COLLECTIVE BARGAINING AND SOCIAL DIALOGUE IN EUROPE

TO PROTECT WORKERS' HEALTH AND SAFETY AT WORK AGAINST HEAT AND HEAT WAVES

Adaptation to heat and climate change at work.

ADAPTHEAT

Collective bargaining and social dialogue in Europe to protect workers' health and safety, welfare and productivity against heat and heat waves

HEAT STRESS

health risks, adaptation measures, regulatory gaps, improvements through collective bargaining

Adaptation to heat and climate change at work.

ADAPTHEAT

Collective bargaining and social dialogue in Europe to protect workers' health and safety, welfare and productivity against heat and heat waves

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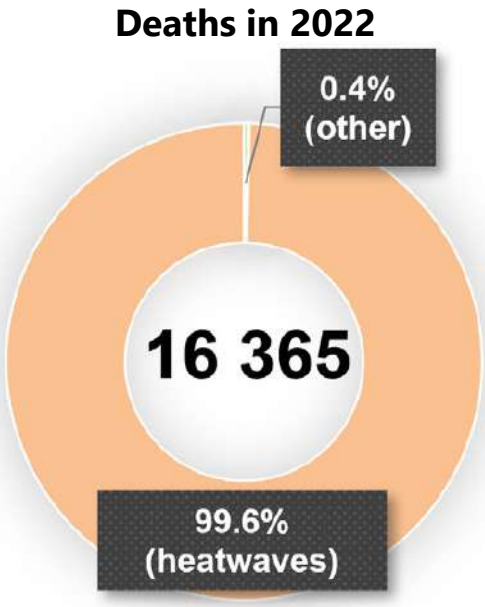
Heat is the most pressing climate hazard for Europe

- "*Europe is the **fastest-warming** of all the WMO regions, warming twice as much as the global average since the 1980s*"

WMO, 2022

- "*The **most severe**, in terms of mortality, were the heatwaves (13% of all events)…representing 99.6% of all fatalities*"

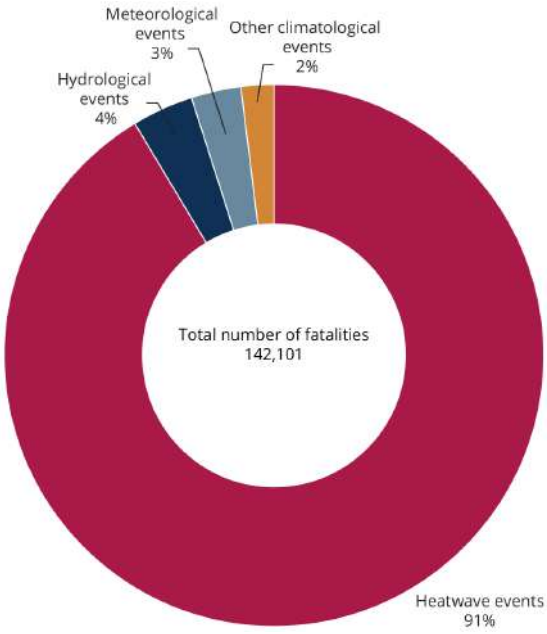


Heat is the most pressing climate hazard for Europe

- "*Heatwaves cause the **largest** number of deaths among weather- and climate-related events in Europe*"

EEA, 2022

- "*…heatwave events are responsible for **86-91%** of fatalities caused by weather- and climate-related extreme events in EEA member countries*"



Heat is the most pressing climate hazard for OSH

ILO (2024)

Flouris, ILO (In press)

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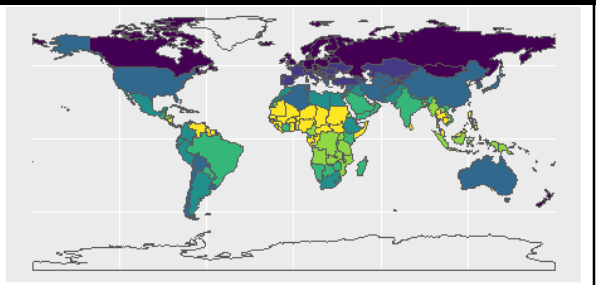
Heatwaves are key, but daily heat exposure is most pressing

