

The Food Industry Executive's Day-by-Day
Pragmatic Climate Performance Roadmap

8 Tracks to Win the Race to Net-Zero

Executive Summary

The problem

The world is racing to transform into a net-zero economy and industries are responding to the change and driving it.

Comparatively, the food industry has not yet responded with the same pace – and understandably, due to the complexity of food supply chains and the singularity of calculating emissions along the food supply chain.

As a result, food industry executives apt to respond to the changing landscape and enter the race to net-zero find themselves in a bind: What's the plan?

The solution

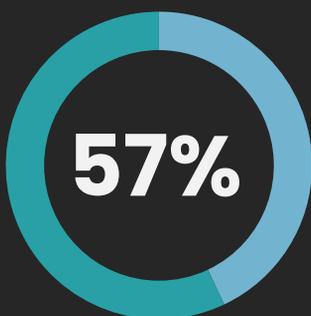
This model was developed to answer this question for the food industry. It provides executives with a **day-to-day roadmap to develop the maturity of their climate performance – successfully and sustainably.**

The roadmap unfolds in 8 tracks, covering strategy and intelligence architecture, target setting and tracking, and drivers along the supply chain as well as own operations.

The value

At the end of this model, food industry executives have **the insights to orchestrate their climate strategy, manage climate performance, and secure the winning spot for their organization on the global race to net zero.**

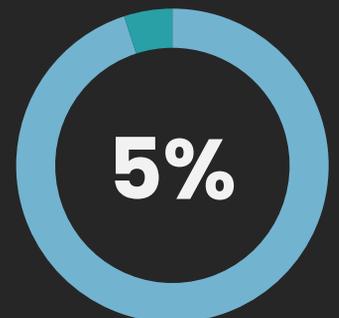
Food industry leaders will oversee the appropriate game plan for their organization to mature along the changing landscape and future-proof their market presence.



Of the global economy is making climate reporting mandatory

\$130 trillion

Committed capital to the net-zero economy transition by 2050



Food companies reporting emissions mature enough to implement a climate strategy

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Foreword

For a third year in 2022, climate action failure takes the top spot as the highest-concerning risk in the World Economic Forum's Global Risk Report [1]. Instead of acting on the top-global risk, the food industry seems to be shooting itself in the foot, contributing with 34% of the global greenhouse gas emissions [2]. If the global climate targets are ever going to be reached, the food industry needs to be part of the solution.

And there is a solution – Science and innovation confirm that climate change is solvable. The risk mitigation efforts on climate change are gaining traction fast, with 68% of them in early development [2]. The timing for businesses to leverage this and affordably secure their future existence is now. Many industries like automotive and logistics are getting ahead of the curve on the race to net-zero, with leading players like Tesla and Maersk generating positive economics.

Meanwhile in the food industry, the likelihood of players deliberately advancing in the race are low, stemming from a low climate performance training level of most decision makers. Less than half merely report tracked progress on the business and financial impact of climate-related risks and opportunities while only 4% evaluate the endurance of their strategy through climate scenarios [3]. As the world advances in managing the climate crisis, a rapid development in the climate performance training level of the food industry is foreseen.

Back in the field of academia, 4 climate economics researchers spent a collective of decades analyzing the climate performance of the food industry and projecting coaching scenarios for its advancement to the race. Our research was advancing the academic discourse but we were compelled to equally develop industry action. At the same time, the food industry's motivation to enter the race to net-zero was gaining traction but the knowledge was missing. It was this demand that led to the creation of CarbonCloud in 2019 – the leading Climate Intelligence Platform (CIP), that set out to map and track the emissions of every single food product and supply chain stage for the decision makers in the food industry to use to their benefit and win the race.

3 years later, over 40,000 climate data parameters and 18,000 climate footprints in, including every packaging material and global ingredient data, CarbonCloud has propelled over 500 food industry frontrunners in the climate race including the prolific fruit giant Dole and this decade's prime example on climate work, Oatly. But the need for next-level climate work is still in demand: The race to net-zero is too critical to reserve elite training for the ones who are already champions.

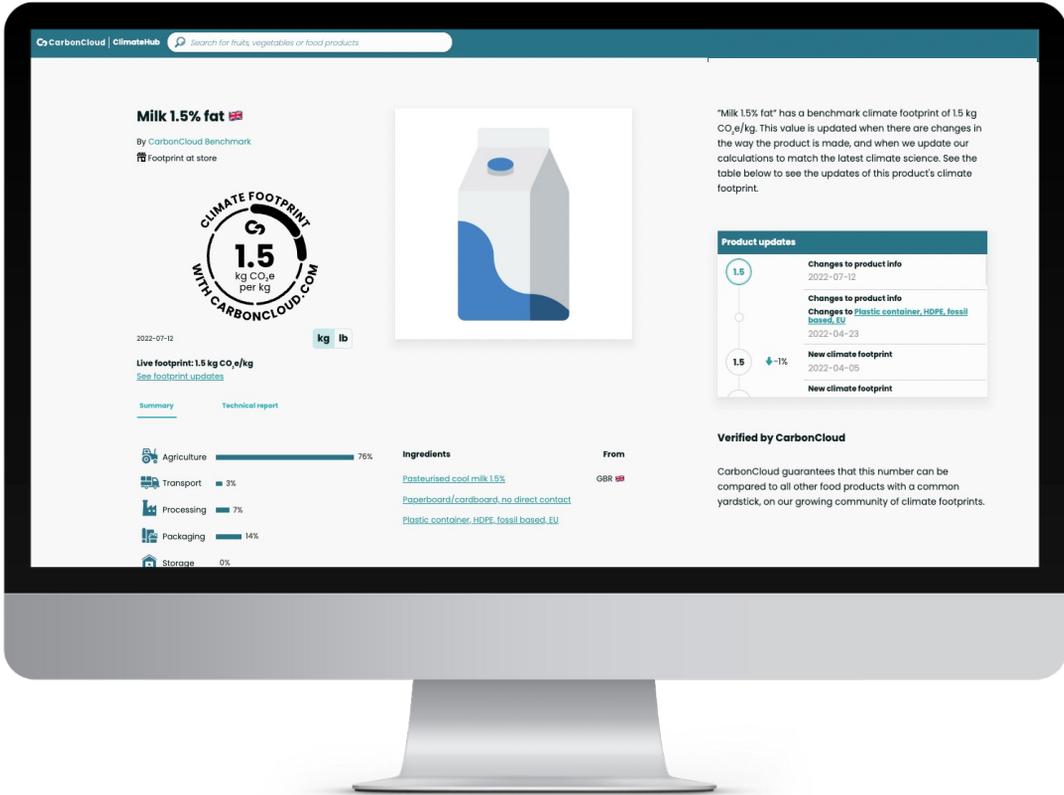
To democratize success in the climate race, the most actionable thing we can do is make our knowledge available: In 2020, we shared the essence of climate knowledge on food with ClimateHub, the constantly evolving, global climate footprint database of 18,000 and rising climate footprints now used by for example the Financial Times [4]. Today, we share the strategic framework that predicates the effective transformation of the food industry to a net-zero economy and sustainably fuels the winners of the net-zero status quo.



