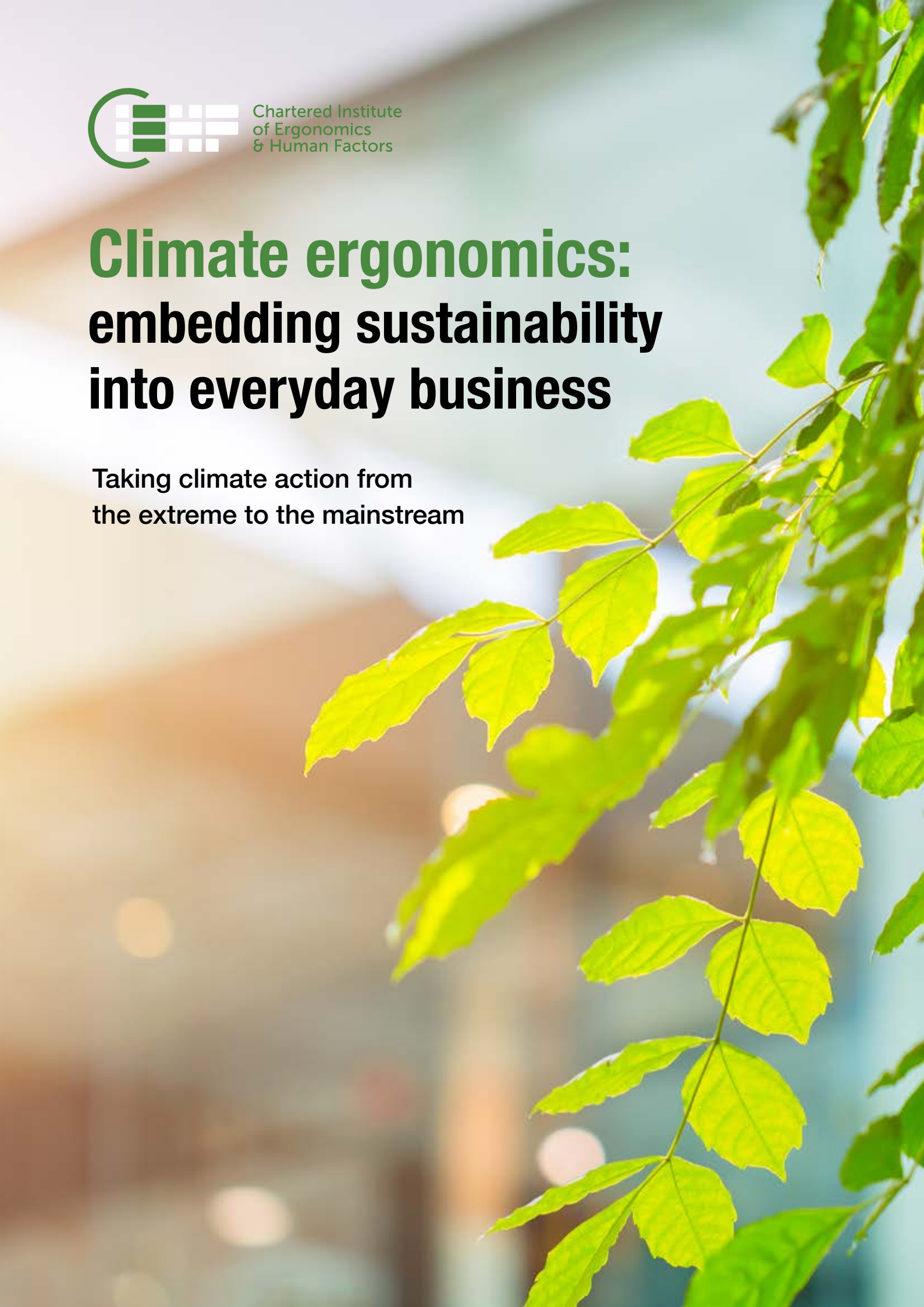
Chartered Institute
of Ergonomics
& Human Factors

Climate ergonomics: embedding sustainability into everyday business

Taking climate action from the extreme to the mainstream



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Introduction

The terms ‘ergonomics’ and ‘human factors’ can be used interchangeably to mean the scientific discipline concerned with the understanding of interactions among people and other elements of a system. Ergonomists and human factors professionals apply specialist approaches, tools and techniques with the aim of optimising human wellbeing and overall system performance.