- "*Across the world, at least 1.8 billion full-time workers were exposed to WHS in 2000, and this number rose to* ***2.4 billion full-time workers*** *in 2020, an increase of 35%*"



- "***One in 10 person-days*** *of work with WHS occurred during a heatwave*"
- Therefore, **90%** of workers' exposure to workplace heat stress happens on a **"typical workday"**, <u>outside the warnings</u> released during heatwaves, which means <u>workers and companies are current unprotected</u>

Flouris, ILO, (In Press)

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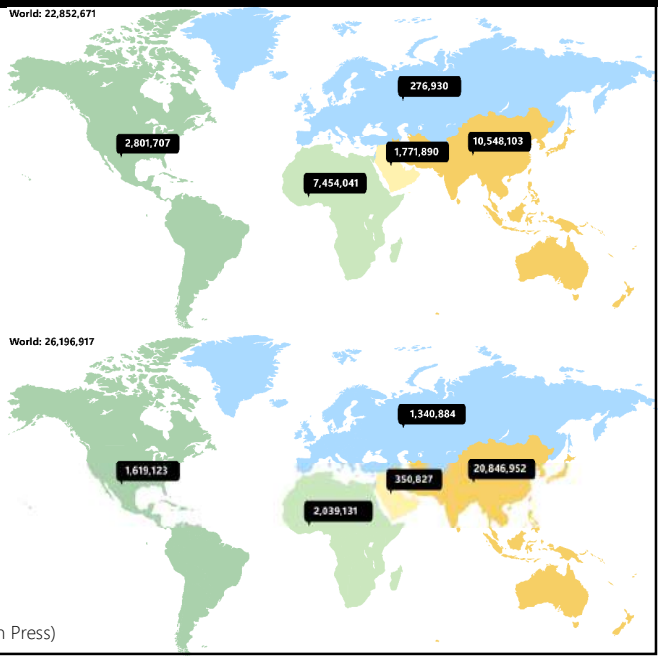
Injuries and kidney disease attributed to workplace heat stress

- Annual injuries from occupational accidents associated with workplace heat stress
  - **80,811** injuries in EU-27
- Number of people living with chronic kidney disease attributable to workplace heat stress
  - **471,305** cases in EU-27



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Flouris, ILO, (In Press)

In EU-27 workforce from May to September each year heat causes…

- Every 1 day
  - 528 occupational injuries
  - 36 moderate heat-related disorders
  - 4 severe heat-related disorders
- Every 2 days
  - 1 fatal occupational accident

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Flouris, ILO, (In Press)

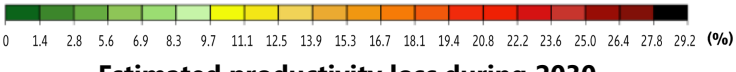
Morbidity and mortality related to workplace heat stress

- Heat stroke can induce **long-term health consequences**
  - in the 14-year period after the event
    - 3.9 times higher risk of a major cardiovascular event
    - 5.5 times higher risk of ischemic stroke
    - 15 times higher risk of atrial fibrillation
  - in the 30-year period after the event
    - 1.7 times higher risk of dying of other cardiovascular disease
    - 2.2 times higher risk of dying of ischemic heart disease

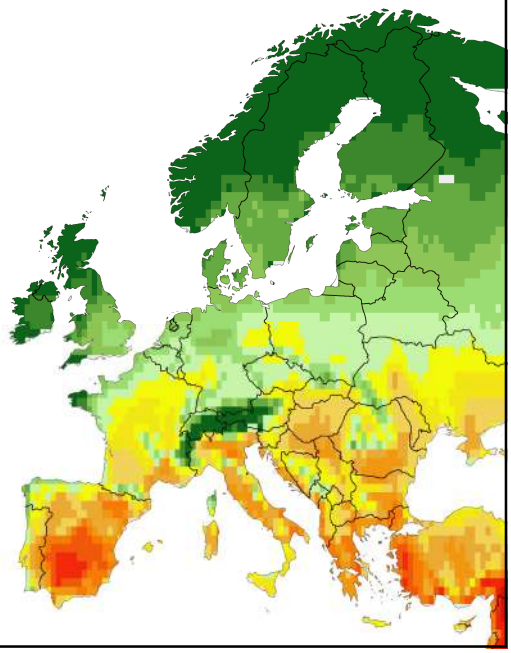
Wallace et al. 2007, Environ Res; Wang et al. 2019, PLoS One

