

Heat Stress and the Corporate Bottom Line

Building Climate Resilience in Indian Industry

For CXOs, boards, sustainability and EHS heads

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About the evidence in this paper

Every figure in this paper comes from a published source in the References. Bracketed numbers [n] point to the reference list. The worked example in Section 5 is illustrative and uses a hypothetical site.

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1. Executive summary

Most of us still treat heat as a weather story or a welfare issue. For Indian companies with factories, sites, warehouses, fleets or field teams, it is also a cost line. It is already large and growing, and climate disclosures now expect companies to report it. Here is what the evidence shows.

- **The loss is already large.** Heat exposure in India cost an estimated 247 billion potential labour hours in 2024, a record 419 hours per person and 124% more than in 1990–1999 [2]. The ILO projects that India will lose 5.8% of all working hours to heat stress in 2030, up from 4.3% in 1995 [3].
- **Europe shows the bill even in a cooler climate.** Allianz Research estimates that the 2026 summer heatwaves cost 30 European economies about €113 billion of output, around 0.46% of their combined GDP, mostly through slower work, longer breaks and missed work [31].
- **It reaches the P&L through several channels at once:** lower output per hour, more absence, heat illness and heat-related accidents, higher cooling and power demand, stressed equipment, and disrupted supply chains and informal labour. Heat also cuts children's learning and closes schools, affecting employees' families and the future workforce. In a national panel of Indian factories, annual plant output fell by about 2% per degree Celsius [5].
- **Disclosure frameworks already cover it.** IFRS S2 names heatwaves and effects on "employee health and safety" in its definition of physical risk [23]. TCFD lists workforce health, safety and absenteeism as a physical-risk impact [22]. BRSR Core requires third-party assessment or assurance of safety-incident data, including for contract workers [24]. Heat illness is best counted there as work-related ill health, not as an injury (Section 5) [43–50].
- **Indian companies are acting on heat, but not yet putting a number on what it costs them.** Not one of the Indian corporate disclosures cited in this paper quantifies heat's impact on the company's own workforce in hours, productivity or rupee cost. Vedanta Aluminium, Hindustan Zinc and Mahindra come closest [10–12]. A Singapore transport group shows it can be done with off-the-shelf data [14].
- **A small metric set and a practical playbook close the gap.** Count hot days and WBGT-hours per site, convert them to working hours lost with published response functions, price the hours, and track heat-illness cases and contract-worker coverage. Companies certified to ISO 45001 can run all of this inside their existing occupational health and safety system (Sections 5 and 6).
- **Cricket got there before most companies did.** Cricket's heat research and policies show the value of WBGT triggers, tiered stop-play rules, ventilated kit, acclimatisation and special care for the young. A batsman's day at the crease produces as much heat as running at about 8 km/h [56]. In Section 8, I take eight lessons from cricket and turn each one into something a company can do.

2. Why heat is a material business risk in India

The hazard is rising

The India Meteorological Department (IMD) treats a heatwave as possible when a plains station reaches at least 40 °C (30 °C in hilly regions, 37 °C at coastal stations), and declares one on departure from normal (4.5–6.4 °C) or an actual maximum of 45 °C or more [1]. In 2024, people in India were exposed to 19.8 heatwave days each on average, 6.6 of which would not have been expected without climate change [2]. They also faced 366 more hours than in 1990–1999 in which moderate outdoor activity carried a moderate or higher risk of heat stress, a record high [2]. Companies' own projections point the same way. Vedanta Aluminium projects 14–17 more days a year above 40 °C at its BALCO smelter by 2050 (SSP2-4.5 to SSP5-8.5), against a 2014 baseline [10]. And next year could be worse. In a sensitivity scenario, Allianz Research estimates that a very strong El Niño could cost India about US\$50 billion (0.30% of GDP) in 2027 [31].

Temperature alone understates the risk: WBGT basics

Humidity, sun and wind change how much heat the body can shed. Occupational health therefore uses the wet bulb globe temperature (WBGT), which combines air temperature, humidity, air movement and radiant heat and was designed for assessing work activity [3]. The ILO notes that at a WBGT of 33–34 °C a worker doing moderately intense work loses 50% of his or her work capacity [3]. In gridded labour-capacity data,

humid coastal Chennai shows a higher baseline loss for moderate indoor work (4.15% a year) than Delhi (3.64%) [26]. A site plan built only on air temperature can miss the risk.

Who is most exposed

Exposure is highest where work is heavy, outdoors or in hot indoor spaces without cooling. ILO estimates for India (Figure 1) show agriculture and construction losing the most hours, with industry close behind by 2030 [3]. The Lancet Countdown attributes 66% of India's 2024 heat-related labour losses to agriculture and 20% to construction [2]. As many as 90% of workers in India work informally [3]. For a company, that means much of the exposed workforce in its value chain sits outside its payroll and its safety systems. In the OECD's informality database (developing and emerging economies), informal workers lost 2.4% of their working hours to heat in 2025, against 1.4% for formal workers; India's safety rules, though they recognise unorganised workers, are in practice designed for establishments with 10 or more workers [57].