Dealing with climate change and sustainability is not only a business imperative, but a socio-economic issue that will impact every business and every human on the planet. This publication by the CIEHF, supported by K Sharp Ltd, is the beginning of our conversation about how as human factors professionals we can play our part personally and professionally through our science and discipline.

This document looks at how human factors and ergonomics has an important contribution to make in supporting how business goes about making the changes that are so urgently required. Our guide will support industry in taking the required steps to encourage the necessary changes in behaviours and, from a practical perspective, it also offers a series of tools and recommendations to build sustainability-focused greener goods, services and practices.

I would like to thank all those who have contributed their expertise to this document and urge everyone reading it to share is contents as widely as possible.

Noorzaman Rashid
Chief Executive
Chartered Institute of Ergonomics and Human Factors

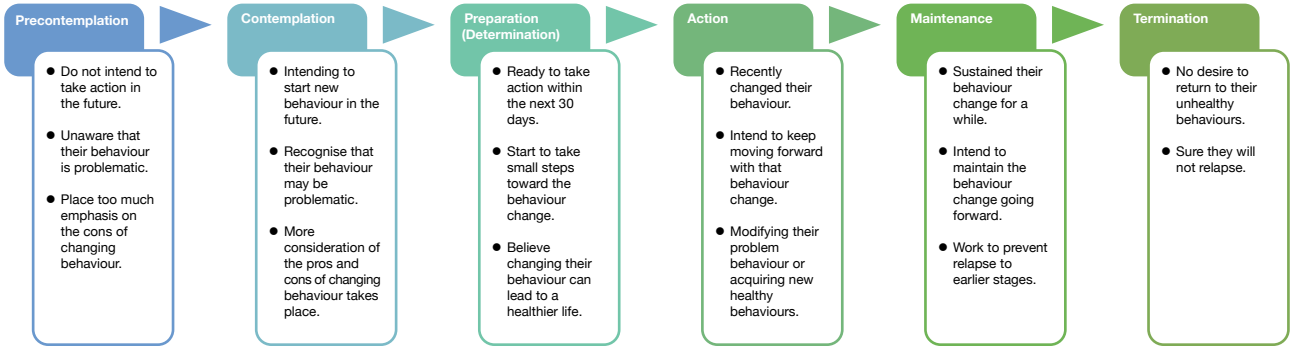
The Chartered Institute of Ergonomics & Human Factors (CIEHF) received its Royal Charter in 2014 to recognise the uniqueness and value of the scientific discipline and the pre-eminent role of the Institute in representing both the discipline and the profession in the UK. This includes the protected status of “Chartered Ergonomist and Human Factors Specialist” with the post-nominal C.ErgHF awarded to practising Registered Members/Fellows who are among a group of elite professionals working at a world-class level.

An introduction to climate ergonomics

Climate change is the greatest human challenge faced today. It is unequivocal that human influence has warmed the Earth's atmosphere, oceans and land (Dangendorf et al, 2019; IPCC, Summary for Policymakers, 2021; Swim & Whitmarsh, 2018; Taskinsoy, 2020). Today's lifestyles and overuse of resources, means that the Earth's average temperature continues to rise, leading to environmental disasters such as the destruction of eco-systems, flash floods, fires, and droughts.

Human factors and ergonomics practitioners currently have no system or procedure to capture the environmental impact of a product, system or service at neither the design, nor implementation stage. This guide will help industry to take the first step in encouraging behaviour change, to aid organisations to start their climate conscious journey. It also offers human factors tools and recommendations to build sustainability-focused greener goods, services and practices.