In EU-27 economy from May to September each year heat causes…

- Every 1 day (previous estimates)
- 2020: **5.4 billion €** *(830 billion € / year)*
- 2060: **26.1 billion €** *(4 trillion € / year)*
- New evidence: more widespread impacts



Estimated productivity loss during 2030



Ioannou et al., 2022

Addressing the lack knowledge in Europe

- **Mission**: to address the negative impacts of workplace heat stress on the health and productivity of workers in strategic European industries

HEAT SHIELD

European Commission | Horizon 2020 European Union funding for Research & Innovation

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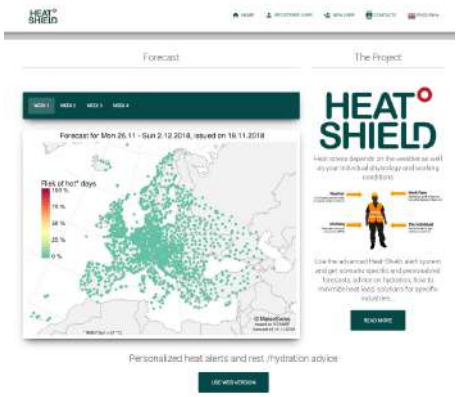
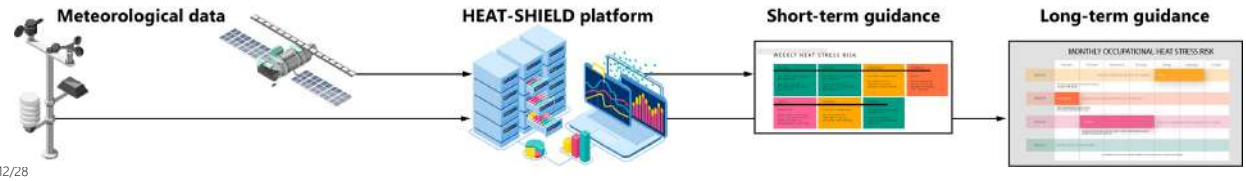
Funded by the EU Horizon 2020 research and innovation programme (no.668786)

HEAT-SHIELD early warning system – www.heat-shield.eu

- The HEAT-SHIELD platform to protect from climate-related shocks, providing guidance to workers and employers early in advance





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European countries already addressing workplace heat stress

- Comprehensive national legislations to address workplace heat stress within the EU-27
  - Belgium
  - Cyprus
  - Greece
  - Spain

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Flouris, ILO, (In Press)

EU approaches to address workplace heat stress

Country	WHS assessment		Provisions						Other
	Heat stress indicator	Safety threshold (work intensity / risk)*	Cool rest areas	Hydration	Rest / Breaks	Health checks	Education & Training	PPE	
Belgium	WBGT	29.0°C (low) 26.0°C (mod.) 22.0°C (high) 18.0°C (very high)			X			X	Workers' core body temperature should not exceed 38°C; Requirements: risk assessment, emergency response plan, ventilation.
Cyprus	WBGT	32.2°C (low) 31.1°C (mod.) 30.0°C (high)		X	X			X	Workers' core body temperature should not exceed 38°C; Provision for alerts based on WBGT forecast from national Meteo service; Requirements: risk assessment, emergency response plan; Identification of vulnerable workers; Provision for acclimatization.
Greece	WBGT	32.5°C (low) 31.5°C (mod.) 30.5°C (high) 30.0°C (very high)	X	X	X	X	X	X	Workers' core body temperature should not exceed 38°C; Provision for alerts based on WBGT forecast from national Meteo service; Real-time WBGT estimate via smartphone application; Requirements: risk assessment, emergency response plan; Identification of vulnerable workers; Provision for acclimatization.
Spain	Air temperature Relative humidity Air flow	27°C (sedentary work) 25°C (light work) 70% (all other rooms) 50% (rooms with risk of static electricity) 0.25 m/sec (non-WHS)			X				Provision for alerts based on air temperature forecast from national Meteo service; Requirements: risk assessment; Identification of vulnerable workers.