David Bryngelsson, PhD
CEO & Co-founder
CarbonCloud

The climate footprint database

+18,000 climate footprints for food



CarbonCloud | ClimateHub | Search for fruits, vegetables or food products

Coffee, Ivory Coast

24
kg CO₂e/kg

kg lb

Footprint at farm

What is included in this footprint?

- CO₂ (carbon dioxide)
- N₂O (nitrous oxide)

Total footprint 24 kg CO₂e/kg

Fertilizer production 1.6 kg CO₂e/kg
Energy usage and gases created when producing synthetic fertilizers.

Field bacteria (Direct N₂O emissions) 1.4 kg CO₂e/kg
Fertilizers & crop residues get digested by bacteria in the farm soil, producing N₂O.

Off-field bacteria (Indirect N₂O emissions) 0.53 kg CO₂e/kg
N₂O created when bacteria digest fertilizers & crop residues that has left the farm land.

Farming on drained wetlands (Organic soils) 3.7 kg CO₂e/kg
Draining wetlands such as swamps cause enormous emissions over multiple decades.

Deforestation 16 kg CO₂e/kg
Standing forests bind large amounts of carbon, a large part of which is emitted as CO₂ when forests are cut down to make room for cropland.

Limestone & Urea 0.33 kg CO₂e/kg
Limestone decreases soil acidity. Urea is a fertilizer. Both contain CO₂ that is released when they are used.

Pesticide production 0.01 kg CO₂e/kg
Energy used when producing chemicals for killing unwanted bugs, weeds and animals.

Name	Organization	Category	Market	Stage	Live footprint
Beef jerky	CarbonCloud Benchmark	Benchmark food product	United Kingdom	At store	37 kg CO ₂ e/kg
Almond milk	CarbonCloud Benchmark	Benchmark food product	United Kingdom	At store	0.44 kg CO ₂ e/kg
Gilt-head bream, edible weight, farmed	CarbonCloud Benchmark	Benchmark food product	United Kingdom	At store	14 kg CO ₂ e/kg
Seaweed, edible weight, farmed	CarbonCloud Benchmark	Benchmark food product	United Kingdom	At store	1.7 kg CO ₂ e/kg
Atlantic herring, fresh, whole fish	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	2.2 kg CO ₂ e/kg
Salmon, farmed, fresh, whole fish	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	2.6 kg CO ₂ e/kg
Pasta w. egg (dry)	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	1.4 kg CO ₂ e/kg
Prawns frozen	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	20 kg CO ₂ e/kg
Pork (average)	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	4.4 kg CO ₂ e/kg
Soft bread, wheat	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	1.1 kg CO ₂ e/kg
Cheese, hard, 28% fat	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	12 kg CO ₂ e/kg
Eggs	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	2.2 kg CO ₂ e/kg
Canned sweetcorn kernels 0.5L	CarbonCloud Benchmark	Benchmark food product	United Kingdom	At store	1.4 kg CO ₂ e/kg
Lentils (dry)	CarbonCloud Benchmark	Benchmark food product	United Kingdom	At store	1.1 kg CO ₂ e/kg
Tomatoes, fresh	CarbonCloud Benchmark	Benchmark food product	United Kingdom	At store	1.8 kg CO ₂ e/kg
Beans, dry	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	0.94 kg CO ₂ e/kg
Beef, flank steak	CarbonCloud Benchmark	Benchmark food product	Finland	At store	56 kg CO ₂ e/kg
Green peas, frozen	CarbonCloud Benchmark	Benchmark food product	United Kingdom	At store	0.85 kg CO ₂ e/kg
Bananas, whole fruit	CarbonCloud Benchmark	Benchmark food product	United Kingdom	At store	0.54 kg CO ₂ e/kg
Broad beans (dry)	CarbonCloud Benchmark	Benchmark food product	Sweden	At store	0.91 kg CO ₂ e/kg

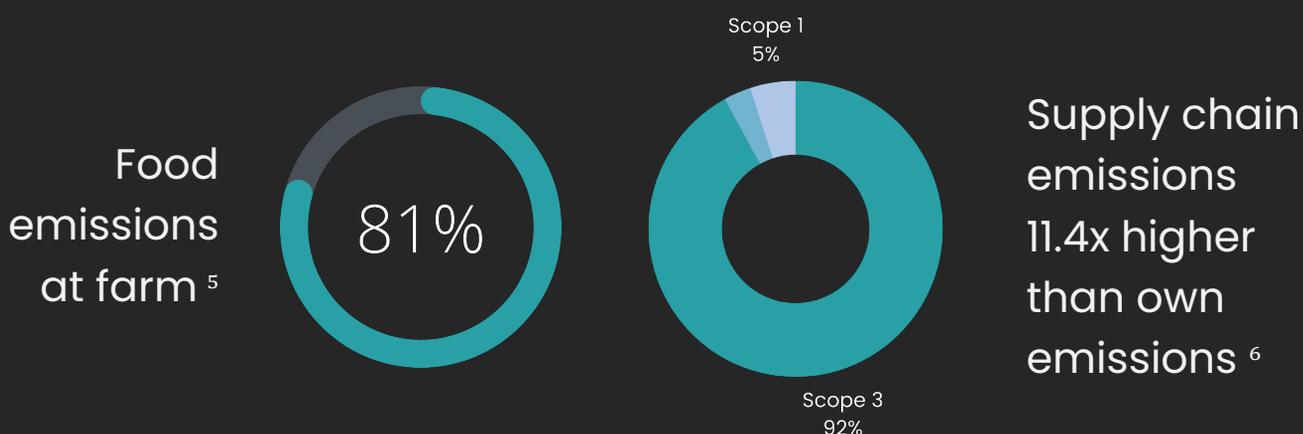
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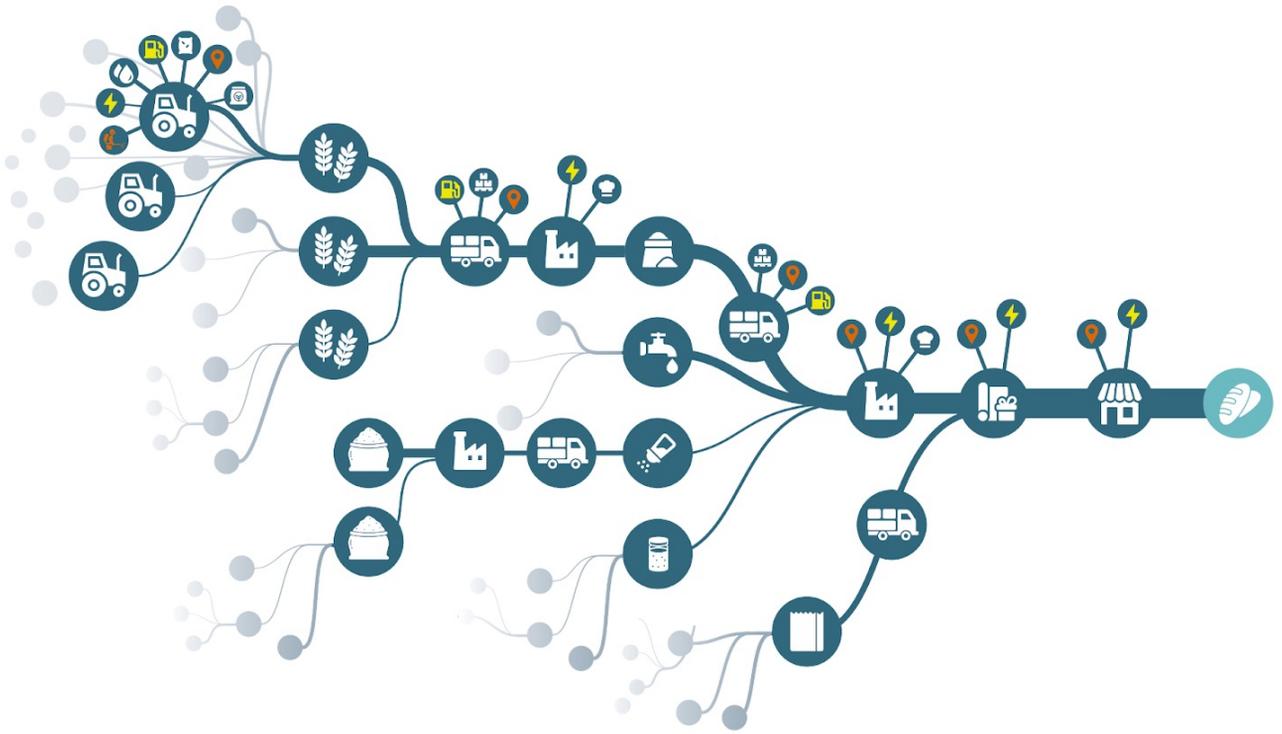
Why is the food industry sitting out the race?