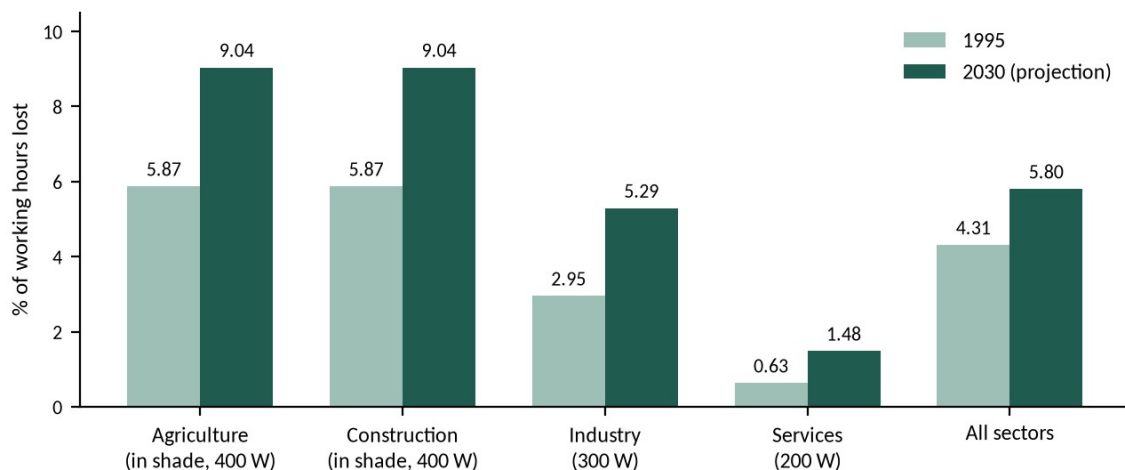


Figure 1. India: share of working hours lost to heat stress, by sector, 1995 and 2030. Source: ILO (2019), Table 6.2 [3]. Notes: RCP2.6 pathway; in-shade WBGT; work intensity of 400 W (agriculture, construction), 300 W (industry; labelled "Manufacturing" in the source's 2030 column) and 200 W (services). Working in the sun adds to these losses [3].

What Europe's heatwaves tell us

2026, modelled estimates. Allianz Research took each country's most intense five-day heat episode of June–August 2026, adjusted for humidity and population, and estimates the output cost at about €113 billion across 30 European countries, around 0.46% of their combined projected 2026 GDP. Italy (€27.8 billion), Germany (€25.0 billion) and France (€20.1 billion) lose the most [31]. Triodos Bank's preliminary estimate, made in August before the summer ended, puts the EU-wide GDP effect at around –1% (about €180 billion), with labour productivity likely the largest channel, and says France could lose 1.4 percentage points of growth [32].

Temperature is only part of it; humidity drives the loss. In Allianz's analysis, humid Italy (air 30.8 °C, wet-bulb 24.1 °C) loses more growth (1.19 percentage points) than hotter but drier Hungary (air 34.6 °C, wet-bulb 22.6 °C; 0.51 points) [31].

This has happened before. A peer-reviewed study estimates that heatwaves in 2003, 2010, 2015 and 2018 each cost Europe 0.3–0.5% of GDP, against about 0.2% in an average year in 1981–2010, with outdoor workers hit hardest [33].

The lesson for Indian companies. If a temperate region loses close to half a percent of output in one hot summer, the stakes are much higher in India, where heat already cost an estimated US\$194 billion of potential income in 2024 [2]. Allianz itself draws on Indian factory evidence for its mechanism [5, 31]. Because losses follow humidity, we should assess sites on WBGT and not air temperature, especially in humid coastal locations. These estimates use different methods, so I would read them as a sense of scale rather than as forecasts.

3. How heat hits corporates

Labour productivity and hours lost. Heat slows work and forces longer breaks. The Lancet Countdown values India's potential income lost to reduced labour capacity at US\$194 billion in 2024 [2]. In Indian factories (weaving, garments, steel), worker output falls on hot days, and a 15-year national panel of plants predicts annual output to fall by 2.1% if every day warms by 1 °C [5]. McKinsey estimated that effective outdoor working hours lost in India could rise by about 15% by 2030, putting about 2.5–4.5% of GDP (US\$150–250 billion) at risk [6].

Health: heat illness, and accidents where heat plays a part. Heat causes cramps, exhaustion and heat stroke, a medical emergency [21, 50]. These are illnesses, best recorded as work-related ill health rather than injuries (Section 5 box) [45, 48]. Heat also raises accident risk. Globally, the ILO estimates that excessive heat causes 22.85 million occupational injuries and 18,970 deaths a year, and that over time heat stress can lead to serious heart, lung and kidney problems [4]. In Asia and the Pacific, 74.7% of the workforce is exposed to excessive heat [4]. Prevention works: Ahmedabad's Heat Action Plan is estimated to have avoided 2,380 deaths in the period after it was introduced [19].

Absenteeism and attrition. In the Indian factory study, absenteeism rose with same-day and previous-week temperatures. Climate control at work removed the productivity loss but not the absenteeism, presumably because workers stay exposed at home and outside [5]. We found no published Indian dataset linking heat to attrition; companies should track it rather than assume it is zero.

Students, families and the future workforce. Children are more vulnerable to heat than adults: infants and young children are less able to regulate their body temperature [37]. Heat also cuts learning. In a US study of 10 million students who retaken the PSAT, without air conditioning each 1 °F hotter school year reduced that year's learning by 1% [34]. In India, across more than 4.5 million Annual Status of Education Report (ASER) tests, ten extra days above 29 °C in a year (compared with days at 15–17 °C) lowered children's maths and reading scores the following year by 0.03 and 0.02 standard deviations, partly through lost farm income; the rural job guarantee (NREGA) weakened the link [35]. UNICEF estimates that heatwaves disrupted schooling for about 171 million students worldwide in 2024, including about 54.8 million in India (a partial, state-level count), and notes that heat and poor hydration hinder children's ability to focus and retain information [36]. WHO notes that athletes are susceptible to exertional heat stress [38]. For most companies the closest link is their own employees, whose children's schools close or change timings in the heat. It also matters to education, edtech and sports businesses, to school-focused CSR, and to the skills of the future workforce. The NCB ACE case study (Section 7) looks at it through student cricket coaching.