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Flouris, ILO, (In Press)

Binding legislations addressing workplace heat stress

Flouris, ILO, (In Press)

Addressing workplace heat stress – Global Synthesis

- In recent years, many countries are revising their laws or developing new specific regulations to address workplace heat stress. A global analysis of 20 countries selected from different ILO regions indicates:
  - a lack of a standardized policy approach to address workplace heat stress
    - due to the intensifying trends of climate change, countries often use **quick and/or *ad hoc* methods** when developing policies and legislations to address workplace heat stress. This is shown through the diversity of approaches and temperature limits that countries and authorities implement, and may lead to ineffective policies and, more importantly, to significant threats to workers' health and safety

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Flouris, ILO, (In Press)

Addressing workplace heat stress – Global Synthesis

- In recent years, many countries are revising their laws or developing new specific regulations to address workplace heat stress. A global analysis of 20 countries selected from different ILO regions indicates:
  - 75% of the analysed national legislations use a **heat stress indicator** to assess the level of WHS exposure
    - 10 out of the 15 legislations that use a heat stress indicator have adopted the **WBGT**

Work intensity	Most countries	Countries in relatively cool climates
low	29.0 - 30.0 °C	22.0 - 25.0 °C
moderate	30.0 - 31.5 °C	26.0 - 28.0 °C
high	31.5 - 32.5 °C	29.0 - 30.0 °C

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Flouris, ILO, (In Press)

Addressing workplace heat stress – Global Synthesis

- In recent years, many countries are revising their laws or developing new specific regulations to address workplace heat stress. A global analysis of 20 countries selected from different ILO regions indicates:
  - other characteristics of analysed legislations:
    - 30% require employers to provide cool, shaded, and ventilated rest areas for workers
    - 65% include provisions for hydration
    - 55% include provisions for rest, breaks, or modified work schedule
    - 45% include provisions for periodical health checks
    - 65% include provisions for education and training
    - 65% include provisions for PPE designed to limit and/or protect workers from workplace heat stress
    - many foresee written risk assessment, acclimatization, and identification of vulnerable groups of workers

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Flouris, ILO, (In Press)

Addressing workplace heat stress – Global Synthesis

- Overall, the analysis of the identified legislative measures shows the following characteristics, which could be used as the main building blocks for developing effective measures:
  1. Use of the **WBGT** as a heat stress indicator to assess the level of workplace heat stress exposure, with varying safety thresholds based on work intensity
  2. Provision for cool, shaded, and ventilated **rest areas**
  3. Periodical **health checks**
  4. Strategy for **hydration**
  5. Rest, breaks, or modified **work schedule** to limit or avoid exposure to workplace heat stress
  6. **Education** and **training**
  7. **PPE** designed to limit and/or protect workers from workplace heat stress
  8. Written **risk assessment**
  9. Provision for **heat acclimatization**
  10. Identification of **vulnerable groups** of workers

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Flouris, ILO, (In Press)

Addressing workplace heat stress – Hydration

	Water intake (L/hour)		
WBGT (°C)	**Low intensity work**	**Moderate intensity work**	**High intensity work**
25.0-28.0	0.35	0.55	0.65
28.0-29.4	0.40	0.55	0.70
29.5-30.9	0.40	0.60	0.75
31.0-32.4	0.45	0.65	0.80
≥32.5	0.50	0.70	0.85

Note: Work intensity follows levels provided in ISO 7243:2017; Simulation performed with the FAME Lab Predicted Heat Strain model (Ioannou, Tsoutsoubi et al. 2019). Simulation data: height: 170 cm; body mass: 70 kg; clothing worn: hat, short-sleeve shirt, bra, denim overalls, underwear, socks, shoes.

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Addressing workplace heat stress – Global Synthesis

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  10. Identification of **vulnerable groups** of workers

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Flouris, ILO, (In Press)

Addressing workplace heat stress – Work schedule

Work time based on the threshold limit values for heat stress exposure as assessed with WBGT (°C)

Allocation for every 60 min of time in an 8-hour work shift		WBGT (°C) based on work intensity			
Work (min)	Break (min)	Low intensity	Moderate intensity	High intensity	Very high intensity
60	0	31.0	28.0	*	*
45	15	31.0	29.0	27.5	*
30	30	32.0	30.0	29.0	28.0
15	45	32.5	31.5	30.5	30.0
Full work stoppage		>32.5	>31.5	>30.5	>30.0

* = threshold limit values are not provided for uninterrupted or almost uninterrupted high and very high work intensity. In such cases, detailed assessment of physiological heat strain is needed, based on workers' core body temperature during work.

