (Sastry & Mallya, 2025a). That argument is consistent with Consoli et al.'s (2016) finding that green skill content is distributed across many occupations rather than concentrated in a small set of green job titles: skill diversification, not green-badge hiring, is the mechanism through which most of the workforce will actually absorb the net-zero transition.

2.3 *Wage and Employment Premia in Green versus Brown Occupations*

The most direct present-day evidence on the ESG employment premium comes from Godøy and Isaksen (2025), who use an Abowd-Kramarz-Margolis two-way fixed-effects model on Norwegian linked employer-employee administrative data (13.5 million person-year observations, 2010–2023) to separate the wage premium attributable to green employment from the premium attributable to worker sorting into higher-paying firms. Their headline result is that the raw green wage gap of 13.8 per cent collapses to a sorting-adjusted premium of 6.6 per cent — roughly half the size the raw gap would suggest — and that this adjusted green premium is itself smaller than the adjusted brown-occupation premium of 14.2 per cent. The premium is also unevenly distributed: it is larger for non-college workers (7.1 per cent) than for college-educated workers (3.5 per cent), and larger in low-skilled occupational categories such as craft, service and elementary work than in high-skilled roles. Historically, the theoretical case for expecting any green premium at all traces to Porter and van der Linde (1995), whose "Porter Hypothesis" argued that well-designed environmental regulation can raise firm competitiveness rather than only raise compliance cost — a proposition that, thirty years on, the Godøy-Isaksen wage data allow economists to test directly rather than argue theoretically.



The practical HR problem this creates is one of capture: a positive but modest and unevenly distributed premium is easy for a firm to under-invest against, because the wage signal alone does not clearly beat the opportunity cost of leaving L&D budget in conventional training. Firms that wish to capture the premium disproportionately therefore need hiring and internal-mobility processes precise enough to identify and reward the workers most likely to hold scarce green competencies — a matching-efficiency problem, not only a training-volume problem. My study of AI-enabled HR analytics in hiring shows that firms using predictive analytics in candidate screening and selection materially shorten time-to-fill and improve person-role fit relative to conventional screening (Sastry & Mallya, 2025b); applied to the green labour market described by Godøy and Isaksen (2025), the same analytics capability is what would let a firm systematically identify and reward the workers earning the 6.6 per cent premium rather than discovering the match by accident.

2.4 Labour-Market Transition Dynamics under Decarbonisation Policy

A distinct, policy-oriented literature projects what net-zero pathways will require of the labour market in aggregate, rather than estimating today's wage premium. The OECD's *A Fair Net-Zero Transition* (2025) frames the central labour-market risk not as net job loss — most OECD scenarios project net job gains — but as mismatch: the workers displaced from carbon-intensive sectors are concentrated in specific regions and occupations that do not automatically overlap with where green job growth occurs, and active labour-market and skills policy is needed to bridge the two. The OECD's companion review of employment and skills policies for the green transition (OECD, 2024) and Cedefop's European skills-anticipation work (Cedefop, 2023) both document that formal vocational education and training systems currently update their curricula more slowly than employer demand for green competencies shifts, producing a structural lag between policy intent and workforce readiness. At global scale, the World Economic Forum's *Future of Jobs Report 2025* projects 78 million net new jobs by 2030 with the green transition identified as a primary structural driver of job growth, while the Forum's joint work with McKinsey & Company (World Economic Forum & McKinsey & Company, 2025) refines this into a labour-reallocation estimate specific to the green transition: 14.4 million jobs created, 2.4 million phased out, and a net gain of 9.6 million jobs globally by 2030, with frontier and lower-income economies facing disproportionate financing, technology-access and skills barriers in capturing their share of that gain. The ILO's *Skills for a Greener Future* (2019) — based on 32 country studies — was among the first to demonstrate empirically that skills shortages, not capital shortages, are frequently the binding constraint on how fast countries can scale renewable and resource-efficient sectors, a finding the sector's own employment data corroborate: renewable-energy employment grew only 2.3 per cent in 2024, its first material slowdown despite record renewable-capacity installation, which the IRENA-ILO *Renewable Energy and Jobs* annual review (2026) attributes partly to skills and supply-chain bottlenecks rather than to weakening demand for renewable capacity itself.

Every one of these transition pathways assumes that firms and training systems will actually make the anticipatory investment the pathway requires, and the evidence on why they frequently do not is itself an economic-constraints question. My analysis of economic constraints and organisational status quo bias shows that firms facing budget uncertainty systematically under-invest in innovation and problem-solving capacity relative to the return such investment would generate under stable conditions, preferring the safer, sunk-cost-protecting status quo (Sastry & Mallya, 2025c). Green L&D investment — whose payoff is deferred, uncertain, and contingent on a policy and technology pathway the individual firm does not control — is close to a textbook case of the investment class that status-quo bias suppresses, which helps explain why the skills-lag documented by Cedefop and the OECD persists even where the aggregate demand case (78 million new jobs, a 9.6 million net gain) is by now well publicised.