Operations and assets. Cooling loads and power demand rise with heat. India's cooling demand is projected to grow to around eight times its 2017–18 level by 2037–38, and space cooling alone to account for 45% of peak electricity demand in 2050 [7]. Equipment suffers too: Vedanta Aluminium reports that prolonged heat affects equipment and lubricant performance and raises operating costs [10], and Singtel's modelling found that, without adaptation, heat-related failure could occur once every 1.4 years at its Singapore telephone exchanges by 2100 [9].

Supply chain and informal workforce. One global model attributes 12–43% of projected heat-related economic losses by 2060 to indirect effects cascading through supply chains [8]. For informal workers the hit is immediate: SEWA reported that extreme heat had cut the working hours of nearly all its women members, forcing them to stay home or take long breaks between 1 pm and 4 pm [18].

Regulation and disclosure. IFRS S2 defines physical risk to include heatwaves and "extreme temperature changes affecting the entity's premises, operations, supply chains, transportation needs and employee health and safety" [23]. TCFD lists "reduced revenue and higher costs from negative impacts on workforce (e.g., health, safety, absenteeism)" [22]. In India, BRSR Core covers safety-related incidents (lost-time injury frequency rate and fatalities) for employees and workers, including the contract workforce, and requires third-party assessment or assurance, which applies to the top 1,000 listed entities from FY2026–27; its value-chain disclosures are voluntary for the top 250 from FY2025–26 [24]. CEEW notes that Indian labour law has no legally binding, heat-specific occupational safety standard, and that BRSR does not uniformly require quantified physical-risk indicators [25]. BRSR's Principle 3 table of "safety related incidents" covers work-related ill health as well as injury but does not identify heat illness separately, so heat stays largely invisible in Indian disclosures (Section 5 box) [43, 44].

4. What leading companies are doing, and the gap

India

- **Vedanta Aluminium** tracks the annual count of days above 40 °C and maximum temperatures as a key risk indicator, with site projections to 2100. It has shifted schedules, built rest sheds with coolers, placed water stations every 200–300 m and issued heat-stress SOPs, and plans WBGT weather stations at all sites, heat-stress cover in insurance and business-partner contracts, and automation of the hottest processes [10].
- **Hindustan Zinc** names the right impact metric, "relative change in labour productivity due to heat stress" under NGFS scenarios for Rajasthan and Uttarakhand, and rates the workforce impact as high, but shows the results only as arrows, with no values [11].
- **Mahindra Group** has the most developed governance: heat action plans written into corporate Key Result Areas, SOPs based on site self-audits, and pilots of evaporative cooling jackets, vehicle canopy insulation and cooling shelters in Jaipur, Nagpur and Rudrapur [12]. Its whitepaper with Deloitte sets out a phased, four-pillar approach with board-level ownership (Section 6) [13].
- **Others** report actions rather than metrics: Tata Steel schedules work to limit direct-sun exposure between 12 noon and 3 pm, and L&T extends lunch breaks and keeps a doctor available full time [28]. ITC reports that a personal cooling vest for construction workers lowered temperature by about 6 °C in laboratory tests [29].
- **Bharti Airtel and Nxtra by Airtel** report heat measures mainly as awareness and site practice. Nxtra's FY25 sustainability report lists "heat stress prevention through water stations, ORS distribution, and tailored training" [51]; its EHS programme made Heat Stress the April 2025 safety "Topic of the Month" [53]; and its FY2025-26 report names "heat stress management" among occupational-health measures, with seasonal risks addressed "through targeted advisories, awareness campaigns, and preventive healthcare measures" [52]. During the 2024 heatwave, a senior Airtel executive told ETTelecom that Airtel had set up special teams to track field staff's health, issue heat-stroke advisories (including reminders to stay hydrated) and offer medical support [54]. Airtel's 2025-26 annual report notes that climate risks "pose health and safety risks to personnel" and sets temperature-related site design criteria, such as reflective roofs and external shading [55]. Both run internal campaigns to beat the heat.
- **SEWA's parametric heat insurance** is the clearest Indian case of a heat-day metric tied to money: it pays when a set number of consecutive days exceed a threshold temperature, with payouts based on daily income [17]. In 2024, 92% of the 50,000 women enrolled received payments [17].

Global

- **ComfortDelGro** (Singapore) quantified heat-stress productivity loss from Climate Impact Explorer labour-productivity data and its own labour costs. Labour productivity is its largest physical risk: 43–56% of total additional financial impact in a >3 °C scenario, reaching 55.5% by 2050 [14]. Its subsidiary **SBS Transit** projects a 15% rise in annual operating costs from heat-related productivity loss by 2050 in the same scenario [15].
- Even large global reporters find it hard. **Olam Agri** states that quantifying the effect of extreme temperatures on employee health and productivity "is still under consideration" [16].

Listening to field staff led to a real change: In our interactions at a large company with an extensive outdoor field workforce, field engineers described working through intense heatwaves in what was then a synthetic black uniform. Some staff developed extensive skin rashes and other heat-stress-induced health problems, and these became reasons for voluntary attrition. The observations were shared and acted on internally: the uniform was changed to a cooler, cotton-based fabric and heat shelters were put up.

