WearOptimo

Continuous Hydration Risk Monitoring for Heat-Exposed Industrial Workforces

Heat-exposed resources workforces face rising safety, productivity and compliance risk because hydration stress is often invisible until it becomes fatigue, error, heat illness or lost productive time. Current controls are necessary, but typically generic, episodic and reactive.

WearOptimo adds continuous, worker-level hydration-risk visibility through a minimally invasive wearable patch and AI-enabled alerting platform, helping operators intervene earlier before risk escalates.

Operational Problem

Resources companies are managing workforces exposed to heat, long shifts, physical exertion and PPE burden. These conditions are difficult to remove without affecting production, maintenance windows or safety compliance — but hydration risk can be identified earlier.

- **Heat stress is a core operational risk.** More frequent high-heat days increase fatigue, slower work pace, heat illness and lost production risk. [1, 8]
- **Hydration risk is often invisible until it escalates.** Workers can lose water and electrolytes long before visible illness appears. Heat exhaustion is linked to excessive loss of water and salt. [11]
- **Mis-hydration affects safe work performance.** Mild dehydration can impair attention, memory, psychomotor performance, mood and decision-making. [4, 5]
- **Current controls are necessary but incomplete.** Water stations, work/rest guidance, toolbox talks and supervisor observation rarely provide continuous, individualised risk visibility.

Implication: Heat stress and mis-hydration are no longer just wellbeing issues. They are safety, productivity and compliance risks that require earlier, data-driven intervention.

"By 2030, the equivalent of more than 2% of total working hours worldwide is projected to be lost every year, either because it is too hot to work or because workers have to work at a slower pace."

– International Labour Organization, 2019[1]

Quantified Impact

Impact area	Evidence-based implication
Heat exposure trend	ILO projects that by 2030, more than 2% of global working hours may be lost annually because it is too hot to work or workers must slow their pace.[1]
Worker hydration risk	Australian underground mining research found ~58% of miners dehydrated before and after shift; hot-climate outdoor worker research also found inadequate hydration common.[2,3]
Human performance	Mild dehydration of ~1–2% body mass loss can impair attention, short-term memory, psychomotor performance, mood and decision-making.[4,5]
Safety consequence	Mining regulators have documented fatalities linked to extreme heat exposure and inadequate hydration management, including a WA fatality associated with dehydration and renal failure.[9,10]
Cost exposure	Heat illness, injury and disruption carry direct and indirect costs. Workplace injury costs are estimated at ~US$42k–44k per case; offshore medevacs at ~US$44k–54k per event.[6,7]
Productivity	Heat is increasingly a production constraint. Occupational heat strain is associated with measurable productivity loss across industries.[1,8]

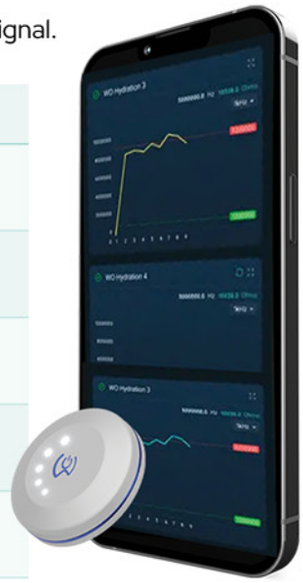
Current Approaches Do Not Close The Gap

Existing heat-stress controls are necessary, but most are still generic, episodic or reactive.

- No continuous worker-level hydration signal during the shift.
- Limited supervisor/team visibility before symptoms appear.
- Compliance evidence is often indirect rather than physiological.
- Most surface wearables measure indirect signals and cannot access the biosignals needed for hydration-risk visibility.
- Deeper-access clinical devices, such as CGM-style systems, are not designed for broad industrial hydration monitoring.

What WearOptimoOffers

WearOptimo is developing a continuous, minimally invasive hydration monitoring platform designed to turn invisible physiological risk into a visible ready-to-work signal.



Capability	Benefit
Sticker-like wearable	A lightweight patch intended for high-heat, long-shift industrial environments.
Minimally invasive sensing	Microelectrodes reach just a hair's width into the skin to access relevant biosignals beyond the skin surface.
AI-enabled hydration readings	Algorithms translate biosignals into actionable hydration-risk readings and traffic-light alerts.
Operational workflow fit	Worker alerts plus optional supervisor/team dashboards, designed to support rather than burden HSE processes.
Validation pathway	Controlled validation with early-access partners, followed by operational readiness work and on-site field trials.