The food industry has been postponing climate work for for three fundamental reasons.

- 1** Firstly, and primarily, there has not been much focus on the food system and climate change until recently. The public discourse and international climate negotiations had a heavy focus on fossil fuels in energy systems, industry and transportation. This is starting to shift as the transition from fossil fuels is accelerating and the role of food production in climate change becomes more prominent.
- 2** Secondly, the science for how to assess climate performance in food production is difficult, especially compared to other sectors. This is amplified in the agricultural phase where emissions occur due to biological processes with diffuse emissions that are challenging to measure. The bar for learning how to assess this performance has simply been too high and the diversity of these studies is so broad, resulting in unharmonized information.
- 3** Lastly, emissions are distributed along complex supply chains. Many actors are involved in breadth and depth, and the majority of the emissions happening early on in the supply chains. Additionally, it is impossible to tell the emissions of a product or commodity by looking at it; this information gets lost along the supply chain. Two products with identical chemical properties, looks, and taste, may have caused significantly different levels of emissions in their production.

The supply chain factor is a complex one but also critical to identifying and solving the right problem. Unpacking and understanding it adds a vast strategic advantage.





The scope of the supply chain problem

The food system has developed over centuries into a complex network with millions of nodes in it. Supply chains are notoriously deep, wide and opaque with emissions happening throughout but with a heavier weight on the earliest stages. 80% of the supply chain emissions are typically at farm – far from the consumer facing producers [5]. Within this network, there are pathways to communicate price and quality; there are no pathways in the network to exchange climate performance information.

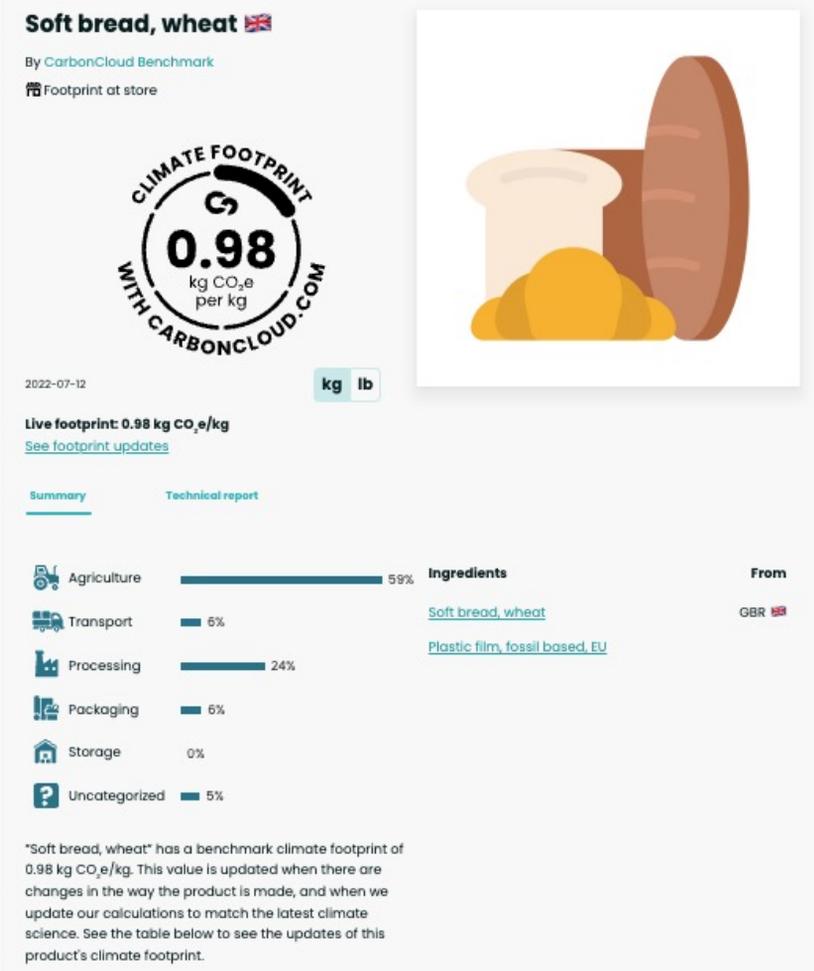
Stakeholders looking at two products can easily tell that they are identical regarding price, quality, taste and chemical composition but they cannot tell apart good climate performance from bad.

The lack of visibility poses a challenge to decision makers committed to improving their climate performance: Climate intelligence is unreachable in the existing structure. Current supply chain visibility solutions for less dynamic industries, such as annual audits or static climate footprints, simply do not solve the problem for the supply chains of food products. The reason for this is that the scale of the information that needs to be tracked to assess climate performance is staggering and it can be exemplified by the simplest product, such as a loaf of sliced bread at a grocery store.

How many parameters does it take to calculate the climate performance of a loaf of bread?

Starting with the loaf of bread at the store aisle, let's walk backwards along the supply chain.

- **Distribution** from the bakery to grocery store: 10+ parameters
- **Packaging:** 8+ parameters
- **Baking:** 15+ parameters
- **Transport** of ingredients from suppliers to the bakery: 5+ parameters per ingredient=15+ parameters
- **Packaging of ingredients:** 8+ parameters per ingredient, equalling 24+ parameters, assuming only one supplier per ingredient type.
- **Milling of Wheat:** 9+ parameters
- **Salt refinement:** 2+ parameters
- **Yeast production:** 11+ parameters
- **Farming of wheat and sugarcane** (for yeast production): 45 parameters per farm.