The gap

Indian companies quantify the **hazard** (days above 40 °C) or describe **actions** (rest sheds, vests, timings), but none of the disclosures cited in this paper links heat to the company's own **hours lost, productivity or rupee**

cost. Contract and gig workers, often the most exposed, are rarely counted. Measured site WBGT data are not reported, and 2030–2050 projections are not tied to current-year actuals. The data and methods already exist; Section 5 shows how to put them together.

5. Measuring it: a simple metric framework

Here are six metrics any multi-site company can start with in one reporting cycle. The first two describe the hazard, the next two its effect on working hours and money, and the last two the health outcome and the company's response. No source we found publishes day-count bands (what counts as "many" hot days), so each company must set and disclose its own.

Metric (what it shows)	How to calculate / data	Published reference	ISO 45001 clause
1. Hot days per site (hazard frequency)	Days a year with Tmax ≥ 40 °C, or heat-index days; IMD data or gridded datasets	IMD heatwave threshold 40 °C plains [1]; Vedanta KRI [10]	4.1 (climate change), 6.1.2 hazard identification
2. WBGT-hours above limit (hazard at the workplace)	Hours with WBGT above the limit for the work intensity; on-site meters, logged hourly	Singapore MOM: mandatory rest from WBGT 32 °C for heavy work [20]	9.1 monitoring and measurement
3. % working hours lost (productivity)	WBGT-based response functions by work intensity (200/300/400 W), indoor or outdoor; ILO or Lancet functions, or gridded data [3, 26]	ILO: 50% capacity lost at 33–34 °C WBGT, moderate work [3]	6.1.2 assessment of risks
4. Cost of lost hours (financial)	Hours lost × loaded hourly labour cost (headcount × scheduled hours × % lost); show as ₹ and % of wage bill or EBITDA	ComfortDelGro method [14]	6.1.2 risks and opportunities; 9.3 management review
5. Heat-illness cases (health outcome)	Heat illness (first aid, recordable, lost time, high consequence) and deaths, coded as work-related ill health with heat as the cause; employees and contract workers; footnoted in the BRSR Principle 3 table	GRI 403-10 [45]; OSHA 29 CFR 1904 [48, 49]; BRSR P3 Q11 [43, 44]	10.2 incident investigation; 9.1
6. Response coverage (resilience)	% of exposed workers (employees + contract) covered by a site heat action plan with WBGT-triggered work-rest rules	NDMA heat action plan guidance [21]	8.1.2 controls; 8.1.4 contractors; 5.4 consultation

Table 1. Heat-workforce metric set (EaselESG proposal). Report actuals each year, plus a 2030/2050 view under at least two scenarios. ISO 45001 clause numbers follow the published structure of ISO 45001:2018 [39, 40].

Heat illness: a safety or a health incident in BRSR?

What the frameworks say. OSHA's recordkeeping rule treats heat illness as an illness, not an injury: injuries are cases "such as, but not limited to, a cut, fracture, sprain, or amputation", while "Illnesses include both acute and chronic illnesses" [48], and its log instructions list "Heatstroke, sunstroke, heat exhaustion, heat stress and other effects of environmental heat" as examples of "All other illnesses" [49]. GRI 403 reports work-related injuries under 403-9 and work-related ill health under 403-10; "ill health" "indicates damage to health and includes diseases, illnesses, and disorders", and work-related ill health "can include acute, recurring, and chronic health problems caused or aggravated by work conditions or practices" [45]. The ILO calls heat stress "a health hazard" [3]; its List of Occupational Diseases Recommendation includes "Diseases caused by exposure to extreme temperatures", and several countries recognise heat-related illnesses as occupational diseases [47].

Where BRSR is ambiguous. BRSR has no separate ill-health table. Principle 3, Essential Indicator 11 is headed "Details of safety related incidents", yet SEBI's guidance defines its lost-time, recordable and high-consequence rows in terms of "work-related injury or ill-health" [43, 44]. But the recordable row is labelled "Total recordable work-related injuries", and the guidance counts fatalities "as a result of work-related injury" [43, 44]. ILO statistical definitions do not settle it: an occupational injury is "any personal injury, disease or death resulting from an occupational accident", while an occupational disease is "contracted as a result of an exposure over a period of time" [46]. Acute heat stroke after one hot shift fits neither neatly, and BRSR is silent.

Our recommendation. Classify heat illness, from heat rash to heat stroke, as work-related ill health (metric 5). In BRSR, count heat-illness cases in the Principle 3 Q11 rows whose guidance covers ill health (lost time, recordable, high consequence), report any heat-stroke death in the fatality row, and footnote how many of each were heat-

related. Keep accidents where heat played a part (such as a fall after dizziness) as injuries, noting heat. Describe heat controls under Q10 and Q12 and disclose the method: the case definition, who confirms a case, and how first aid is treated (OSHA counts "Drinking fluids for relief of heat stress" as first aid [48]). How long harm lasts (for example, beyond a shift) affects severity, not category.

Worked illustration: from hot days to rupees

Illustrative only. Hypothetical site, not a real company.

Assume a Delhi factory with 500 workers doing moderate indoor work (300 W) without air-conditioning, 8 hours a day for 300 days: 1,200,000 scheduled hours a year (assumption).

- Loss rate today: 3.64% of capacity a year (Delhi grid cell, indoor 300 W, Lancet function, 1995–2015 climate) [26].
- Loss rate at 2.0 °C of global warming (the IPCC best estimate for 2041–2060 under SSP2-4.5 [27]): 5.38% [26].
- Hours lost (our arithmetic): $1,200,000 \times 3.64\% \approx 43,700$ hours today, rising to $\approx 64,600$ hours. At 2,400 hours per worker, that is the output of about 18 workers today and about 27 later.
- Cost (our arithmetic): for every ₹100 of loaded hourly labour cost, about ₹44 lakh a year today and about ₹65 lakh later. Replace ₹100 with your own cost.