Figure 1 - Transtheoretical model of behaviour change



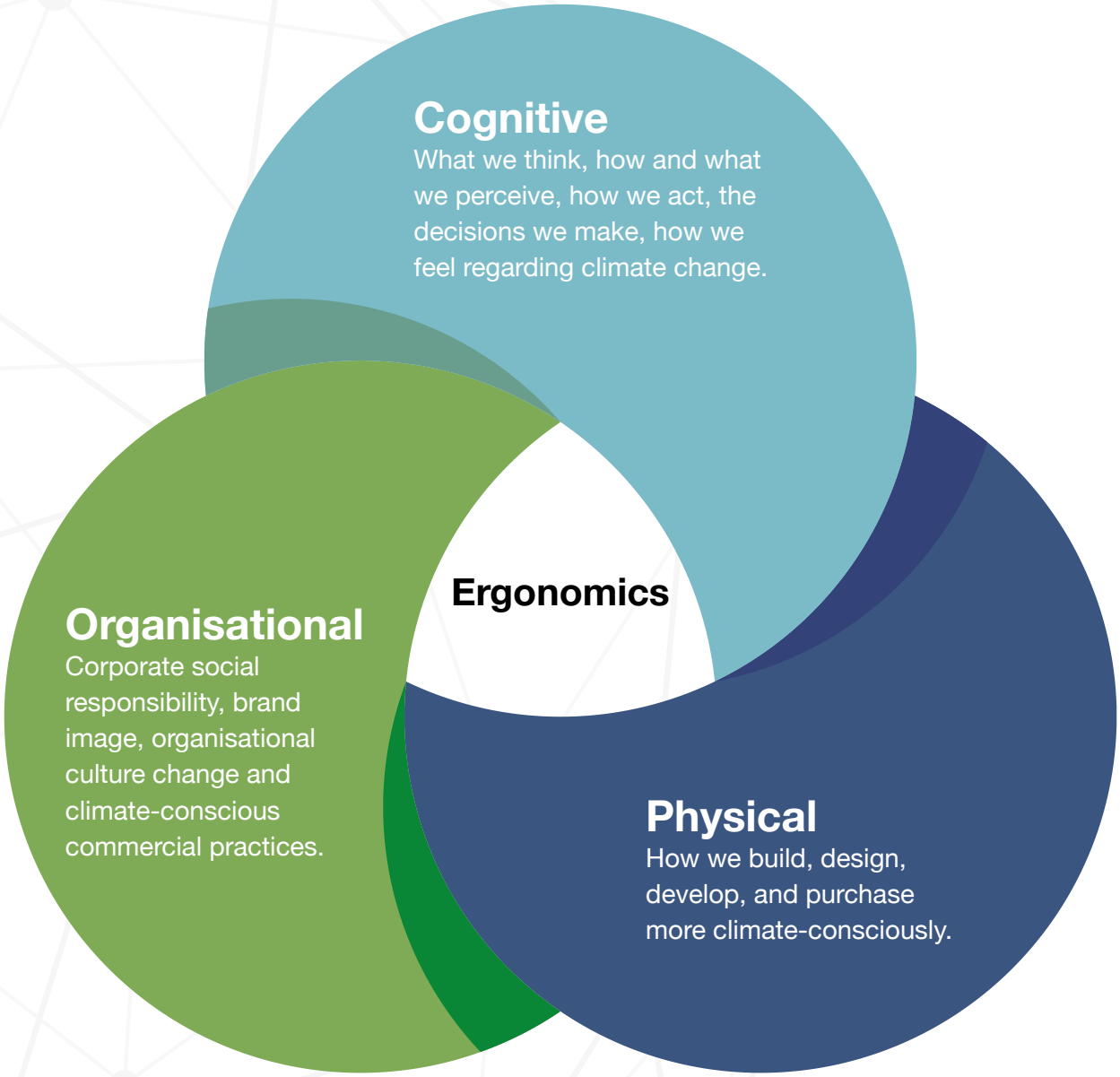
As climate change is human accelerated, logic would suggest that the solution should be human focussed. To reduce the negative impact that humans have on the planet, substantial changes must be made to behaviour with scientists from a range of disciplines putting forward the notion that humans must change their ways if climate change is to be restricted (Capstick, Whitmarsh, Poortinga, Pidgeon & Upham, 2015; Whitmarsh, 2009; Whitmarsh, Lorenzi & O'Neill, 2012). These approaches have taken theoretical and experimental approaches in line with their disciplines; however, no one has applied human factors systems thinking to climate change. Thus, the process provided in this guide is underpinned by empirically supported behaviour change theory; namely, the transtheoretical model of behaviour change (see Armitage, 2010; Kraft, Sutton & Reynalds, 1999; Sutton, 2005) depicted in Figure 1. It will, therefore, operate as a conduit for measurable behaviour change within the organisational setting.

A human factors approach may, therefore, be a promising way forward; the field lies at the intersection of psychology, engineering, design and uses the unique 'systems thinking' approach to make actionable and measurable change. As such human factors professionals have a unique perspective and approach to implementing and encouraging behavioural change. Adopting this approach may, therefore, be a fruitful unexplored avenue for implementing positive sustainable change in organisations.