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Circular of Greek Ministry of Labour and Social Security, 2024

Addressing workplace heat stress – Global Synthesis

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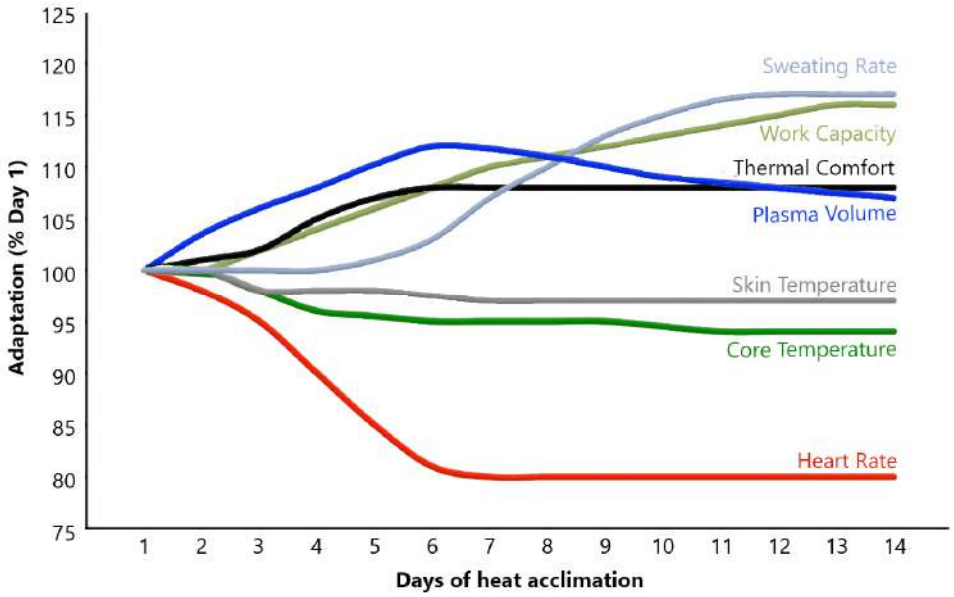
Flouris, ILO, (In Press)

Addressing workplace heat stress – Heat acclimatization



Périard et al., 2015

Addressing workplace heat stress – Return to duty

Percent of full assignment	Days away from heat exposure due to routine absence (or illness)					Days after returning to work
	<4 (---)	4-5 (1-3)	6-12 (4-5)	12-20 (6-8)	>20* (>8*)	
	100	R/E	80	60	50	1
		100	100	80	60	2
				100	80	3
					100	4

Note: R/E = Reduced workload expectations with no specific reduction in excessive heat exposure; * treat as unacclimatized.

25/28

Addressing workplace heat stress – Global Synthesis

- Overall, the analysis of the identified legislative measures shows the following characteristics, which could be used as the main building blocks for developing effective measures:
  1. Use of the **WBGT** as a heat stress indicator to assess the level of workplace heat stress exposure, with varying safety thresholds based on work intensity
  2. Provision for cool, shaded, and ventilated **rest areas**
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  5. Rest, breaks, or modified **work schedule** to limit or avoid exposure to workplace heat stress
  6. **Education** and **training**
  7. **PPE** designed to limit and/or protect workers from workplace heat stress
  8. Written **risk assessment**
  9. Provision for **heat acclimatization**
  10. Identification of **vulnerable groups** of workers

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Flouris, ILO, (In Press)