Caveats: these are potential losses before adaptation, from gridded climate data rather than site measurements. They exclude absenteeism, incidents, overtime and rework, so are likely to understate the full cost. For comparison, the ILO national estimate for Indian industry is 2.95% (1995) rising to 5.29% (2030) [3].

6. Building resilience: a practical playbook

Run it through the ISO 45001 system

If your occupational health and safety (OH&S) management system is certified to **ISO 45001:2018**, you already have a system to manage heat in. The standard is built on the Plan-Do-Check-Act cycle [39], and heat is simply another OH&S hazard to run through it. Since the 2024 climate amendment, clause 4.1 requires an organisation to determine whether climate change is a relevant issue, and clause 4.2 notes that interested parties can have climate-related requirements [40].

Plan: identify heat as a hazard and assess the risk by task, site and season (6.1.2), consulting workers and contractor representatives (5.4).

Do: apply the hierarchy of controls (8.1.2): eliminate or automate hot tasks, then engineering controls (cooling, shade, ventilation), then administrative controls (work-rest cycles, timing, training), with PPE last, since PPE that is too hot or heavy is less likely to be worn [42]. Plan the emergency response to heat stroke (8.2) and set heat rules for contractors through procurement (8.1.4).

Check: monitor WBGT and heat-illness cases (9.1).

Act: investigate heat-illness cases, heat-related accidents and near misses, and correct the controls (10.2). ISO 14090 (adaptation principles) and ISO 14091 (climate vulnerability, impact and risk assessment) can support the company-wide view [41]. The table below maps each measure to its clause.

Each measure below comes from published guidance or company practice. Start with governance and measurement, so that the money goes where the hours are actually being lost. Section 8 adds lessons from sport.

Measure	What to do	ISO 45001
Governance	Give heat a named board-level owner and put site heat plans into management KRAs, as Mahindra has done [12]. Review heat risk at least once a year in the enterprise risk process [9].	5.1, 5.3; 4.1
Risk assessment	Screen all sites, then model the most exposed and critical ones in detail [9]. Map work by intensity (200/300/400 W) and indoor or outdoor	6.1.2; 5.4

	exposure, including contract labour. Consult workers and contractor representatives on the findings and heat rules.	
Heat action plans and early warning	Link site actions to IMD's colour-coded alerts (yellow, orange, red) [21]. Ahmedabad's plan sets alert levels at 41.1–43 °C, 43.1–44.9 °C and 45 °C or more, and asks employers to provide water and consider longer afternoon breaks or alternative working hours [19]. Plan first aid and emergency response for suspected heat stroke, a medical emergency [21].	8.1, 8.2
Work-rest cycles and shifting hours	Move strenuous work to cooler hours and add rest breaks [21, 3]. Benchmarks: Singapore requires at least 10 minutes' rest an hour for heavy work at WBGT 32 °C and 15 minutes at 33 °C [20]; Tata Steel limits direct-sun work from 12 noon to 3 pm [28].	8.1.2 (admin.)
Cooling, shade and hydration	Provide cool drinking water near the work, shade and rest shelters [21]. A Chandrapur coal-mine advisory sets rest shelters below 25 °C [30]. Vedanta places water stations every 200–300 m [10]. Indoors, use ventilation, cool or green roofs and shading [3].	8.1.2 (engineering)
PPE and monitoring	Use more breathable protective clothing and breaks to remove heavy PPE [3]. Pilot cooling vests [12, 29]. Install WBGT meters and log readings hourly in the hot season [20, 10]. Train staff and first-aiders, use a buddy system, and give extra attention to pregnant workers and those with medical conditions [3, 21].	8.1.2 (PPE); 9.1; 7.2
Infrastructure and design	Size cooling for future peaks and make power supply resilient with on-site generation and storage [9]. Automate or mechanise the hottest, heaviest tasks [10, 3].	8.1.2 (eliminate); 8.1.3
Insurance and parametric cover	Check that insurance covers heat-related illness for employees and partners [10]. Consider parametric income protection for low-wage and informal workers, on the SEWA model [17, 57].	Outside ISO 45001
Supply chain and contractors	Write heat clauses (water, shade, timings, incident reporting) into contractor and business-partner contracts [10]. Use BRSR Core value-chain reporting (voluntary for the top 250 listed entities from FY2025–26) to collect heat-illness cases from key partners [24].	8.1.4; 5.4
Disclosure and targets	Report metrics 1–6 in BRSR narrative and IFRS S2/TCFD physical-risk sections [22–24], with heat illness footnoted as work-related ill health in the BRSR Principle 3 table (Section 5 box) [43, 44]. Set targets on outcomes (hours lost, heat-illness cases) as well as inputs (shelters, vests).	6.2, 9.3, 10.2

Learnings from the Mahindra-Deloitte heat whitepaper

Mahindra Group and Deloitte South Asia's whitepaper, Corporate heat adaptation and mitigation strategies [13], was developed with a working group of industry, policy and research stakeholders. We found it a useful Indian corporate reference to read alongside the measures above.