Defining climate ergonomics

Climate ergonomics is a scientific discipline that focuses on human interactions, and their effect on the macro-climate that they inhabit. Underpinned by human factors principles, climate ergonomics applies theory, data, and methods to optimise both human and climate well-being.

Climate ergonomics operates within three main areas:



Sustainability as described: sustainability as done

The need for climate action is directly analogous to safety activity. And this lends itself to huge confusion about who is responsible for sustainable activity and who can do something about it. The drivers from climate change, in terms of targets, culture and leadership comes top down and describes what sustainable action is required.

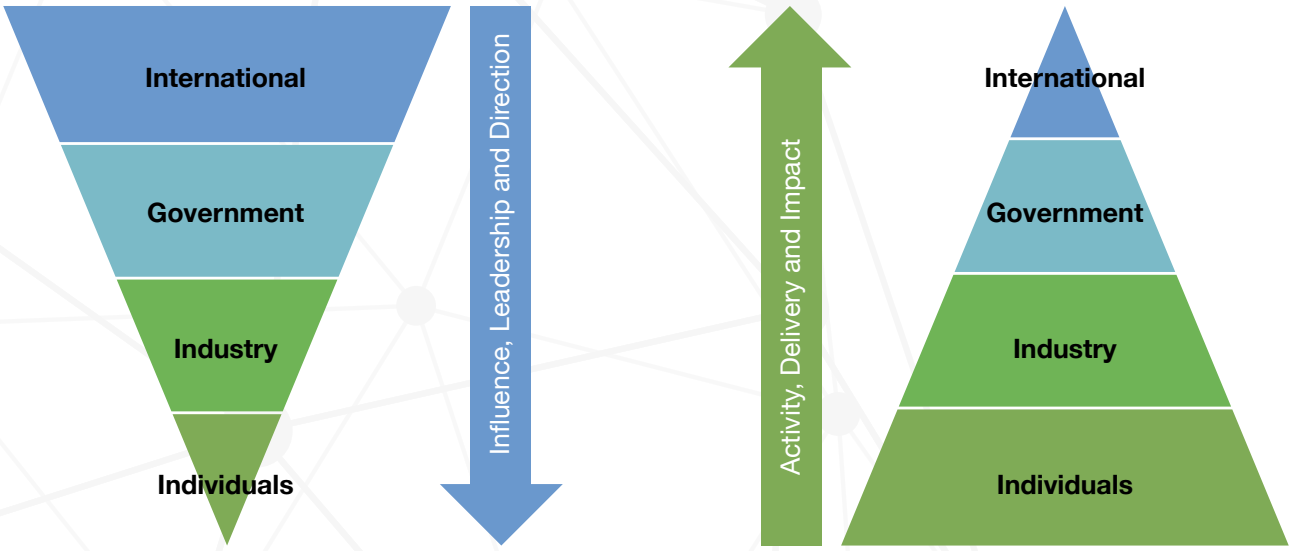


Figure 2 - Sustainability as described: sustainability as done

Climate change affects us all. The commitment to tackling climate change is not, however, always at the top of an organisation's agenda as this can result in potential additional costs to the business and potential extra workload to staff. In order to understand people's motivations to engage in climate conscious decisions and behaviours, one must understand the underlying factors that may motivate or inhibit pro-sustainability behaviours.

For industry, pressures typically come from above. International agreements such as the Paris Agreement on Climate Change (2016) predetermine the actions that will have to be made. Within the organisation's home country, the national government may form strategies and expectations for industry that bring them more in line with net zero: the idea that you offset all carbon emissions by proactive behaviours that counteract emissions. This may also include the introduction of fines and penalties for actions, goods and services that are not environmentally friendly. Other pressures may include board members or senior members of staff in the organisation. Pressure may also come from colleagues and/or loved ones and/or friends or the self. It is commonly accepted that external pressures that encourage organisational change are effective tools to pressure businesses to more sustainable practices (Boiral, Henri & Talbot, 2012; Helmig, Spraul & Ingenhoff, 2016; Kolke & Pinkse, 2007).

Creating a climate ergonomics-led sustainability plan

Climate change affects everyone, and as legal, economic, and moral pressures grow, there's never been more urgency for brands to start adopting a more climate-conscious approach. But the magnitude of the issue can seem overwhelming – making it difficult to know where to start. It doesn't have to be that way, and these simple steps can help you create a climate ergonomics model to shift the attitudes, behaviours, and practices of your workplace in a more climate-conscious direction.