Addressing workplace heat stress – Vulnerable groups

Personal	Environmental	Pharmacological	Pathological
▪ Pregnancy ▪ Disability ▪ Lack of heat acclimatization ▪ Low physical fitness ▪ Hypohydration ▪ Advanced age ▪ High body mass index ▪ Limited work experience	▪ Heavy/impermeable clothing ▪ Physical work/exercise ▪ Heat wave ▪ High temperature ▪ High relative humidity ▪ Little air movement ▪ Sources of radiant heat (sun and/or machinery)	▪ Antiepileptic, antipsychotic and neuroleptic drugs, tricyclic antidepressants, amphetamines, cocaine, "ecstasy" ▪ Anticholinergic substances ▪ Heart and antihypertensive drugs: (diuretics, nitrites, vasodilators and calcium ion channel blockers) ▪ Hormones (including insulin) ▪ Alcohol ▪ Ergogenic stimulants	▪ Acute illness (e.g., infection with fever or gastroenteritis) ▪ Diseases of the central nervous system and mental illnesses ▪ Cardiovascular diseases ▪ Malignant hyperthermia ▪ Diabetes mellitus ▪ Kidney diseases ▪ Skin rash, sunburn and/or previous burns on large skin areas ▪ Hemoglobin diseases (sickle cell anemia) ▪ Chronic liver diseases ▪ Chronic respiratory diseases

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Flouris, ILO (In Press)

PROTECT HEALTH AND SAFETY AT WORK FROM HEAT AND HEAT WAVES AND HEATWAVES AT WORK

ADAPTHEAT

+ INFO ADAPTHEAT PROJECT

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28/28

Addressing workplace heat stress – Belgium

- Royal Decree of 4 June 2012 on thermal environmental factors
  - employers must perform **risk analysis** of thermal factors, considering workplace characteristics and nature of work and take organizational and technical measures to mitigate heat stress, ensuring that their workers' core body temperature remains below **38°C**
  - employers should determine preventive measures before summer period considering updates in technology and science
  - **Wet-Bulb Globe Temperature (WBGT)** is used to determine action values for heat stress, with work interruption for non-acclimatized workers foreseen when WBGT raises beyond
    - 29°C for low intensity work
    - 26°C for moderate intensity work
    - 22°C for high intensity work
    - 18°C for very high intensity work

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Flouris, ILO, (In Press)

Addressing workplace heat stress – Cyprus

- "Safety and Health at Work (CoP for the Protection of Workers from Heat Stress) Order of 2014" amended in 2020
  - covers employees and self-employed persons
  - employers must perform **risk analysis** of thermal factors, considering workplace characteristics and nature of work and take organizational and technical measures to mitigate heat stress, ensuring that their workers' core body temperature remains below **38°C**
    - **WBGT** is used to determine action values for heat stress, with work interruption for non-acclimatized workers foreseen when WBGT raises beyond
      - 29.7°C for low intensity work
      - 28.6°C for moderate intensity work
      - 27.5°C for high intensity work
    - below these levels, measures also include work-rest cycles
  - **National Meteorological Service** provides real-time and forecasts of WBGT

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Flouris, ILO, (In Press)

Addressing workplace heat stress – Greece

- Ministerial Decision No. 65581 and yearly circulars
  - covers employees
  - employers must perform **risk analysis** of thermal factors, considering workplace characteristics and nature of work and take organizational and technical measures to mitigate heat stress, ensuring that their workers' core body temperature remains below **38°C**
    - **WBGT** is used to determine action values for heat stress, with work interruption foreseen when WBGT raises beyond
      - 32.5°C for low intensity work
      - 31.5°C for moderate intensity work
      - 30.5°C for high intensity work
      - 30.0°C for very high intensity work
    - below these levels, measures also include work-rest cycles
  - **National Meteorological Service**: WBGT real-time and forecasts
  - **smartphone app** from Thessaly University: WBGT real-time and forecasts

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Flouris, ILO, (In Press)

Addressing workplace heat stress – Spain

- Law 31/1995 on Occupational Risk Prevention, and Royal Decrees 1561/1995 and 486/1997
  - covers mainly people working outdoors
  - employers must perform **risk analysis** of thermal factors, considering workplace characteristics and nature of work and take organizational and technical measures to mitigate heat stress, based on weather warnings from the **National Meteorological Agency**
    - **Temperature** should not exceed
      - 27°C (sedentary work)
      - 25°C (light work)
    - **Relative humidity** shall be
      - 30-70%
      - 50-70% (in areas with risk of static electricity)
    - **Air velocity** should not exceed
      - 0.25 m/sec (in normal workplace temperature)
      - 0.5 m/sec (in high workplace temperature, when doing sedentary work)
      - 0.75 m/sec (in high workplace temperature, when doing active work)
      - for AC or air currents to mitigate workplace heat stress:
        - 0.25 m/sec (sedentary work)
        - 0.35 m/sec (active work)

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Flouris, ILO, (In Press)