Box: key learnings from the whitepaper [13]

- **Heat is a present, portfolio-wide issue.** Companies should move from reactive heatwave response to proactive, portfolio-wide strategies. Most of India's 2050 urban infrastructure is yet to be built, so today's site and building decisions will shape local heat for decades. The paper cites 48,156 suspected heat cases and 161 confirmed heat deaths in India in 2024.
- **Segment the workforce by exposure.** It separates outdoor workers, mobile field workers who move between outdoor and indoor settings, and indoor workers in enclosed spaces without cooling. In a South India study of about 2,000 workers, outdoor workers had 2.1 times the odds of heat-related symptoms and 11.4 times the odds of productivity loss compared with indoor workers. Glass plants reported WBGT near 40 °C close to furnaces, and small foundries about 34 °C, with 40–50% productivity losses in the hottest sections.
- **Heat reaches assets and power as well as people.** Air-conditioner efficiency falls by about 30% as ambient temperature rises from 27 °C to 45 °C. Peak power demand reached about 250 GW in FY2024–25 and is projected to exceed about 366 GW by 2031–32; the extra load for each 1 °C rise in daily temperature has grown from about 3.5 GW in 2019 to over 7 GW.

- **Own it at the top, and fund it.** Heat resilience should sit with the board and senior management, with budgeting, HR, procurement, administration and manufacturing working to one funded heat-risk mandate. Tools include Heat Safety Committees, Heat Safety Officers, SOPs with clear escalation lines, real-time dashboards linked to public heat alerts, and a yearly cycle of pre-season heat-risk mapping, in-season spot checks and post-season audits reported to governance bodies.
- **Four pillars, phased.** Workforce safety: mandatory rest breaks, recovery spaces, flexible shifts, mobile hydration stations with local drinks such as buttermilk and lemonade, regional-language materials, a "Heat Warriors" early-detection programme, and a buddy system with scheduled hydration and symptom checks, with compliance logs reviewed weekly. Technology and data: smart HVAC controls, IoT monitoring and cooling-as-a-service contracts with metered savings. Infrastructure: insulation, high-reflectance roofs, phase-change materials, green cover and permeable paving; for new sites, shaded corridors and master plans that limit paved area. Equipment: condition-based maintenance sensors, heavy equipment run in cooler hours, and procurement standards requiring vendors to show performance at high temperatures. These are sequenced as quick wins, medium-term upgrades and long-term investments.
- **Its recommendations for companies.** Embed heat governance in EHS and ESG frameworks, align site actions with IMD alerts, and schedule intensive physical labour in cooler hours.
- **What it leaves open.** We found no KPIs or targets in it beyond monitoring, compliance logs and audits; it does not treat contract workers as a separate category or report own pilot results.

7. Case study: NCB ACE cricket academies (Delhi)

A Delhi cricket academy in summer faces the corporate problem on a small scale. The work is outdoors, the schedules are fixed, coaching staff are paid by the hour or session, and revenue depends on attendance. It also links to the student evidence in Section 3: the trainees are students in age-group batches whose attendance, health and safety depend on how heat is managed. With NCB ACE Sports, we looked at its two cricket training academies, at Patel Nagar and Mayur Vihar in Delhi. The box reports what the head coach told us.

Case: adapting a Delhi cricket academy to beat the heat

Every Delhi summer, a cricket coach has to work out how to keep practice going in the heat. We are grateful to the head coach of NCB ACE Sports, also a BCCI level umpire and in the game for more than 40 years, for generously sharing his experience of managing practice across the academy in an interview.

- **Timing.** In summer, batches move from 3–6 pm to 4–7 pm, which avoids the peak heat.
- **Training for real conditions.** Grounds reach around 40 °C, with heat from the sun and off the ground. Players do 1–2 mandatory warm-up rounds before nets, and drills run in live conditions, so players learn to acclimatize to the heat.
- **Hydration.** Medium and fast bowlers need water breaks as much as keepers and batsmen. Electral (ORS), chilled water, glucose and a banana are mandatory for the 6–12 age batches and recommended for older players.
- **Matches.** Two scheduled drinks breaks, after 15 and 30 overs. In summer, umpires also allow water breaks at over changes and when a batsman is declared out.
- **Kit and attitude.** The cotton-acrylic kit stays the same, with half sleeves in summer. Coaches and players say they are used to the heat; skin tanning was the effect noted. Parents concerns are addressed by the summer timing change.

What could come next. The coach's changes cost little and come from long experience. Two additions would make them easier to track: a simple temperature or WBGT threshold for pausing play, and a light-touch record of any heat-illness symptoms, mirroring the measurement opportunity in Section 4.

Companies are in the same position. Many already do sensible things in the heat because experience tells them to. A simple heat threshold and a record of heat-illness symptoms are what let them measure and report it (Section 5). Section 8 sets the case against the wider cricket research.

8. Lessons from sport: what cricket's heat playbook means for corporates

Cricket is a useful comparison for Indian companies: it is played outdoors through the hottest months, in protective clothing, on fixed schedules, with revenue riding on the result. Hit for Six, a BASIS (British Association for Sustainable Sport) report combining climate science from the Priestley International Centre for Climate with heat physiology from the University of Portsmouth's Extreme Environments Laboratory, sets out how heat affects players, officials, spectators and the game [56]. We turn its findings and the governance responses it records into company actions, and flag where a point is our own inference.