2.5 Talent, Leadership and Organisational Readiness for the Green Transition

If aggregate demand projections are the "what," organisational readiness research is the "whether a given firm can actually respond." LinkedIn's Economic Graph, drawing on anonymised profile data from over one billion members across 84 countries, provides the clearest present-day evidence that readiness is not keeping pace with demand: green-skill hiring grew 7.7 per cent year-on-year in 2025 against green-skill supply growth of only 4.3 per cent, a gap that has widened from the 2021–2025 average (6.2 per cent hiring growth against 3.4 per cent supply growth), and workers who hold green skills now enjoy a 46.6 per cent higher hiring rate than the broader workforce (LinkedIn Economic Graph, 2025). Gallo (2025), examining green investment and productivity dynamics using firm-level European data, adds a complementary finding: firms that sustain green capital investment realise measurable total-factor-productivity gains over a multi-year horizon, but the gains are contingent on complementary organisational capacity — green investment without organisational readiness does not reliably raise productivity.

Organisational readiness, in HRM terms, is substantially a leadership and talent-architecture question, which is where three strands of my own prior work converge on this subsection's argument. Building future-ready organisations, I have argued, depends on leadership strategies explicitly designed around young-talent management rather than on retrofitting legacy leadership pipelines (Sastry & Mallya, 2025d) — directly relevant to a green-skills market in which, per LinkedIn's data, demand is concentrated among recently-formed competencies that incumbent leadership pipelines were not built to recognise. My study of leadership for innovation under global challenges similarly finds that firms which formally develop future-oriented leadership capacity are better positioned to reallocate resources toward emerging demands such as decarbonisation than firms relying on existing managerial hierarchies (Sastry, 2024c). And because green-skill scarcity inevitably raises questions of internal equity — who gets designated as "green talent," and what that designation is worth relative to peers — my analysis of talent designation and social comparison shows that unmanaged status differentiation among employees can itself become a source of organisational friction that offsets the productivity gains a talent programme is meant to deliver (Sastry, 2025). Together, these three findings suggest that the LinkedIn-documented



hiring-supply gap will not close through external recruitment alone; it also requires the internal leadership-pipeline and talent-equity architecture that green L&D investment is rarely designed to include.

2.6 The Indian Context: Skilling Infrastructure and Net-Zero 2070

India's net-zero-2070 commitment sits on top of a green-skilling base that is, by the evidence above, both small and fast-growing. The Skill Council for Green Jobs, established with World Bank support (Skill Council for Green Jobs & World Bank, 2020), was created precisely to address the sector-specific certification gap that generalist vocational training systems were not built to close, and remains India's principal institutional mechanism for green-skill certification across renewable energy, waste management and allied sectors. Renewable-energy employment in India stood at roughly 1.3 million workers in 2024 (IRENA & ILO, 2026); industry projections reported by NLB Services put India's total green workforce at 7.29 million by FY 2027–28 and 35 million by 2047, with Tier-II and Tier-III cities expected to account for 35–40 per cent of the nearer-term figure and demand for ESG-analytics, climate-data and green-technology roles projected to grow 20–30 per cent annually (cited in ESG News, 2025). Industry commentary accompanying these projections is explicit that the binding constraint is skills, not capital or policy ambition: India's green shift is expected to create jobs faster than its training system can currently certify workers for them (Business Standard, 2025).

Closing a gap of this magnitude — from roughly one million workers today to a stated ambition an order of magnitude larger within a generation — is not primarily a problem of vocational-training capacity in isolation; it is a problem of how India's broader higher-education and skilling infrastructure absorbs and delivers large-scale programme change. My co-authored study of enterprise resource planning adoption in India's higher-education sector found that ERP-enabled institutions were able to scale programme administration, track outcomes and reallocate teaching capacity substantially faster than institutions relying on manual administrative systems (Sastry et al., 2026) — a capacity constraint directly analogous to the one India's green-skilling infrastructure now faces at a much larger scale. Read against the Skill Council for Green Jobs' certification mandate, this suggests that closing India's green-skills gap will depend as much on the administrative and technological readiness of the institutions delivering training as on the volume of green L&D funding announced at the policy level.

3. CONCEPTUAL FRAMEWORK

The literature reviewed above supports a transmission-channel model in which green L&D investment does not raise labour demand directly, but instead operates through a small number of intermediate channels, each of which can bind independently. Table 1 sets out the constructs used in the remainder of the paper, and Table 4 (Section 7) maps six specific L&D levers to the labour-demand channel each is expected to activate, together with the literature strand supporting that link. The framework's central proposition, following Consoli et al. (2016) and Vona et al. (2018), is that green labour demand is skill-content-driven and distributed across occupations rather than concentrated in a narrow set of "green jobs" — which means the relevant HRM lever is workforce-wide skill diversification (Sastry & Mallya, 2025a) rather than the recruitment of a small green-specialist headcount. The framework's second proposition, following the organisational-readiness evidence in Section 2.1 and 2.5, is that the conversion of L&D spend into behaviour change and eventually into labour-demand response is gated by departmental structure, delegated authority, leadership pipeline design and talent-equity management — organisational variables that most ESG employment-premium studies hold constant or ignore, but which this paper's own prior findings suggest are binding in practice.