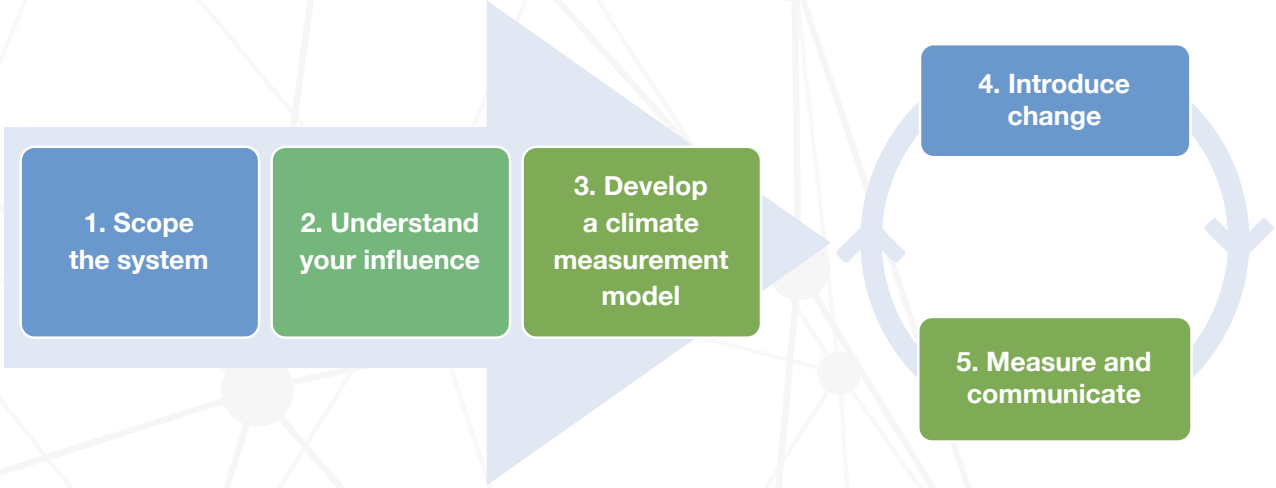


Figure 3 - Climate ergonomics sustainability process

1. Scope the system

- What needs to be changed?
- What are the boundaries and limitations?
- What internal and external factors should be considered?

2. Understand your influence

- What does your organisation represent?
- What power do you have within the organisation, or individuals within it, to make change?
- What influence do you have on employees, competitors, industry, and market-share?

3. Develop a climate measurement model

- Create a comprehensive list of priorities and evaluations.
- Measure and benchmark your organisation's current performance.
- Identify any changes that could be made.
- Implement a system to objectively measure changes before introducing interventions.

4. Introduce change

- From your comprehensive list developed in step 3, select a small number of changes (this could be to a current practice, system, service, or product).
- To begin with, keep changes small and manageable to show that success can be achieved. This can be scaled up when the process is shown to have delivered tangible outputs.
- Define a set period that you will implement and evaluate this change.

5. Measure and communicate

- Measure, evaluate, and reflect on changes and performance and be sure to follow up in the future (i.e., to measure longer-term effects or, indeed, desensitisation, etc.).

Steps 4 and 5 are iterative and should be adaptive and managed to help you reach your end goal. More explanation follows.

1. Scope the system

In line with the human factors systems approach, we must understand the wider system that any activity or product is built within. So, before considering any change or intervention, an analysis of the system that the user operates in must be explored. Based on this, it can be established what changes and interventions are plausible for execution.

The first step of the climate sustainability process is to define the boundaries of the business you are operating within. This could include adapting systems, processes, policies, practices, or products. One could also employ commonly used human factors tools such as a target audience description, user profiles or staffing analysis. The second – and perhaps most important – step is to understand the boundaries (including blockers and enablers) and the scope of these changes. It helps to articulate this visually – for example in an organisational chart, enterprise diagram, or a block department diagram – to give you a full picture of these activities. The third step is to explore what can be changed within your system (or business) and how this could be done.