What the cricket research found

Box: key findings from Hit for Six [56]

- **The work itself makes heat.** In a re-created 92-over innings by an international batsman, in indoor nets at 15 °C, average heat production matched running continuously at about 8 km/h (around 36 kJ a minute) in kit with pads and helmet. The report compares a day at the crease to a marathon. This is the body's own load, before any heat from the weather.
- **Humidity and sun matter more than the thermometer.** At the same 30 °C air temperature and a light wind, the WBGT was 25.9 °C on a cloudy day at 50% humidity, 29.5 °C on a sunny day at 35% humidity and 32.0 °C on a humid day with light cloud at 90% humidity. The American College of Sports Medicine (ACSM) advises cancelling, or recommending voluntary withdrawal from, continuous exercise above a WBGT of 28 °C.
- **Clothing blocks the body's cooling.** When the air is hotter than skin (typically 33–35 °C), evaporating sweat is the only way to lose heat, and protective clothing and high humidity make it less effective. Batsmen and wicketkeepers face the highest risk; in Australian first-class cricketers, batsmen's core temperature rose more than fielders'.
- **Fluid loss hits performance early.** An athlete competing all day in a hot climate may need 4–12 litres of fluid. Losing 1–5% of body mass can impair cognitive and physical performance, and 4.3% can cut endurance by 22–48%.
- **Heat affects thinking before it affects strength.** Complex tasks (sustained vigilance, working memory, doing two things at once) are more vulnerable to heat than simple ones. The report expects more errors, including by overheated umpires.
- **Individual risk varies a lot.** Acclimatisation, illness, hydration, medication, age and sleep all change how a person copes. England captain Joe Root retired hurt and was taken to hospital at the 2017–18 Sydney Ashes Test, with reported temperatures of 43.7–47.3 °C; he also had a stomach bug.
- **Rules followed incidents.** After the Root episode, Cricket Australia updated its heat policy to recommend on-site cold immersion, air-conditioned changing rooms and clothing advice on hot days. In 2017 all Sydney senior club games were called off for the first time, with a Cricket Australia doctor warning that grade cricket lacked the means to monitor and manage heat stroke. In 2018–19 under-15 national championship games were shortened.
- **India is already in the zone.** New Delhi's days above 37 °C rose by about six a decade in 1991–2013, Visakhapatnam now averages 18 a year, and April–May maximums of 40–42 °C are 1–2 °C higher than in the 1970s. At the 2017 Kolkata one-day match, the apparent temperature reached 42 °C; three fast bowlers left the field after four-over spells to cool down, and two other players needed on-field medical attention.

Eight lessons and the corporate actions they point to

The table pairs each lesson from cricket with a company action, linked to the Section 5 metrics and the Section 6 ISO 45001 clauses.

Lesson from sport	What cricket shows	Recommended corporate action
1. Measure the body's load, not the air temperature	WBGT ranged from 25.9 °C to 32.0 °C at one air temperature [56]. Sports medicine treats WBGT as the criterion measure of heat stress; the report recommends WBGT monitoring for young players.	Set site triggers on WBGT, not air temperature. Start with the hottest and most humid sites and log readings hourly in the hot season. Count outdoor work in the sun separately (metric 2; ISO 45001 9.1).

Lesson from sport	What cricket shows	Recommended corporate action
2. Agree tiered triggers in advance, and give someone the authority to stop	ACSM uses black, red, yellow and green flags. The report asks national boards for clear thresholds that let officials lengthen drinks breaks, shorten sessions and suspend play [56].	Write a four-tier site protocol (Table 2) with named stop-work authority at each tier, so no one has to argue for a stop in the moment. Take numeric limits from occupational sources (Section 5), not sport (metrics 2 and 6; 8.1.2, 5.3).
3. Treat clothing and kit as part of the hazard	Pads and helmets restrict sweat evaporation. The report suggests shorts above a WBGT of 25 °C and asks manufacturers to test ventilated helmets, gloves and pads. Lord's relaxed its dress code for members in the 2018 heatwave [56].	Audit uniforms and PPE for heat. Trial ventilated fabrics and a hot-season variant, add heat performance to PPE and uniform specifications, and relax dress rules in heatwaves. Section 4 gives a first-hand uniform example (8.1.2 PPE; 8.1.4).
4. Screen the person as well as the site	Root's stomach bug, hydration, medication, age and sleep all change heat risk [56]. The same heat affects two players differently.	Add a no-blame fit-to-work check at the start of hot shifts (unwell, vomiting or diarrhoea, fever, new medication), buddy checks, and a named higher-risk list including pregnant workers and those with medical conditions (6.1.2; 7.2).
5. Acclimatise before you load	Acclimatisation is regarded as the most effective way to reduce heat-related risk, and heat exhaustion is mostly seen in people not used to the conditions. The report recommends acclimatisation programmes and longer tours [56].	Phase in exposure for new joiners, returners from leave, staff transferred from cooler regions, and everyone in the season's first hot week. Include contractors in induction (8.1.2 administrative; 8.1.4).
6. Schedule around the heat and cap exposure spells	Sri Lanka's physical preparation manager schedules conditioning for 7:30 am, as a second session in the midday heat is often unrealistic. Bowlers at Kolkata left the field after four-over spells. The report recommends extra drinks and cooling breaks above a WBGT of 25 °C [56].	Move hot tasks to cooler hours, rotate people off the hottest tasks, and build drink and cooling breaks into rosters at set tiers. Price the lost throughput so supervisors are not penalised for stopping (metrics 3 and 4; 8.1.2).
7. Protect those least able to say no, and the thinnest sites	Young players tolerate heat less and may feel unable to refuse to play. Unlike at elite level, grassroots cricket often lacks cooling and medical cover [56].	Give contract and gig workers, new joiners and small supplier or dealer sites the same triggers, water, shade, first-aid cover and a no-penalty right to stop. Write it into contracts and track it (metric 6; 8.1.4, 5.4).
8. Expect judgement and safety-critical tasks to fail first	Vigilance, working memory and dual tasks are more vulnerable to heat than simple tasks [56].	Our inference: treat heat as a contributing factor in safety-critical work (driving, cranes and forklifts, work at height, control rooms), with tighter triggers and shorter spells, and record heat as a factor in near-miss and incident investigations (6.1.2; 10.2).