Table 1. Key constructs and definitions

Construct	Definition	Primary indicator used in this paper
Green L&D Investment	Employer- or system-level expenditure of time and budget on training, certification and reskilling explicitly oriented to low-carbon or environmentally adapted competencies.	Qualitative construct, proxied through the reviewed programme and policy evidence.
ESG Employment Premium	The wage or hiring-rate differential associated with green-skilled employment relative to comparable non-green employment, net of worker-sorting effects where estimable.	Sorting-adjusted wage premium (%); relative hiring-rate index.
Net-Zero Labour Demand	Projected change in employment associated with decarbonisation pathways, measured as jobs created, phased out and net gained over a stated horizon.	Millions of jobs, by horizon (2030, 2047, 2070).
Skill Diversification	Breadth of complementary competencies held by a worker or embedded in a workforce, as distinct from possession of a single narrow "green" specialism.	Distribution of green skill content across job titles (e.g., % of green hires in non-green titles).

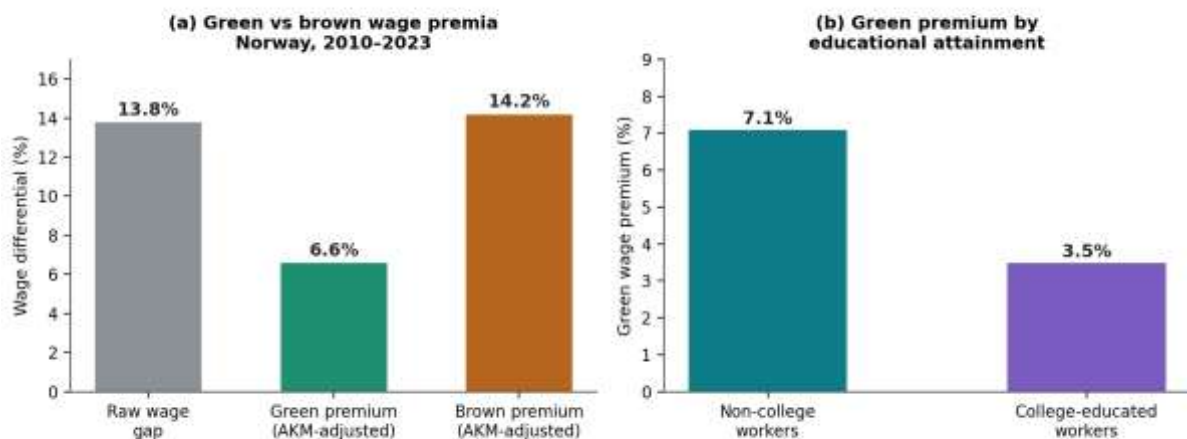
4. METHOD

This paper does not estimate a new causal model of the L&D-to-labour-demand elasticity; the data required to do so — matched firm-level green L&D expenditure and subsequent green hiring outcomes across a sufficiently large and heterogeneous sample of firms — does not yet exist in the public domain at the resolution this question requires. The method is instead a structured secondary-data synthesis and comparative-statistics approach, consistent with the systematic-review-plus-policy-synthesis method used elsewhere in this author's research programme on HRM-economics linkages. Verified primary and institutional sources were

identified for (i) present-day green/ESG wage-premium estimates from peer-reviewed and working-paper sources using linked employer-employee data, (ii) global hiring and skills-supply indices from labour-market platform data, (iii) sectoral and national employment projections published by multilateral organisations (OECD, ILO, IRENA, World Economic Forum) and industry advisory sources, and (iv) India-specific green-workforce data from government-linked skilling institutions and industry reporting. Figures 1 through 4 present these data as comparative visualisations; Tables 2 and 3 tabulate the underlying figures with source attribution for verification. Because the underlying studies use different countries, time windows and definitions of "green," the comparison in Sections 5–7 is presented as a set of parallel, source-attributed data points rather than as a single pooled estimate, and this limitation is discussed explicitly in Section 9.

5. THE PRESENT ESG EMPLOYMENT PREMIUM

Figure 1. The Present ESG Employment (Wage) Premium



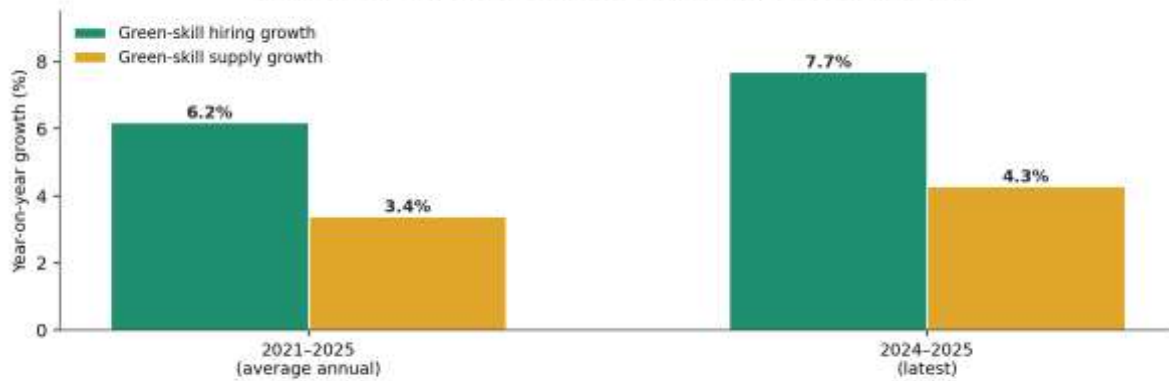
Source: computed from Godøy & Isaksen (2025), LSE Grantham Research Institute Working Paper No. 432.