In the unlikely case of only one farmer for wheat and one for sugarcane, there are 190+ parameters to assess the climate performance of this bread. In reality, there are approximately 1,000 farmers supplying wheat to each mill and sugarcane to each plant, which translates to approximately 90,000 parameters. To add to the complexity, there may well be several suppliers unravelling complete supply chains for each ingredient, several production sites for each product, or even a whole product portfolio of different products with different ingredients and packaging solutions

The world is watching

The destination is the same, whether you are racing for the Planet or for your bottom line

The food industry has had valid reasons for sitting out the race to net-zero. Thankfully, food executives can look ahead at other industries who mastered the learning curve and are already competing fiercely in the race to net-zero. In the automotive industry, Tesla is the leader in addressing climate change, gracing its founder and CEO Elon Musk with the trophy of the world's wealthiest individual [7]. Surpassing Toyota and Mercedes Benz, Tesla the most valuable and the fastest growing automotive brand worldwide, with a revenue of \$75 billion and growth rate over 157% in 2021 [8].

Invested capital

The global landscape offers an additional sneak peak into the food industry's future and its upcoming maturity: It's a growth opportunity at the command of the executives. At COP26, the Glasgow Financial Alliance for Net Zero (GFANZ) committed to US\$130 trillion to achieve net zero by 2050 [9]. Leveraging this capital to tackle climate risks and opportunities and reduce costs can improve financial performance in up to 50% of the cases [5].

The consumer front

On the consumer side the demand is high as well, with more than 80% of the consumers willing to pay more for sustainable products in Europe, USA, and Asia [10]. 71% of consumers are willing to pay a premium for traceability and on the most difficult front, behavioral change, more than half of consumers are willing to change their shopping habits

to reduce their environmental impact [11]. The pattern is clear: The majority of consumers are sitting tight in their demand, waiting for the supply of climate-transparent products.

Additionally, the numbers above don't fully capture the loudest, most influential audiences in climate action, Millennials and Generation Z: 1 in 3 millennials and Gen-Z place climate change as their top priority and are personally taking action to help address climate change [12]. The playing field for the proactive growth-oriented companies is set – and it is ideal.

Upcoming regulations

The result of the increased consumer demand and the regulation-lead price increase forces the food industry to transform now. Food executives entering the race with a concrete action plan will command their revenues and margins. Food executives sitting the race out will be called to pay the price.

The question for attuned leaders is rarely "how do we sit this one out?". The real knowledge gap is in the question this model addresses: "What is the plan?".

\$130 trillion

Committed capital to go net-zero by 2050

80%

Consumers willing to pay more for sustainable products

Crisis responses

On an overarching level, one of three responses is typically triggered for a decision maker when a large transformation in the market is imminent.

Freeze

Ignoring the problem and magnitude of the change

Freeze responders lack a problem diagnosis or were frictionless leaders pre-crisis.

The freeze response has an infamous example with its own name: The **Volkswagen** emissions scandal or Dieseltgate. In 2016, Volkswagen settled the case for \$14.7 billion for employing software that activated control in lab emissions tests for 11 million units. In the more mature automotive industry with clear regulations, until 2020 the scandal cost the car manufacturer \$33 billion for the buyback program, settlements, fines, and penalties [13]. Once regulations settle for the food sector, the organizations currently in freeze can expect a similar outcome.

Flee

Band aid solutions that check random boxes without a systematic approach

Fleeing usually manifests as greenwashing: Unfounded claims, unratified compensation strategies, a focus on details. The obstacle lies in the lack of a systematic, holistic approach.

The dairy giant **Arla** recently demonstrated a fleeing response and turned it to action: Arla's "Zero carbon footprint" claim on its milk cartons triggered a loud pushback for greenwashing by the public and the press. The company quickly retracted the cartons and announced additional compensation for suppliers based on their carbon-reducing activities [14] as well as a pilot for a methane-reducing feed innovation [15], signalling a shift to the third response.

Fight

Systematic and fundamental change management grounded on exhaustive problem identification.

Decision makers accept that: 1) The business is moving onto a crisis that will influence operations, and 2) Surviving requires risk mitigation and gradual change management. Success begins with accurate problem identification, a strategy, a roadmap, and appropriate resource allocation.

Oatly committed to fight in 2019, an outlined strategy made public with the now notorious "Hey food industry, show us your numbers" campaign. The brand is systematically developing its operations in accordance with its climate strategy, reporting on climate KPIs, selecting suppliers based on climate performance, reducing its footprint along the supply chain, while doubling its revenue in 2020 [16].

Tesco, The climate trailblazer among retailers, has committed to net-zero by 2035 in Scope 1 and 2 and by 2050 in Scope 3. Tesco has already calculated its climate footprint for Scope 1 and 2, cradle-to-shelf. The retailer aims to work closely with its suppliers to reach the ambitious net-zero goal in Scope 3 and is preparing to release its supply chain climate roadmap, including key actions along the supply chain [17].



42%

Environmental claims eligible for a greenwashing audit by the European Commission



40%

Companies within the food industry reporting to CDP with insufficient, opaque, or no information on climate performance



5%

Companies within the food industry reporting to CDP with the maturity to implement and iterate on a climate performance strategy



On your mark

Welcome to the race to net-zero

In the past decade when the action margins were more forgiving, fleeing was the dominant crisis response: problem-aware organizations with good intentions pouring resources into commitments and greenwashing. In fact, the European Commission screened tens of company websites for greenwashing claims and found 42% of the claims to be eligible for a greenwashing audit; the claims were either too vague or unsubstantiated giving the European Commission reasons to question their accuracy or intentions [18]. Today, with regulatory bodies already screening for substantiation, a thinner action margin and a market far more mature than the food industry, the fight response is do or die.

But the fight response is easier pledged than done. Out of the 781 organizations within the food system reporting to Carbon Disclosure Project (CDP), 40% have either failed to provide sufficient information on climate performance or are not transparent with their level of governance

A mere 5% of the reporting companies have reached the maturity level to implement and iterate on their climate strategy. The high participation rate and the lack of tangible, strategic work with emissions reduction confirm our conclusion. The will is there; the way is not.

The Climate Performance Roadmap serves to show the way and answer to the question “*What is your plan?*”. It was articulated in 2022 to provide food industry executives with milestones, solutions, and effective actions to assess and advance the climate performance of their business. This Model puts food industry executives on the driver’s seat of managing the change towards a decarbonized economy. As the phrase implies, performance is a **process** of improvement towards an end goal and improving climate performance is no different. For this, the maximum benefit of the Climate Performance Roadmap spurs from frequent consultation, especially in times of growing pains.

An aerial view of several runners on a red track, with their shadows cast long and dark on the surface. The runners are in various stages of their stride, and the track has white lane markings with arrows pointing to the right.

Go!

The constants of the climate performance model

The training unfolds along eight dynamic, independent Tracks working in conjunction.

-  **Track #1** Climate performance as part of the corporate strategy
-  **Track #2** Climate performance data model and management
-  **Track #3** Climate Performance as a supply chain strategy
-  **Track #4** Climate data collection in the supply chain mapping
-  **Track #5** Customer and Stakeholder Engagement on Climate Performance
-  **Track #6** Climate Compensation/offsetting

Two additional Tracks support the maturity in each of the six main tracks.

-  **Track #7** Climate Intelligence Digital & Infrastructural Enablers
-  **Track #8** Intraorganizational empowerment

In each Track, the four levels of climate performance maturity are based on how engagement develops.