A tiered flag system companies can borrow

Lesson 2 is the most transferable: ACSM's flags link a measured reading to a pre-agreed action. The table shows the flags as reported in Hit for Six [56] beside an illustrative corporate version.

Flag	ACSM WBGT band	Action in sport (ACSM)	Illustrative corporate action (EaselESG)
Black	WBGT above 28 °C	Cancel, or recommend voluntary withdrawal.	Stop non-essential exposed work. Emergency tasks only, with extra controls and medical cover on hand.
Red	23–28 °C	Advise those at increased risk of heat collapse to withdraw; others slow down.	Mandatory work-rest cycles and rotation. Stand down workers on the higher-risk list. Buddy checks.
Yellow	18–22 °C	Advise those at increased risk to slow down; warn all of the risk.	Extra water and shade breaks. Supervisors check in. Heat-illness signs covered in the toolbox talk.
Green	Below 18 °C	Lower risk, but collapse can still occur.	Normal work, with water and shade available and reporting of symptoms still open.

Table 2. ACSM WBGT flags and an illustrative corporate equivalent. The ACSM bands are for lightly clothed road-race athletes on continuous activity; the report advises using the lower temperature in a band for people in heavier clothing or padding [56]. Corporate actions are our illustration, not a published standard.

Cautions before borrowing sport's numbers

The report notes that specific WBGT guidelines for cricket are not widespread, and that its own 25 °C trigger for extra breaks and shorts comes from ACSM guidance for runners, with more work needed for cricket [56]. Athletes also differ from employees: they choose their effort, work for hours rather than shifts, and at elite level have physios and doctors on hand. Companies should copy the structure (measure, tier, pre-authorise, record) and take numeric limits from the occupational sources in this paper: the ILO capacity-loss relationships, Singapore's rest rules at WBGT 32 °C and 33 °C, and the NDMA guidance (Sections 5 and 6).

In practice, heat often comes with other problems: smog, thin crowds and water shortages. Sri Lanka's players wore smog masks during a Test in Delhi in December 2017, and the report recommends air-quality testing at grounds [56]. Delhi and Hyderabad franchise officials blamed heat for low attendance, and drought forced 13 Indian Premier League matches out of Maharashtra in 2016 [56]. Company equivalents are air quality on hot days, footfall and customer comfort in retail, hospitality and real estate, and water availability, which can decide where operations can run. The Mahindra–Deloitte whitepaper records similar effects in India: daily visitors to the Taj Mahal fell from 25,000–30,000 to about 12,000–15,000 in May 2024, and leading Rajasthan hotels saw occupancy of about 20–25% against about 50% a year earlier, with tariffs cut by 75–80% [13].

What this means for the NCB ACE academies

What Hit for Six says. Young players respond differently to heat and tolerate it less well, so extra facilities, guidance or rules should allow for that. At grassroots level, at any age, cooling and prompt medical attention may not be on hand as they are at elite level. Young players may also feel less able to refuse to play in hot or humid conditions, so the report recommends monitoring both conditions (WBGT) and their health [56]. This applies directly to NCB ACE, whose academies train children from the age of 6 onwards.

What the coach described (Section 7). Later summer timings (4–7 pm instead of 3–6 pm), mandatory ORS, chilled water, glucose and a banana for the 6–12 age batches, water breaks for batsmen, medium and fast bowlers and wicketkeepers, and extra water breaks in summer matches.

Our observations. The academy's age-banded hydration rules and move to cooler hours fit the report's concern for young players. They also provide shade or another way to cool down at each ground and a clear plan for suspected heat illness, including access to the nearest hospital, and parents' contact details at every session. Because young players may feel unable to refuse to play, the two next steps in Section 7 matter; a temperature or WBGT threshold for pausing play, set by the coach and not left to children or to parents' level of concern, and a light-touch record of heat-illness symptoms with first aid training.

Recommended actions for corporates

In order of priority, we recommend the following to be in place before the 2027 hot season (the report puts India's summer at April to June [56]):

- **Move to WBGT and tiers.** Install WBGT readings at the hottest and most humid sites and adopt a four-tier protocol with named stop-work authority (lessons 1 and 2).
- **Redesign kit.** Audit uniforms and PPE for heat, trial ventilated options with suppliers and add heat performance to specifications (lesson 3).
- **Acclimatise and screen.** Phase in exposure and run a no-blame fit-to-work check for new joiners, returners, transfers and contractors (lessons 4 and 5).
- **Extend to the edges.** Apply the same triggers, water, shade, first-aid cover and right to stop to contractor and tier-2 sites through contract clauses (lesson 7).
- **Measure the cost of stopping and of not stopping.** Track hours lost by tier, heat-illness cases and heat-related near misses (metrics 3 to 5), so that stopping work is budgeted for and supervisors are not blamed for it, and treat heat as a factor in safety-critical roles (lessons 6 and 8).

9. Conclusion and how EaselESG can help

Heat already costs Indian business working hours, output and health, and the cost will rise. The national evidence is strong and the methods are public; what is missing is measurement at site and workforce level, including contract workers. If you count hot hours, put a rupee value on them and act on what you find, you will invest better, and investors will find your disclosures more credible. Cricket shows how simple the system can be. Measure conditions at the body, agree tiered triggers in advance, and give people the authority to stop (Section 8). At EaselESG we help companies find research-backed ways to build climate resilience and develop impactful disclosures. We can help set up the heat metric set described here, build site heat plans within an ISO 45001 system, and bring the results into reporting.

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