Why This Matters

- **Protect People:** earlier intervention before dehydration progresses into heat illness, fatigue or error.
- **Protect Production:** preserve productive hours on high-heat days and reduce avoidable disruption.
- **Strengthen Compliance:** improve duty-of-care evidence and heat-management reporting.
- **Build Trust and ESG Value:** demonstrate visible action on worker wellbeing and safety leadership.
- **Improve Planning:** create a better evidence base for scheduling, training, supervision and heat-risk policy.

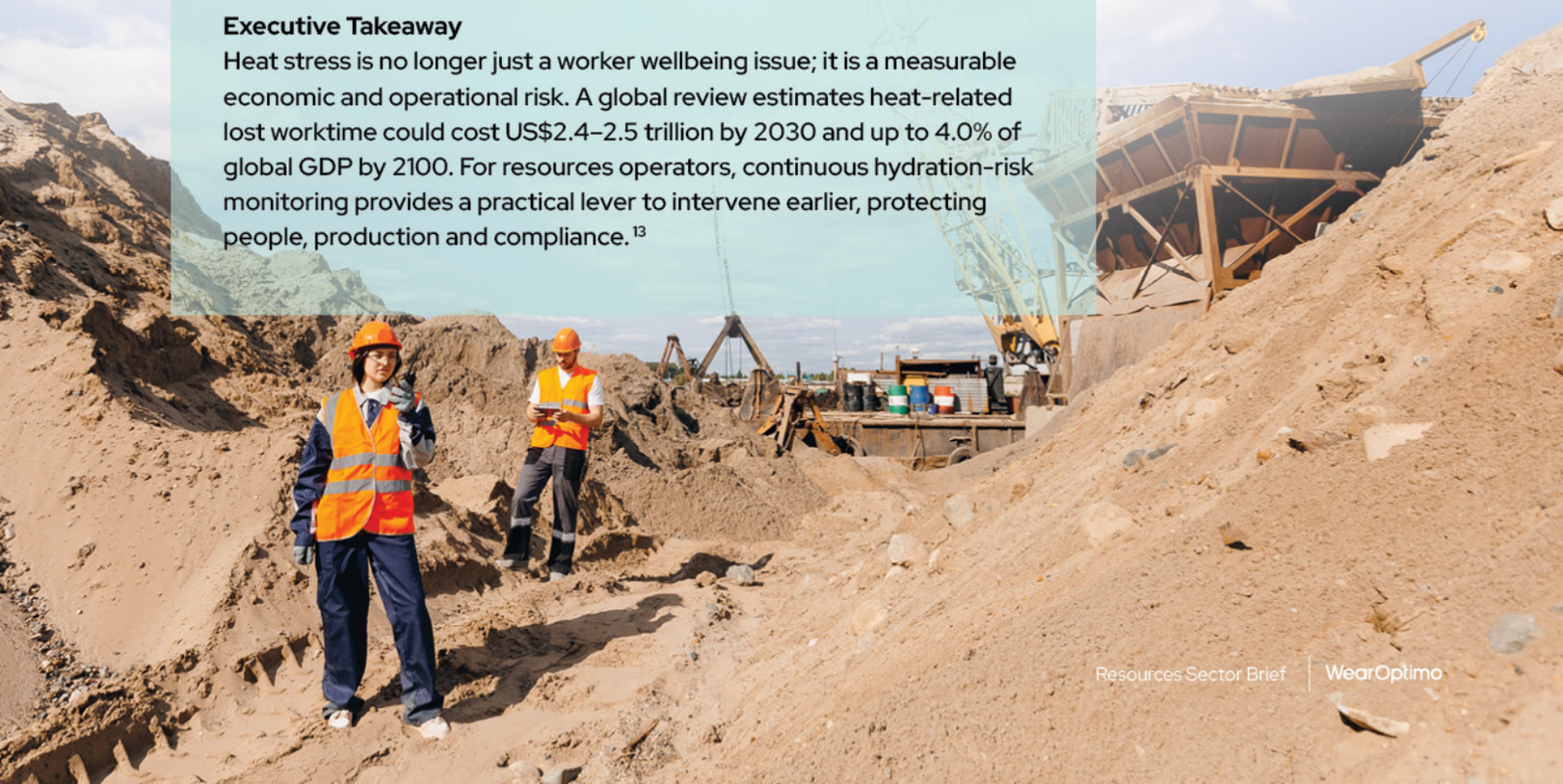
Protect People

Protect Production

Protect Compliance

Executive Takeaway

Heat stress is no longer just a worker wellbeing issue; it is a measurable economic and operational risk. A global review estimates heat-related lost worktime could cost US$2.4–2.5 trillion by 2030 and up to 4.0% of global GDP by 2100. For resources operators, continuous hydration-risk monitoring provides a practical lever to intervene earlier, protecting people, production and compliance.[13]



Continuous hydration risk monitoring in a wearable device for high-heat, long-shift industrial environments.