Table 2. Summary of present ESG/green employment premium evidence

Study / Source	Geography	Data & Method	Key Premium / Gap Finding
Godøy & Isaksen (2025)	Norway	Linked employer–employee administrative data, 2010–2023; AKM two-way fixed effects	Green premium 6.6% (raw gap 13.8%); brown premium 14.2%; non-college 7.1% vs college 3.5%
LinkedIn Economic Graph (2025)	Global (84 countries)	Platform hiring & skills-supply data, 2021–2025	Green hiring +7.7% y-o-y vs supply +4.3% y-o-y (2025); 46.6% higher hiring rate for green-skilled workers
Gallo (2025)	Europe (firm-level)	Firm-level green investment and productivity panel	Green investment raises total-factor productivity only where organisational readiness is present
World Economic Forum (2025)	Global	Executive survey, 1,000+ employers	Green transition identified as a top structural driver of the 78 million net new jobs projected by 2030

The clearest present-day estimate of the ESG employment premium comes from Godøy and Isaksen (2025): a sorting-adjusted green wage premium of 6.6 per cent, against a raw (unadjusted) gap of 13.8 per cent and a brown-occupation premium of 14.2 per cent. Two features of this result matter for green L&D investment planning beyond the headline number. First, roughly half of the raw green wage gap is explained by worker sorting rather than by the wage-setting effect of green employment itself — high-wage workers disproportionately move into green jobs, which means the premium a firm can expect to pay to *convert* an existing (average) worker into a green-skilled one is smaller than raw labour-market wage comparisons suggest. Second, the premium is markedly larger for non-college workers (7.1 per cent) than for college-educated workers (3.5 per cent) and larger in lower-skilled occupational categories, which runs counter to a common assumption in corporate green-skilling programmes that the highest-return L&D investment targets technical and managerial staff. If the wage market is pricing the premium correctly, the strongest present-day case for green L&D investment is in frontline, craft and service roles, not in specialist or leadership tiers — a finding that should recalibrate how L&D budgets are currently allocated across job families.

Figure 2. Green-Skill Demand Is Outpacing Green-Skill Supply

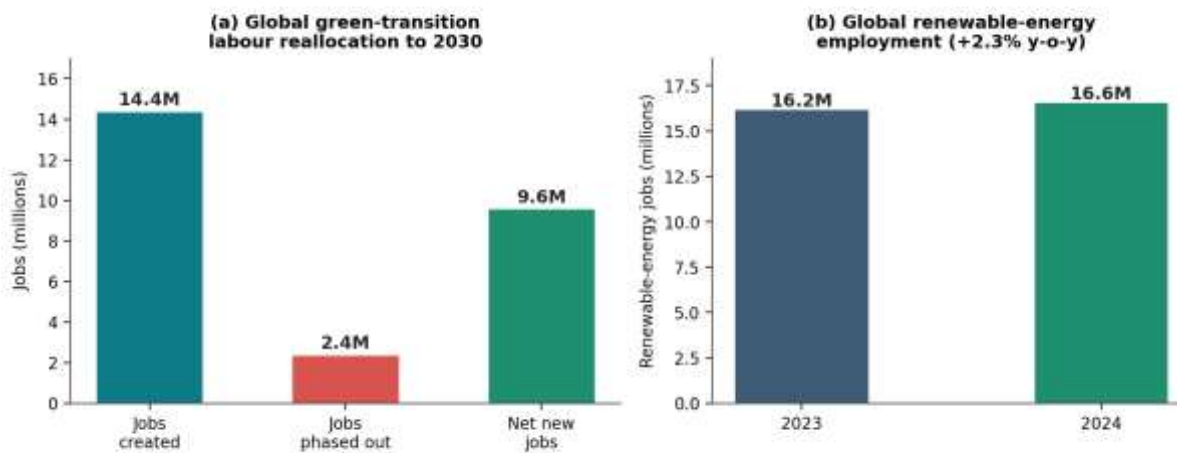


Note: hiring rate for green-skilled workers runs 46.6% above the broader labour market; 53% of 2025 green-skilled hires filled non-green job titles. Source: LinkedIn Economic Graph, Global Green Skills Report 2025.