Problem aware

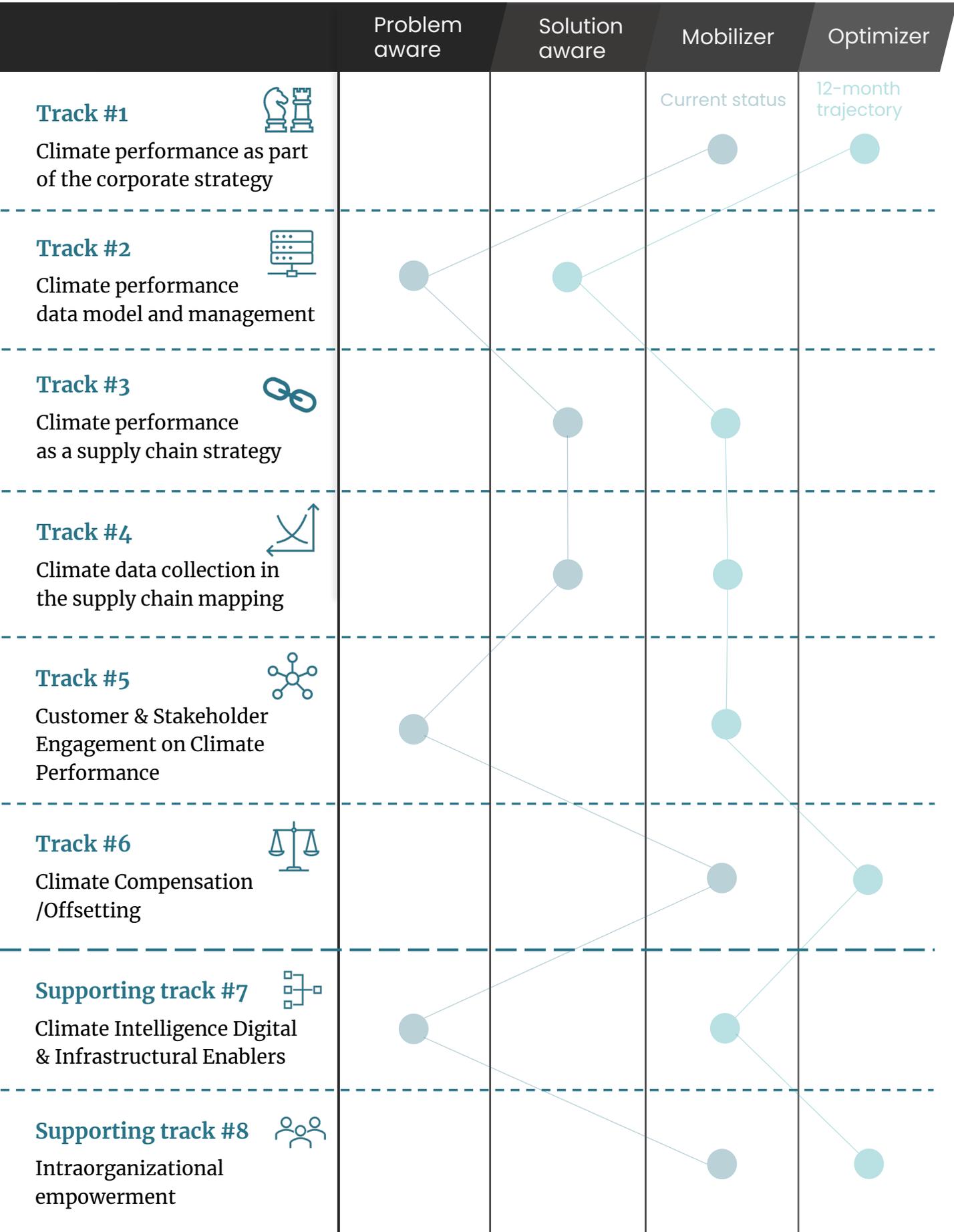
Solution aware

Mobilizers

Optimizers

Self-assessment

Executives in control of the eight Tracks can survey their current state and 12 month plan in each track and identify their development level at the sound of the starter pistol. This assessment pinpoints the organization's first gear and immediate first step.

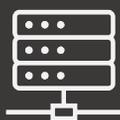


1



Climate performance as part of the corporate strategy

2



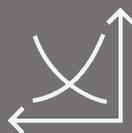
Climate performance data model and management

3



Climate performance as a supply chain strategy

4



Climate data collection in the supply chain mapping

5



Customer & Stakeholder engagement on climate performance

6



Climate compensation / Offsetting

Problem aware

Solution aware

Mobilizers

Optimizers

7



Supporting track

Climate Intelligence Digital & Infrastructural Enablers

8



Supporting track

Intraorganizational empowerment



Climate performance as part of the corporate strategy

This Track outlines the definition of successful implementation of a climate performance strategy; how the organization will work strategically with climate change, emission reductions and a changing policy landscape. The organization needs to decide how seriously to take this and to what extent its internal and external stakeholders are held accountable on climate transparency and climate performance.

In his book *Good Strategy, Bad Strategy*, Richard Rumelt outlines: “A good strategy is a specific and coherent response to overcoming the obstacles to progress. A good strategy works by harnessing and applying power where it will have the greatest effect” [19]. Rumelt counts 3 elements in a good strategy: A diagnosis that simplifies the complexity of the issue, a guiding policy chosen to overcome the obstacles, and a set of coherent actions designed to carry out the guiding policy.

Organizations that want to gain top fitness on this Track, need to diagnose the problem correctly and establish an emissions baseline; choose their guiding policy and set quantified emissions reduction goals; and break it down into a roadmap a) what can be acted upon b) that has the largest effect and c) can be financially supported.

The development levels here ultimately reflect advancement along the roadmap: The interplay among the baseline measurement, the ambition of the goals and the relevant decisions to get there. Are the middle managers held accountable in performance reviews? Are suppliers pressured for transparency? Are suppliers discontinued for non-compliance?

Why is it important?

A proactive strategy definition is imperative in order to minimize costs, articulate the relevant trade-offs and set guidance for employees. While the inclination of most is reactivity, the ROI of a proactive strategy is much larger. Best exemplified relatively recently by predictive maintenance software, strategic maintenance insights have proven to increase production line availability by 5 to 15% and reduce maintenance costs by 18 to 25% [20].

Executives need to define whether climate change is a business opportunity to proactively leverage, a business risk to mitigate, or a nuisance to act minimally on. The level of ambition, engagement and the subsequent quantitative goals are necessary to define the success criteria and the roadmap.

Track #1

Climate performance as part of the corporate strategy



Problem aware

Problem-aware organizations venture initial attempts at setting emissions reduction goals without baseline insights or consistency or an applicable roadmap. Actions are scattered and the starting point is yet unclear but are gradually realizing that the emissions of the organization are more than office light and electricity or employee travels, but about the products and their supply chains.

Solution aware

The solution-aware focus on learning their climate performance baseline and increasingly on integrating it into core business: products and supply chains. They start internal reporting on performance, but without systematic accountability on organizational functions. Decision-makers realize that the problem needs a systematic approach and a roadmap. R&D initiates experimental product development with climate performance factored in.

Mobilizers

Mobilizers track climate performance as KPIs and cascade to key functions and levels. A roadmap for climate strategy is in place, including steps for additional data collection and a realistic timeline for reductions. A set of improvement initiatives are identified, prioritized and activated through a holistic action plan with a clear governance. Quantitative goals are formulated to lower emissions on an annual comparative basis. R&D have specific targets to exclusively develop new products excelling in climate performance. Low-volume products without a decarbonization plan are discontinued.