Here are some key activities to help you:

- ☑ Establish operational boundaries under consideration. This may be the full organisation or a department/branch. Discover the size of the domain that you will be working in and the size of the issue. If you are part of a specific department, your scope may be bound to the department.
- ☑ Identify any climate champions in your organisation, network, industry, or community that you can share best practice. If none exist – for example within your organisation – such roles should be created.
- ☑ Find out if there is financial support to instil a climate-conscious change. Some changes may be costly, so it's important to consider how this can supported, managed and sustained over the long as well as shorter term.
- ☑ Explore potential profiling and publicity opportunities for your climate-conscious changes. The media frequently covers the topic of climate change – and any coverage will give you access to a wider audience. It may also help senior management buy-in.

2. Understand your influence

Anyone can want to make positive climate-conscious changes but that does not mean that they are able or empowered to do so. Operational success depends on the position and influence of the individual(s) pioneering the change. It is also bound by the size and influence of the system the individual is operating within; for example, the size of the business or department.

You and your brand's outreach will directly impact the magnitude of change you can produce. It also requires a strong leader. Here is a quick checklist to help you discover your potential impact.

- ☑ Do you have a mandate from your organisation's leadership?
- ☑ Do you have the resources required? (Such as staffing and funding)
- ☑ Do you have the authority to lead the change? If not, do you know someone who does or how to get it?
- ☑ Do you have the platform to communicate to the organisation? If not – do you know someone (could be an awareness team, say) who does?
- ☑ What can you learn from other individuals within your organisation and other organisations?
- ☑ Define what you can control. For example, if you are involved in the design process of a product, consider: could alternative, greener materials be used? Where could these be sourced? Will there be added costs? Does change affect just you and your department, or does this extend across the organisation? For example, if you are the chief executive officer (CEO) of a company, you may have the power to make changes on a large scale that will affect all aspects of the business. If you are head of a department or division, you may have the power to make changes on a smaller scale that will affect some aspects of the business but may then also have a platform to build upon for wider dissemination throughout the business.

It is crucial to establish what you can change. It's equally important to engage with the people who can support (and amplify!) your cause. Think big and scope out help from the right people with the right power and influence to help your cause.

3. Develop a climate measurement model

Once the scope is defined and the influence understood, a comprehensive list of all the potential changes that could be made should be identified and evaluated. In a similar way that a backlog is created in agile methodologies (see McCormick, 2012; Sumner, 2016), this allows the understanding of what could be done.

Organisations can be best understood in relation to three different perspectives across the business; these being:

Operational
How the business runs on a day-to-day basis.

Delivery
The production or supply of the products, solutions or services offered by the business.

Culture and Leadership
The underpinning culture, values and motivations of the orgnisation and how this manifests through organisational norms.

Thinking in terms of the three domains helps the organisation focus.

Create a definitive list of what changes could be made. This should be as exhaustive as practicable. The following table exemplifies some of the changes that could be considered:

Operational	Delivery	Culture and Leadership
Paper recycling	Production materials	Climate champions
Energy supply	Waste minimisation in production	Staff awareness and training
Working from home	Digital twins	Environmental accreditations
Cycle to work scheme	Carbon offsetting	Internal company communications
Office lighting and heating automation	Reduction in single use plastics	Internal incentive setting
Cloud IT services	End of life considerations	Sharing of best practice

Table 1 - Example climate measurement model

A fundamental business principle is to be able to accurately determine if an intervention is successful and, therefore, there needs to be an accurate and reliable way to measure where the organisation is currently. It is important to identify and test some form of measure that allows you to capture how things are working (or not) now and what impact this product, good or service has on the climate. This may not be easy to identify at first, hopefully you will come up with some idea of a measure during the reflection stage.

Along with each change should be an evaluation of what the cost of the change would be, and the value to the objective. This allows a critical evaluation of each and the ability to prioritise each opportunity.

Item	Cost of implementation	Value to Targets	Priority
Office Waste Recycling			
Electric Vehicle Salary Sacrifice			
Project X Supplier Review			
Cloud / Digital			

Table 2 - Example opportunity evaluation

Each element will either be direct or indirect. A direct element is something that is quantifiable at any given point in time. This is something that can be tracked and reported on.

> *Example: Printer paper usage and recycling rates. Measuring how much paper is being put into the printer.*

An indirect element is something that may not be quantified or baselined for measurement purposes, but activities can still take place.

> *Example: A business may rent an office and electricity usage may not be individually metered. Therefore direct measurement is not practicable. However it is reasonable to assume that activity could be taken that would impact it, ie., turning off electrical applicances not in use.*

Each element must be changeable. At this point you create a baseline measurement.