Selected References

1 International Labour Organization. Working on a Warmer Planet: The Impact of Heat Stress on Labour Productivity and Decent Work. Geneva: ILO, 2019. *https://www.ilo.org/publications/working-warmer-planet-impact-heat-stress-labour-productivity-and-decent*

2 Polkinghorne, Benjamin G., Vinodkumar Gopaldasani, Susan Furber, Brian Davies, and Victoria M. Flood. "Hydration Status of Underground Miners in a Temperate Australian Region." BMC Public Health 13 (2013): 426. *https://doi.org/10.1186/1471-2458-13-426*

3 Miller, V., and G. P. Bates. "Hydration of Outdoor Workers in North-West Australia." Journal of Occupational Health and Safety – Australia and New Zealand 23, no. 1 (2007): 79–87. *https://espace.curtin.edu.au/bitstream/handle/20.500.11937/1962/18028_V%20%20Miller%20full%202007.pdf?sequence=2*

4 Adan, Ana. "Cognitive Performance and Dehydration." Journal of the American College of Nutrition 31, no. 2 (2012): 71–78. *https://pubmed.ncbi.nlm.nih.gov/22855911/*

5 Masento, Natalie A., Mark Golightly, David T. Field, Laurie T. Butler, and Carien M. van Reekum. "Effects of Hydration Status on Cognitive Performance and Mood." British Journal of Nutrition 111, no. 10 (2014): 1841–1852. https://doi.org/10.1017/S0007114513004455

6 National Safety Council. "Work Injury Costs." Injury Facts. Accessed 2025. *https://injuryfacts.nsc.org/work/costs/work-injury-costs/?source=295*

7 Thibodaux, Donald P., Robert M. Bourgeois, Ronald R. Loeppke, Doris L. Konicki, Pamela A. Hymel, and Marianne Dreger. "Medical Evacuations from Oil Rigs off the Gulf Coast of the United States from 2008 to 2012: Reasons and Cost Implications." Journal of Occupational and Environmental Medicine 56, no. 7 (2014): 681–685. *https://pubmed.ncbi.nlm.nih.gov/24988094/*

8 Flouris, Andreas D., et al. "Workers' Health and Productivity under Occupational Heat Strain: A Systematic Review and Meta-Analysis." The Lancet Planetary Health 2, no. 12 (2018): e521–e531. DOI: 10.1016/S2542-5196(18)30237-7

9 WorkSafe Western Australia. Significant Incident Report No. 257: Field technician collapses during exploration activities – fatal accident. Date on report: 28 February 2018. PDF. *www.worksafe.wa.gov.au/system/files/documents/2025-03/MSH_SIR_257.pdf*

10 WorkSafe Western Australia. Significant Incident Report No. 232: Underground operator collapses underground – fatal accident. Date on report: 30 November 2015. PDF. *www.worksafe.wa.gov.au/system/files/documents/2025-03/MS-SIR-232.pdf*

11 Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH). "Heat-related Illnesses." Updated March 3, 2026. *https://www.cdc.gov/niosh/heat-stress/about/illnesses.html*

12 Occupational Safety and Health Administration (OSHA). "Accident Report Detail: 138477.015 – Employee dies from heat illness after performing labor tasks" (Lynx Pressure Solutions LLC; event date June 10, 2021). *https://www.osha.gov/ords/imis/accidentsearch.accident_detail?id=138477.015*

13 Borg, Matthew A., Jianjun Xiang, Olga Anikeeva, Dino Pisaniello, Alana Hansen, Kerstin Zander, Keith Dear, Malcolm R. Sim, and Peng Bi. "Occupational Heat Stress and Economic Burden: A Review of Global Evidence." Environmental Research 195 (2021): 110781. *https://doi.org/10.1016/j.envres.2021.110781*

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