The hiring-market evidence in Figure 2 complements the wage evidence by describing quantity rather than price. LinkedIn's Economic Graph data show green-skill hiring growing at 7.7 per cent year-on-year in 2025 against green-skill supply growth of only 4.3 per cent — a gap that has widened relative to the 2021–2025 average of 6.2 per cent versus 3.4 per cent — with green-skilled workers commanding a 46.6 per cent higher hiring rate than the broader labour market. Notably, 53 per cent of green-skilled hires in 2025 filled job titles that were not themselves labelled "green," which is direct evidence for the Consoli et al. (2016) and Vona et al. (2018) finding that green skill content diffuses across the wider occupational structure rather than concentrating in a small set of green job titles. Read together, Figures 1 and 2 indicate that the present-day market signal is a persistent quantity gap (supply lagging demand growth by a factor of roughly 1.8) accompanied by a positive but moderate and unevenly distributed price signal (a premium roughly half the size of the brown-occupation premium it is meant to eventually displace).

6. PROJECTED NET-ZERO LABOUR DEMAND

Figure 3. Projected Net-Zero Labour Demand, 2023-2030



Source: World Economic Forum & McKinsey & Company (2025); IRENA & ILO, Renewable Energy and Jobs – Annual Review 2025.

Table 3. Projected net-zero labour demand indicators, global and India, 2024–2047

Indicator	Baseline	Projection	Horizon	Source
Global green-transition jobs (created / phased out / net gain)	—	14.4M created; 2.4M phased out; 9.6M net gain	by 2030	WEF & McKinsey (2025)
Global renewable-energy employment	16.2M (2023)	16.6M (+2.3% y-o-y)	2024	IRENA & ILO (2026)
India renewable-energy workforce	1.3M (2024)	7.29M	FY 2027–28	IRENA & ILO (2026); ESG News (2025)
India green workforce (all sectors)	1.3M (2024)	35M	2047	ESG News (2025), citing NLB Services

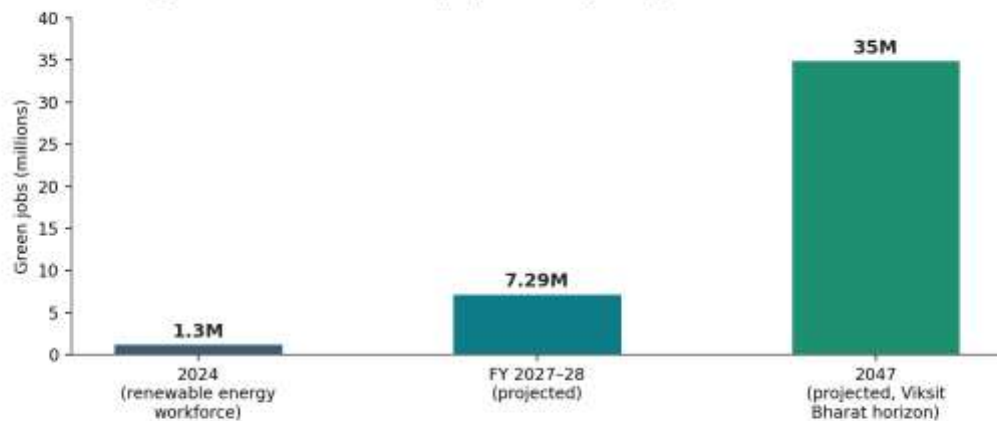


India Tier-II/III green-job share	—	35–40% of FY28 total	FY 2027–28	ESG News (2025)
Demand growth, ESG analytics / climate-data / green-tech roles (India)	—	20–30% p.a.	ongoing	ESG News (2025)

Projected labour demand under net-zero pathways is an order of magnitude larger in scale than what the present-day premium evidence alone would predict firms to prepare for. The World Economic Forum and McKinsey & Company (2025) project 14.4 million jobs created and 2.4 million jobs phased out through the green transition globally by 2030, a net gain of 9.6 million jobs — consistent with the Forum's wider *Future of Jobs Report 2025* finding that the green transition is among the strongest structural drivers of the 78 million net new jobs it projects economy-wide by 2030 (World Economic Forum, 2025). Renewable-energy employment specifically reached 16.6 million jobs globally in 2024, up 2.3 per cent from 16.2 million in 2023 — the sector's first material growth slowdown despite record renewable-capacity additions, which the IRENA-ILO *Renewable Energy and Jobs* annual review (2026) attributes in part to skills and supply-chain constraints rather than to weakening underlying demand. The OECD's *Fair Net-Zero Transition* (2025) analysis is consistent with this reading: at the aggregate level, most net-zero pathways project net job gains, but the risk that dominates policy attention is regional and occupational mismatch between where jobs are lost and where they are created, a mismatch that active labour-market and skills policy — not aggregate job counts — is required to resolve.

6.1 The India Case

Figure 4. India's Green Employment Trajectory towards Net-Zero 2070



Note: Tier-II/III cities are projected to account for 35–40% of the 7.29 million FY28 green jobs; demand for ESG analytics, climate-data and green-technology roles is projected to rise 20–30% annually. Sources: IRENA & ILO (2026); NLB Services, cited in ESG News (2025).