Optimizers

Climate Performance KPIs are tracked throughout the organization and all business functions are held accountable similarly to financial KPIs. The climate performance roadmap is of equal strategic importance to the financial budget. Quantitative reductions goals are formulated on a quarterly comparative basis. Climate performance and emission reduction plans are core parts of the value proposition in all stakeholder communication. They actively lobby for stricter climate regulation on the markets they operate as a way of strengthening their competitive advantage. All products for which R&D or Procurement cannot find a decarbonisation strategy are discontinued.

Who's holding the baton?

Initially it is owned by sustainability or marketing. As the organization matures, it moves to the CFO or the CEO, or a CCPO (Chief Climate Performance Officer) and becomes a core agenda item of every executive committee and board meeting.



Climate performance data model and management

This Track refers to how the organization processes and analyzes the collected data into insights. Choices made here overflow in two other tracks: Which organization and supply chain management strategies are possible to implement, as well as whether data driven visibility on how actions are impacting a company's journey towards net zero.

Why is it important?

Data is like garbage: You'd better know what you are going to do with it before you collect it. When Mark Twain phrased this quote, climate change was not an issue. Nevertheless, the essence is relevant: collecting data without a strategy is just hoarding numbers. A systematic approach is critical in assessing climate performance at scale and precedes data collection. Data-driven organizations know this very well but they also leverage its value, as they experience over 30% annual growth [21].

The science for calculating climate performance is mature and known, but the processes for collecting the large quantities of data needed for the calculations are in their infancy. Assessing the climate footprint of a single crop at farm gate requires about 45 parameters, of which a farmer knows 10 at best. chain strategy. For a refined product at the store

shelf the number of parameters is in the hundreds to thousands. On top of this, the assessment can be done in many different ways. This cripples the ability to compare products and suppliers with a shared frame of reference and requires complete insight into production processes that the suppliers may not want to disclose.

Defining the playing field of climate performance and the choice of calculation platform will influence what types of insights can be accessed and what reduction initiatives can take place. Reliance on expert consultants is costly, provides only static results, little insights, and renders performance tracking impossible. It ultimately hinders the organization from maturing into two strategic Tracks: Climate performance as part of the corporate strategy and Climate Performance as a supply chain strategy.

Climate performance data model and management



Problem aware

Top-down, company-wide, annual assessment of Scope 1 & 2 (supply chain ignored) and/or occasional product-specific full scope manual Life Cycle Assessments (LCA) without structured updates. The organization uses inconsistent data sources (dubious benchmarks, different system boundaries of LCAs). Some data is readily available but spread out over multiple spreadsheets, departments, and organizations. No overview of which production data is relevant or important for climate performance.

Solution aware

Key parts of portfolio primary data are calculated and reviewed annually. Assessments are performed in a structured manner on a dedicated platform, continuously updated with version tracking. Company-wide assessments include rudimentary Scope 3 (supply chain) emissions. There is an increasing level of automation, yet the organization is still relying on some manual reconciliation

Mobilizers

The organization expands to full portfolio climate footprints with primary data (bottom up). There is consolidation between company-wide, top-down, and product assessments. The data model is reviewed at least quarterly on a dedicated intelligence platform that caters to all relevant functions within the organization: Sustainability, R&D, Procurement, Marketing, Finance & operations. Data definition and ownership are perfectly defined within and with the company's ecosystem. Structures for internal auditability are implemented and prepared for external auditability.

Optimizers

Gaps are filled automatically between top down and bottom up. Optimizers have digitally transformed their entire operations with climate performance as a central, continuously tracked KPI along the entire operation and supply chain. Internal audits are performed regularly to proactively ensure there are no material weaknesses.

Who's holding the baton?

At the first stages, it is initiated by Sustainability or CSR. Moves towards COO and CFO as the organization matures.



Climate Performance as a supply chain strategy

This Track refers to the ways an organization accounts for the climate performance of the entire supply chain. Evaluating whether to include the supply chain in the strategy or not has large implications on the choices of tools, tactics, and pathways in the climate roadmap.

Why is it important?

For fast-moving consumer goods and particularly food, 80%-95% of the emissions happen early in the supply chain. Transparency on climate performance and any actions on emissions reduction must involve the supply chain. It presently does not: A recent analysis of 25 major multinational corporations and their net-zero targets as pledged in Science-Based Targets initiative, the corporate climate target commitment scheme, showed that only 3 of the organizations committed to a 90% decarbonization of the value chain. The collective target of all 25 companies accounts for less than 20% of their total climate footprint in all Scopes [22].

At the moment, a lot of food organizations focus their supply chain efforts on packaging and transportation. However, these

areas account for less than 10% of the footprint in most products. These emissions also matter, but without strategic work and tools these actions are inefficient and have minimal ROI: Vast resources are spent in optimizing details and the largest portion of the emissions is still on the sideline. The amount of innovation and strategic work necessary to mitigate the bulk of emissions, ingredients and feedstocks, is usually much larger and any changes in these domains have a bigger impact on carving the business strategies.

To act on the majority of the emissions effectively and efficiently, the organization needs to define a clear strategy to collect, manage and exchange supply chain data, set requirements, and delegate accountability regarding climate performance.

Climate performance as a supply chain strategy



Problem aware

Systematic data collection from suppliers is mostly ignored or represented with inconsistent data sources. There are sporadic attempts at data collection via questionnaires or email and little to no follow-up for non-compliance. Self-reported performance data is taken at face value with no systematic alignment of calculations or scope.

Solution aware

Supply chains are increasingly modeled for product-specific and company-wide assessments, based on representative data and structured alignment of calculations via a shared platform or third party. Selected key suppliers are involved in the assessments and a review of their performance data.

Mobilizers

Data collection is consistent and demands on climate transparency are reviewed annually at minimum. Suppliers take ownership of their data collection and assessment according to consistent calculation methods, using a dedicated platform and live data. The majority of supply chain parts are consistently mapped several tiers deep, all the way to agriculture or resource extraction. Proactive risk and opportunity exploration include calculations, scenarios, and sandboxing for what-if modeling. Top list of actions to reduce climate impact are in place.

Optimizers

The entire supply chain lives on a digital twin. Data collection from the supply chain is automatic and occurs in real-time and with high quality. The organization improves continuously and incorporates machine learning proposals and insights. Supplier data is randomly and proactively audited for consistency, quality, and compliance. Data relevant to climate performance is automatically cross-checked with other systems.

Who's holding the baton?

In the initial levels of maturity, the process is owned by Sustainability or CSR with help by procurement and product developers. As the organization matures, it is progressively moving to the COO.

Track #4



Climate data collection in the supply chain mapping

This Track determines how climate performance data from the supply chain is collected and assessed.

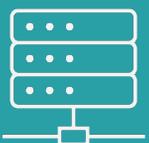
Why is it important?

If it is not measured, it cannot be managed. Systematic and cohesive data collection is necessary to make data-driven decisions along the supply chain. If data collection is incohesive, the results from different climate performance assessments can differ by more than 30% depending on details in the assessment. Data deriving from these assessments is unusable and can provide no insights for decision making or action points. For informed and effective procurement decisions, a consistent and equitable strategy is key.