During this part of the process a consideration of current practice must be made and captured. For example, if you are going to instigate an employer electric vehicle contribution scheme, you need to understand who is currently using fully petrol or diesel fuelled cars. If the change that you would like to make is more subtle - like reducing the amount of paper your office use - can you establish how many reams you currently use? This is important so that you can measure change later in the process. If you don't have a way to measure something directly, don't worry, you can still introduce meaningful changes to practice. But, perhaps, instead you may need to focus on why this change needs to be done. What has motivated you to instigate change?

The measures should be used to give you information regarding your current practice. If you measure the same thing again after you have introduced a notable change to practice, you can establish how the two values changed and in what direction. The measure may quantify current use of a particular product, system or compound related to climate change. All of these factors may affect how successful the overall implementation is. It is also beneficial to consider and understand the change in people's perceptions, attitudes, awareness, and understanding, too. This will give greater insight into the desire to change behaviour and/or to do even more in the future.

These elements will help to understand and show the impact of any new environmental behaviours or processes:

- ☑ Identify an appropriate measure.
- ☑ Check the reliability (are measurements consistent over time) and validity (does the measure capture what it should) of the measure.
- ☑ Make sure any results you get are easily understandable or that you have a way to interpret them. Being able to visualise the data is key to broad communication.
- ☑ Form a representation of how your product, system or service currently operates.
- ☑ Make a prediction(s) about what you think will happen to this value once you introduce your planned change and then measure any change against the prediction(s)

The whole list of elements to change, the cost and potential impact of the change in a prioritised list is the company climate change measurement model.

4. Introduce change

Having followed the previous steps, you should now be ready to instigate change within your organisation. It is important to consider that sustainable change will not happen overnight. Neither does it happen all at once.

Here are a few key things to consider:

Start small, think big
Be bold with your goals, but realistic when introducing changes. We advise starting with three achievable shifts. These could include making sure that lights are turned off at the end of the day or removing all plastics from the design or packaging of a product.

Communicate
Make your stakeholders (including employees and where applicable – supply chains, other external organisations, etc.) aware of any changes that will impact them. Effectively communicate the measures you are putting in place and highlight what this means for each one.

Have a back-up
Make sure whatever change or intervention you put in place has a feasible alternative ready to take its place, should you need to adapt or pivot your approach, i.e., if the original change mechanism does not have any impact or that the impact is negative.

Get support
Find out if there are other teams, departments, or networks that could also integrate your proposed changes.

Seek feedback
Engage stakeholders, both inside and outside the business, to give you honest opinions and feedback on how the change is working for your organisation / marketplace. Seek to find if there are tweaks or alternatives to processes, systems, or services that could optimise climate-focused outcomes.

Find a champion
Identify champions for your cause. These people should highlight why the change has occurred and encourage people to adapt culturally and behaviourally to the new, climate-conscious way of working.

Pick a time
Choose the timeframe in which you will measure the success of your changes. This could be days, weeks, or months, but should allow for the change to be implemented – and adopted – in a safe and secure way. Try to ensure that the timeframe chosen does not clash with another major change being made to the organisation that could confound the impact of the change being made by you / your team.

5. Measure and communicate

Once changes have been implemented, measuring, evaluating, and reflecting on your organisation's performance will be key to optimising climate-focused results.

Here are a few key things to optimise climate-focused results:

- ☑ Be open about the outcomes and share the impact your changes have made. Share your results with all levels of the organisation. If you have elected a champion for your cause, seek their support to help you communicate your findings using effective means, e.g., infographics, videos and posters, not just written reports.
- ☑ Be aware that changes might not always meet your target. Identify if the trend is in the right direction. If so, give it more time and review it again. If not, scope out the potential to tweak or adapt your approach. If appropriate, employ statistical techniques to measure the significance and effect sizes of the outcomes of changes made.
- ☑ If your change is not working, assess why this could be, noting that there could be other changes going on within the organisation that could be impacting your change. You can also reintroduce the change, adopting the same measures as before, to see if there is a difference between the values of your first and second trial.
- ☑ Reflect on what you have done and how it went. Listen to feedback and explore if there are any ways to adapt your plan to make it better. This process is iterative, and can be used to refine changes to optimise outcomes.

Make a plan, make people and sustainability part of everyday business, take the first step.

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