India's own trajectory illustrates the scale of the demand projection most starkly. Against a 2024 renewable-energy workforce of roughly 1.3 million (IRENA & ILO, 2026), industry projections reported via NLB Services put India's green workforce at 7.29 million by FY 2027–28 and 35 million by 2047 (cited in ESG News, 2025) — respectively a 5.6-fold and a 27-fold increase from the 2024 base. Tier-II and Tier-III cities are projected to account for 35–40 per cent of the nearer-term figure, and demand for ESG-analytics, climate-data and green-technology roles specifically is projected to grow 20–30 per cent annually, a rate that exceeds even the global green-hiring growth rate documented by LinkedIn (7.7 per cent) by a wide margin. India's Skill Council for Green Jobs (Skill Council for Green Jobs & World Bank, 2020) is the principal institutional mechanism tasked with certifying workers against this trajectory, and industry commentary is explicit that skills — not policy ambition or capital availability — are the binding constraint on how much of this projected demand India's labour market can actually fill (Business Standard, 2025).

7. DISCUSSION: THE PREMIUM-DEMAND GAP AND ITS HRM IMPLICATIONS

Table 4. Mapping green L&D investment levers to labour-demand transmission channels

L&D Lever	Transmission Channel	Expected Labour-Demand Effect	Supporting Evidence
Workforce-wide skill diversification (vs. green-specialist hiring)	Distributes green skill content across existing occupations	Broadens the base absorbing net-zero demand; matches the diffuse skill-content pattern	Consoli et al. (2016); Vona et al. (2018); Sastry & Mallya (2025a)
Departmental / structural redesign	Improves the conversion of training input into behaviour change	Raises the effective throughput of a given L&D budget	Sastry (2024a); Al-Sabi et al. (2024)



around training delivery			
Delegated authority and resourcing at the point of training uptake	Increases employee initiative and follow-through on new practice	Converts training exposure into applied capability	Sastry & Ravish (2025)
Burnout-aware leadership and workload design	Protects the discretionary effort training uptake requires	Prevents L&D investment from being absorbed without behaviour change	Sastry (2024b)
Future-oriented leadership-pipeline design	Aligns managerial recognition with emerging (not legacy) competencies	Speeds internal reallocation toward green-relevant roles	Sastry & Mallya (2025d); Sastry (2024c)
Talent-equity management around “green talent” designation	Limits social-comparison friction from differentiated recognition	Preserves the productivity gain the training investment is meant to deliver	Sastry (2025)

Sections 5 and 6 describe two evidence bases that, read separately, could each justify a cautious approach to green L&D investment — the wage premium is real but moderate, and the demand projections, while large, are diffuse and multi-decade. Read together, they instead describe a market that is currently mispricing green skill formation. A 6.6 per cent wage premium and a hiring-growth rate of 7.7 per cent against a 4.3 per cent supply-growth rate are not consistent signals if the underlying demand base is set to grow by a factor of 5.6 to 27 times over the next two decades, as India's trajectory alone illustrates: either the premium will rise substantially as scarcity intensifies, rewarding early L&D investors, or supply will catch up faster than current training-system capacity suggests is likely, in which case the premium the market is currently paying is close to its ceiling. The organisational-readiness literature reviewed in Sections 2.1 and 2.5 suggests the first outcome is more probable in the near term: because green L&D investment is gated by departmental structure, delegated authority, leadership-pipeline design and talent-equity management (Sastry, 2024a, 2024b, 2024c; Sastry & Ravish, 2025; Sastry & Mallya, 2025d; Sastry, 2025), and because these organisational preconditions themselves take years to build, aggregate green-skill supply is unlikely to close the LinkedIn-documented 1.8-times demand-supply growth gap quickly, which should keep upward pressure on the premium over the medium term.

For HR investment sequencing, three implications follow directly. First, given that the green wage premium is largest for non-college and lower-skilled occupational categories (Godøy & Isaksen, 2025), L&D budgets concentrated on technical-specialist or managerial green training may be under-targeting the segment of the workforce where the market is currently paying the clearest return. Second, given that 53 per cent of green-skilled hires already fill non-green job titles (LinkedIn Economic Graph, 2025), consistent with the diffuse skill-content finding of Consoli et al. (2016), organisation-wide skill-diversification programmes (Sastry & Mallya, 2025a) are likely to generate more labour-demand-relevant capability per rupee invested than narrowly defined green-specialist training tracks. Third, because status-quo bias systematically suppresses exactly the deferred-payoff investment that green L&D requires (Sastry & Mallya, 2025c), firms that build an explicit business case using premium and demand-growth data of the kind synthesised in this paper are better positioned to overcome internal budget resistance than firms relying on generic sustainability-mandate framing.