Supply chains can be long, multilayered and ever-expansive with thousands of agents involved, each with large amounts of information relevant for climate performance. The choice of tools for mapping and understanding the supply chain determines the

degree to which suppliers can be held accountable and their ability to live up to targets.

Moreover, the climate performance orchestration issue is prominent in the food industry. At present, there is no agreement on system boundaries that are fair and applicable to all categories, resulting in unusable, incomparable climate performance data. Competitors and actors along the supply chain are unlikely to trust each other unless they have a shared view of a single source of truth for climate performance data. Business decisions will only be as wise as the data they are based on. Poor data management results in slow update cycles that impair performance and decision making. As a result of this costly process, the organization misses important business opportunities.



The results from different climate performance assessments can differ by **more than 30%** depending on details in the assessment.

Track #4

Climate data collection in the supply chain mapping



Problem aware

Inconsistent or no action in the supply chain and without accountability. The problem aware may request their suppliers to join pledge or disclosure schemes e.g., Science Based Targets initiative, but there are no attempts to understand the emissions, benchmark suppliers against each other nor audit internally or externally.

Solution aware

The organization accepts the need to map out their supply chain and establish its baseline to make progress. There is demand for climate transparency with consistent frameworks and/or a platform for selected key suppliers. Top-tier suppliers are reviewed for climate performance yearly. Continuous and systematic action and reduction plans are still undefined or at the cradle.

Mobilizers

Mobilizers track production and supplier data on climate performance in one dedicated climate intelligence tool. Climate transparency and performance is a procurement requirement, tracked quarterly. An auditing mechanism, remedies, action plans and best practices are systematically in place. Peer-based benchmarks are often leveraged to assess performance. An extended set of suppliers is in yearly/quarterly climate performance review. The organization offers incentives for suppliers with a proven track record and mitigation plans. Suppliers are expected to systematically map their suppliers. Non-compliant suppliers are discontinued. Manual data collection and performance review is an exception.

Optimizers

Procurement processes include quantitative targets on performance and regular communication to guide suppliers. Climate transparency and performance are weighed equally to price and quality in procurement decisions. Existing suppliers need to show credible roadmaps for emission reductions in line with the procuring corporation's climate roadmap or they are proactively replaced by other suppliers that can. Auditing is continuous, automated, and digitalized. Remedy actions are informed by automatic peer-based benchmarks on a neural network structure to automatically assess areas of underperformance and automatically derive next best remedy plans.

Who's holding the baton?

At early stages, this is often initiated by sustainability. As the organization matures, it moves towards Procurement, COO and CFO.



Customer & Stakeholder Engagement on Climate Performance

This Track outlines how companies use the results of their climate performance assessments in their financial bookkeeping, go-to-market strategies, brand identity, and customer communications. Does the organization see climate change as a compliance parameter or a way of differentiating against competitors?

A company can only be part of the solution to climate change for as long as they stay in business. The larger its operations are, the larger its potential for positive impact. Customers drive business for every level of the supply chain: When a consumer facing product gains market, the ingredient supplier does as well.

There is a large business opportunity in proactively working with climate transparency and performance. 80% of end consumers are actively looking for sustainable products when they do their grocery shopping [5]. By catering to them through climate labels and climate performance visibility along the supply chain, a food brand incorporates climate performance into its core business as a differentiator and claims market shares from competitors.

Nevertheless, not all environmental labels and claims are created equal.

Why is it important?

More and more nations are developing guidelines and requirements for what an environmental claim must and must not disclose, to avoid misleading consumers. In the US, the UK and Australia, a vague, qualitative environmental claim without substantiation is a likely track to the courthouse [22, 23, 24]. The advertising authorities in mature markets are crystallizing their guidelines towards specific, measurable, traceable claims. This aspect of traceability in claim guidelines makes audit trails mandatory for compliance.

From an ingredient or logistics supplier all the way to the farmers, suppliers can also differentiate themselves against competition by being transparent on their climate performance and engaging their customers, who in turn can score better on transparency and performance by doing business with them.

Track #5

Customer & Stakeholder Engagement on Climate Performance



Problem aware

The organization makes statements without proper assessments. Climate performance is bundled with other sustainability issues like water scarcity, biodiversity, etc. The organization can still make unsubstantiated, vague, or qualitative claims with a focus on arbitrary aspects, such as packaging, transportation, energy sources without keeping track of the proportions. Offsetting is frequently used for net-zero or carbon negative claims. Claims are simplifications with indices for good or bad or traffic light systems for on-package labels. Auditability for claims is limited or non-existent.

Solution aware

Quantitative climate performance labels on packaging with third-party validation and limited auditability on parts of the portfolio. Suppliers in B2B sales include climate performance reports in procurement bids to differentiate themselves. The focus is on transparency and accuracy with substantiated claims.

Mobilizers

Labels of climate performance and documentation disclose the portfolio-wide climate footprint and supply chain performance; ambitions and initiatives are shared. Mobilizers are rallying customers into voting with their wallets for climate transparency. Data for all claims is auditable with version tracking for historic development over time.

Optimizers

The organization actively lobbies for climate transparency and emission reduction legislation and makes public, quantitative reduction pledges. Optimizers strategically advance and enrich the mainstream narrative, intentionally aiming to be perceived as world class in climate communication. Every product is labeled with a specific climate performance indicator linked to a live web-report with complete supply-chain transparency. Audit trails and time series for climate performance are publicly available for every product. Automatic extraction and disclosure of reports with data and action plans for historic and future climate performance improvements are available for all relevant stakeholders.

Who's holding the baton?

Initially owned by Sustainability and championed by the Marketing department or management, progressively move to the CMO, CEO, CFO



Climate Compensation /Offsetting

Climate compensation or offsetting strategy is applicable when the organization decides to employ a third party to cover for actions not taken by the organization itself. Either as greenwashing because the organization has not yet managed to align on a strategy for emission reductions or as a last step when the technology or measures for unavoidable emissions, when further reductions are not yet existing or too costly to justify.

Why is it important?

Climate compensation will play an important role in climate change mitigation to reduce CO₂ levels in the atmosphere in two instances: 1) When the emissions have ceased, and 2) to cover for emissions that are difficult, extremely expensive or even impossible to completely mitigate, such as nitrous oxide from agriculture. However, the market is awash with offsetting offers that are purely fraudulent, or well-meant but unable to keep their promises. Many are nothing more than creative bookkeeping. Others are serious and scientifically solid but tend to be more expensive by orders of magnitude and not commercially feasible for everyone in the near future.

As outlined in the Crisis response section, a common initial reaction for a company realizing that their operations are contributing to climate change is to look for easy ways out, to flee. In this state, handily accessible offsetting projects look attractive. Unfortunately, they tend to only distract and delay real action, which is a disservice to organizations purchasing them as they expend the time to act on real emission reductions.



Problem aware

Organizations at this stage act on questionable, company-level emission data and offset with cheap projects such as afforestation before they actually reduce emissions in production or supply chain.

Solution aware

The organization is progressively redirecting offsetting budgets towards internal initiatives in supply chain transparency and data-driven analysis.