8. POLICY AND MANAGERIAL IMPLICATIONS

Table 5. Policy and managerial implications matrix

Stakeholder	Priority Action	Expected Outcome
Firm HR / L&D function	Sequence L&D spend toward frontline and craft-level roles first; diversify skills workforce-wide rather than hiring a narrow green-specialist headcount	Captures the segment of the wage premium the market already rewards most strongly
Firm leadership	Build an explicit internal business case from premium and demand-growth data to counter status-quo budget bias	Overcomes the deferred-payoff investment aversion documented in Sastry & Mallya (2025c)
Education & training providers	Shorten curriculum-update cycles for green competencies; expand certification throughput, not only enrolment capacity	Narrows the documented hiring-growth vs skills-supply-growth gap (7.7% vs 4.3%)
Indian policymakers / Skill Council for Green Jobs	Strengthen the administrative and technological capacity of certifying institutions alongside funding volume	Addresses the certification-throughput constraint industry commentary identifies as binding
Researchers	Prioritise matched firm-level L&D-expenditure / hiring-outcome data collection	Enables direct estimation of the L&D-to-labour-demand elasticity this paper infers indirectly



For firm-level HR practice, the analysis implies that green L&D investment should be sequenced toward frontline and craft-level roles first (where the present premium is largest and best-documented), supported by workforce-wide skill-diversification rather than green-specialist hiring, and protected against status-quo budget bias through an explicit internal business case grounded in premium and demand data rather than compliance framing alone. For training and education providers, the gap between green-skill hiring growth (7.7 per cent) and supply growth (4.3 per cent) documented globally, and the order-of-magnitude gap between India's current and projected green workforce, both point to curriculum-update speed — not aggregate training capacity — as the binding constraint, consistent with the OECD (2024) and Cedefop (2023) findings on vocational-system lag. For policymakers, particularly in India, the evidence supports strengthening the administrative and technological capacity of the institutions that deliver green-skills certification (Sastry et al., 2026) at least as much as increasing the headline funding announced for green-skilling programmes, since certification throughput — not funding volume alone — appears to be the constraint that industry commentary identifies as binding (Business Standard, 2025).

9. LIMITATIONS AND FUTURE RESEARCH

The comparison presented in this paper is a structured synthesis of verified secondary sources rather than a single pooled causal estimate, and this is its principal limitation. The wage-premium evidence (Godøy & Isaksen, 2025) is drawn from Norway, a small, high-income, strongly unionised labour market; its magnitude should not be assumed to generalise directly to India or to other emerging economies without local replication, which linked employer-employee administrative data of comparable quality does not yet permit at scale outside a small number of countries. The demand-side projections synthesised in Section 6 come from a mix of multilateral-organisation modelling and industry advisory sources using different methodologies, time horizons and definitions of "green" employment, and should be read as directionally consistent rather than as strictly additive or comparable point estimates. Future research should prioritise three extensions: first, replicating the Godøy-Isaksen wage-premium method on Indian linked employer-employee data as such data becomes available, to test whether the premium's skew toward non-college workers holds outside Norway; second, matching firm-level green L&D expenditure data to subsequent green-hiring outcomes to estimate the L&D-to-labour-demand elasticity directly, rather than inferring it from parallel but unmatched evidence bases as this paper does; and third, extending the organisational-readiness framework developed here (Table 4) into a measurable index that HR functions could use to benchmark their own green-skilling readiness against the demand trajectory their sector faces.

10. CONCLUSION

The present ESG employment premium and the projected labour demand of the net-zero transition are, on the evidence synthesised here, out of step with each other in a specific and actionable way: demand growth for green skills already exceeds supply growth by a factor of roughly 1.8 globally, the wage premium rewarding green employment is real but moderate and concentrated among non-college and lower-skilled workers rather than the technical-specialist tiers most corporate L&D budgets target, and demand-side projections — particularly India's, where the green workforce is projected to grow more than five-fold by FY 2027–28 and more than twenty-seven-fold by 2047 relative to 2024 — imply a scarcity that current premium levels have not yet fully priced in. For HRM practice, this paper's contribution is to show that closing this gap is not simply a matter of spending more on green training, but of sequencing that spend toward where the present wage evidence says the market already rewards it, diversifying skills across the existing workforce rather than concentrating investment in a narrow green-specialist headcount, and building the organisational scaffolding — departmental structure, delegated authority, leadership pipelines, talent-equity management — that this paper's own prior research indicates governs how much of any L&D investment actually converts into labour-market-relevant capability.