Mobilizers

Offsetting budgets are allocated to supply-chain reductions. Offsetting is no longer done in cheap questionable projects, as focus is on the root cause of the emissions, their associated scope and remedy plans clearly documented. Pilot-scale offsetting projects are initiated with offsetting measures proven to be effective, such as direct air capture. Reporting of emissions and offsetting is kept separate.

Optimizers

The organization employs offsetting measures proven to be effective, such as direct air capture on a larger scale. These measures are utilized to compensate for expensive or presently impossible to mitigate supply-chain emissions. Offsetting is done for emissions where ROCPI (Return On Climate Performance Investment) is low but is expected to increase in the future as new technology develops, to bridge the development phase.



Who's holding the baton?

Initially owned by marketing or CSR, progressively moves towards the CFO.



Climate Intelligence Digital & Infrastructural Enablers

This supporting Track refers to the organization's digital capabilities to access and share relevant data across its ecosystem and to digitally support the associated underlying data model. It is thus about answering questions like: Where is the data? Who owns the data and can access it? How structured is the data collection and processing? Is there a single source of truth for data, or do different versions exist? Does the solution perform at the desired speed?

Why is it important?

Running the Net-Zero race requires managing a significant amount of data, that is spread within and outside the company boundaries, and fuels complex calculations and processing rules. To be clear, data encompasses both **raw data**, e.g. a crop parameter, as well as a **meta data**, e.g. supply chain modeling information or a set of ingredients for a recipe. This means that digital capabilities are critical for success: shadow IT is not an option.

Typical internal and external data sources leveraged in such a process are Enterprise Resource Planning (ERPs), Product Information Management (PIM) or Food Management Systems (FMS) - that are increasingly consolidated into data lakes as part of companies' digitalization processes.

As climate performance and transparency climbs up in strategic relevance for the organizations, companies need to ensure that all climate performance management is based on the best available information at any point in time. In reverse, any activity for climate performance improvement needs to be evaluated for ROI on other strategic dimensions, not the least cost. Finally, companies also need to ensure that this process can be done in a secure and timely manner – regardless of the volume of information processed.

Track #7

Climate Intelligence Digital & Infrastructural Enablers



Problem aware

Climate calculations are performed independently from production system data and are often based on old data. The overall climate performance process, from collection to calculation often relies massively on ad-hoc systems – typically error-prone spreadsheets. This generates significant risks in terms of data consistency and security.

Solution aware

An internal single source of truth is in place but not consolidated with ERP systems yet. Excerpts from or exports to ERP systems or data lakes is performed manually and intermittently. The overall climate performance process, from collection to calculation can still rely on typically error-prone spreadsheets, but can also stretch existing tools that are not “fit-for-purpose” (e.g. BI, Budget Planning, Statutory Consolidation). All of these lead to inefficiencies and limited evolutivity.

Mobilizers

The company is employing a dedicated, fit-for-purpose Climate Intelligence Platform. Any relevant source systems are assessed for relevance and integrated into it. State-of-the-art integration capabilities, ideally leveraging orchestrated APIs, are leveraged within and with the company’s ecosystem. A singular integrated single source of truth for climate relevant data for all functions within the company is in place.

Optimizers

Beyond leveraging a fit-for-purpose, fully integrated Climate Intelligence Platform, the company employs highly advanced, real-time, food-specific digital capabilities. Sensor-based data is leveraged, while real-time external data is cross-checked with logistics systems, real-time energy metering, etc. In short, there is an integrated “live digital twin” of the operation regarding climate-relevant data, integrated between supply chain and internal operations. The digital twin serves as a foundation for faster and better insight-to-action loop.

Who’s holding the baton?

Initially, data orchestration is co-owned by a sustainability IT champion alongside a sustainability leader, and gradually moves to the CIO.

Supporting Track #8



Intraorganizational empowerment

This supporting Track delineates the degree to which employees are aligned with a shared vision of the organization and to what degree they are empowered to perform the necessary actions to get there.



Disengaged employees are 18% less productive and 15% less profitable

Why is it important?

Organizations are the people working in them. No goal will be taken seriously and no action will be taken unless the employees understand the what and the why, and they are empowered to act on it. Employee engagement increases effective decision-making. On the flipside, disengaged employees put organizations on

a certain path to a failed strategy, as they are 18% less productive and 15% less profitable [26]. Miss engaging your employees in your climate strategy and it is destined to be equally less effective and profitable.



Intraorganizational empowerment

Problem aware

Senior management is aware, but at very different levels of understanding and with expected legal requirements in focus. Climate performance is primarily viewed as an issue for Sustainability, maybe Marketing and any initiatives are driven by early, internal champions. Climate performance is not deemed relevant for core business decisions.

Solution aware

Senior management has decided to make climate transparency part of core business. Feasibility tests and pilot projects are launched. Decision makers are primarily waiting for the dust to settle, and what emerges as standard. Sustainability and Marketing managers are the primary drivers, but early positive results drive multiple departments to engage at varying levels of awareness.

Mobilizers

Most departments and managers are empowered, aware, and can articulate climate performance goals. Climate performance is incentivized within key functions. The majority of employees receives an introductory training in climate performance.

Optimizers

All managers and employees can articulate climate performance goals and their importance. Climate strategy is part of employee onboarding and continuous training and is deemed on par with financial performance. Climate performance is incentivized in most if not all employees and heavily in executives.

Who's holding the baton?

Initially owned by Sustainability, CSR or marketing and progressively moves to the COO and CFO.

Conclusion

The food industry is at the set position of the most critical race since industrialization. Executives are willing and ready to mobilize but are too often nowadays tangled in action paralysis or convinced to sprint a marathon.

This Climate Performance Roadmap was articulated to ensure that every food executive crosses the finish line of the race to net zero without losing track, stamina, or supporters along the way. The model derives from years of expertise in climate science, behavioral economics, and digital transformation, thousands of insightful data points and countless interactions applying this expertise, iterating its application, testing and confirming the best practices around corporate climate performance for food.

Much like any instance of transformation, racing to net-zero is ultimately change management. What decision makers need to succeed is a roadmap, a tool to walk the roadmap, ownership, and of course, continuous iteration. As any seasoned executive already knows, change is effectively managed when leaders know when and how to steer to drive the desired effect.

As any leader knows, success is an orchestrated team effort achieved by dedicated champions and morale late bloomers alike.

As any athlete of any level knows, race fitness is not achieved in a once in a lifetime sprint but through iterative training and day-by-day breakthroughs and improvement.

It just happens that this particular transformation change is unlike any other – It is the race of the century and the food industry is in a central position to place the entire humanity on top of the podium. By sharing this roadmap, as well as open source data, we intended to demonstrate our team's passion and commitment to find solutions for the Food Industry's race to Net-Zero.

What is unfortunate is that the food industry is left to its own devices to manage change on an immensely complex issue – and manage it fast. The good news is that it is perfectly manageable as long as it is effectively mapped and measured. The better news is that there are platforms that can act as a digital catalyst.

This is where we are convinced CarbonCloud has a role to play. CarbonCloud's climate intelligence platform is the solution where we put our knowledge and skills to create the supporting digital capabilities to unite every part of the food industry. We'd be glad to show you how it accelerates your journey towards our common mission.



The Climate Intelligence Platform

Contact: hello@carboncloud.com

Visit: carboncloud.com

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July 2022

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