REFERENCES

1. Al-Sabi, S. M., Al-Ababneh, M. M., Al Qssem, A. H., Afaneh, J. A. A., & Elshaer, I. A. (2024). Green human resource management practices and environmental performance: The mediating role of job satisfaction and pro-environmental behavior. *Cogent Business & Management*, 11(1), Article 2328316. <https://doi.org/10.1080/23311975.2024.2328316>
2. Bowen, A., Kuralbayeva, K., & Tipoe, E. L. (2018). Characterising green employment: The impacts of 'greening' on workforce composition. *Energy Economics*, 72, 263–275. <https://doi.org/10.1016/j.eneco.2018.03.015>
3. Business Standard. (2025, October 17). India's green shift to create jobs but skills gap a concern: Ratul Puri. *Business Standard*.
4. Cedefop (European Centre for the Development of Vocational Training). (2023). Meeting skill needs for the green transition: Skills anticipation and VET. Publications Office of the European Union.
5. Consoli, D., Marin, G., Marzucchi, A., & Vona, F. (2016). Do green jobs differ from non-green jobs in terms of skills and human capital? *Research Policy*, 45(5), 1046–1060. <https://doi.org/10.1016/j.respol.2016.02.007>
6. ESG News. (2025). India to create 7.29 million green jobs in two years. *ESG News*, citing NLB Services (S. Alug).
7. Gallo, E. (2025). Green investment and productivity dynamics. *Review of Income and Wealth*, 71(3), Article e70024. <https://doi.org/10.1111/roiw.70024>
8. Godøy, A., & Isaksen, E. (2025). A green wage premium? (Working Paper No. 432). Grantham Research Institute on Climate Change and the Environment, London School of Economics.
9. International Labour Organization. (2019). Skills for a greener future: A global view. International Labour Organization.
10. International Renewable Energy Agency & International Labour Organization. (2026). Renewable energy and jobs: Annual review 2025. IRENA/ILO.
11. Jackson, S. E., Renwick, D. W. S., Jabbour, C. J. C., & Muller-Camen, M. (2011). State-of-the-art and future directions for green human resource management: Introduction to the special issue. *German Journal of Human Resource Management / Zeitschrift für Personalforschung*, 25(2), 99–116. <https://doi.org/10.1177/239700221102500203>



12. LinkedIn Economic Graph. (2025). Global green skills report 2025. LinkedIn Corporation.
13. Organisation for Economic Co-operation and Development. (2024). *Employment and skills policies for the green transition*. OECD Publishing.
14. Organisation for Economic Co-operation and Development. (2025). *A fair net-zero transition: Labour market policies to meet the challenges of decarbonisation*. OECD Publishing.
15. Porter, M. E., & van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives*, 9(4), 97–118. <https://doi.org/10.1257/jep.9.4.97>
16. Renwick, D. W. S., Redman, T., & Maguire, S. (2013). Green human resource management: A review and research agenda. *International Journal of Management Reviews*, 15(1), 1–14. <https://doi.org/10.1111/j.1468-2370.2011.00328.x>
17. Sastry, N. S. K. (2024a). An impact of departmental structure on task achievement. *EPRA International Journal of Economic and Business Review (IJEECEM)*, 11(9).
18. Sastry, N. S. K. (2024b). Revitalizing leadership to combat workforce burnout. *EPRA International Journal of Economic and Business Review (IJEECEM)*, 11(9).
19. Sastry, N. S. K. (2024c). An impact study on fostering future leadership for innovation to meet global challenges. *International Journal of Managerial Studies and Research*, 12(2), 23–26. <https://doi.org/10.20431/2349-0349.1202003>
20. Sastry, N. S. K. (2025). Talent designation and social comparison: Economic drivers of organizational growth – An empirical analysis. *EPRA International Journal of Economics, Business and Management Studies (IJBMS)*, 12(10).
21. Sastry, N. S. K., & Mallya, M. (2025a). Strategic HRM for economic resilience: Skill diversification, labor market dynamics and technology disruption. *EPRA International Journal of Research & Development (IJRD)*, 10(11), 408–414.
22. Sastry, N. S. K., & Mallya, M. (2025b). Revolutionizing HR hiring with AI analytics: Enhancing efficiency and attracting top talent. *EPRA International Journal of Research & Development (IJRD)*, 10(9), 125–131.
23. Sastry, N. S. K., & Mallya, M. (2025c). Economic constraints and the status quo: Barriers to innovation and creative problem-solving. *EPRA International Journal of Research & Development (IJRD)*, 10(9), 191–197.
24. Sastry, N. S. K., & Mallya, M. (2025d). Building future-ready organizations: Leadership strategies for young talent management. *EPRA International Journal of Research & Development (IJRD)*, 10(9), 88–91.
25. Sastry, N. S. K., & Ravish, P. Y. (2025). Empowering employees in the Indian workplace: The transformative power of delegation and resources. *EPRA International Journal of Research & Development (IJRD)*, 10(7).
26. Sastry, N. S. K., Kumar, V. P. K., Jijesh, J. J., Radhakrishna, H., Kulkarni, P. G., & Mallya, M. (2026). Assessing the effects of enterprise resource planning on the higher education sector in India. *E3S Web of Conferences*, 692, Article 03012. <https://doi.org/10.1051/e3sconf/202669203012>
27. Skill Council for Green Jobs & World Bank. (2020). *India's Skills Council for Green Jobs*. World Bank Group.
28. Vona, F., Marin, G., Consoli, D., & Popp, D. (2018). Environmental regulation and green skills: An empirical exploration. *Journal of the Association of Environmental and Resource Economists*, 5(4), 713–753. <https://doi.org/10.1086/698859>
29. World Economic Forum. (2025). *The future of jobs report 2025*. World Economic Forum.
30. World Economic Forum & McKinsey & Company. (2025). *Making the green transition work for people and for the economy*. World Economic Forum.