

Scenario Analysis
May 2023



SINAI

Getting From 'Business as Usual' to 1.5°C-Aligned

Basic scenario analyses to inform corporate decarbonization strategy



Table of Contents

About	1
I. Introduction	3
II. ‘Business as Usual’ Scenario	5
III. Mitigation Pathways	7
IV. Company Target Pathway	11
V. 1.5°C–Aligned Pathway	13
Summary	14
Glossary	15

SINAI is a San-Francisco-based technology company focused on automating how companies monitor, price, analyze risk and reduce carbon emissions worldwide

Our Mission

Our mission is to provide organizations the technology necessary to build deep decarbonization strategies.

Our tools engage organizations to automate carbon analysis and reporting for their entire operation, transforming the way they interact with their business, value chain, & the environment.

Our Values

Mindful



We lead with the heart, we praise ethics, peace, integrity, honesty, friendship, positivism, optimism, intuition and humility.

Community Builder



We love and respect our community's boundaries. We're open-minded but also protective of a safe space to share and be ourselves. We love breakfast and we know a good zoom background when we see it :)

Proactive



We're driven, we take ownership, we default to action and don't wait for others to take the lead. We move forward and make progress, we're curious and engaged.

Scientific & Data-Driven



We take action based on facts, with a balance of intuitive approaches. We love to learn, ask questions, grow from new information, and educate ourselves in curious and constructive ways.

Inclusive



We're a diverse team of people, with all genders, colors, ages, backgrounds and interests. We're empathetic not only to all humans, but to all living beings. We listen and we learn from others.

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I. Introduction

Climate commitments by organizations and government entities have never been so ambitious. Net-zero targets have proliferated as the standard among public companies, economy-wide.

Ambitious targets call for ambitious action.

Decarbonization has become a strategic necessity for any organizations long term financial success. Companies will approach these commitments in a variety of ways:

- ◆ Renewable power purchases
- ◆ Switching business models
- ◆ Adapting existing processes, etc.

And while it is possible to make good on an ambitious commitment without offsets, inevitably, many will turn to carbon offsets to contribute to reaching emissions targets, where emissions couldn't be eliminated through efficiencies, fuel-switching, and new technologies.

Figure 1 — 4 Basic Scenarios for Organizations to Evaluate



In this report, we will cover SINAI-recommended scenario analyses for decarbonization planning, reporting, and execution of a decarbonization strategy. In the process, we will highlight the available tools and practices for building the identified scenarios. Scenario analysis is a useful strategic tool for businesses and governments to understand the implications of different climate futures.

The goal of this report is to help unfold what the journey to building transition strategies, and the inputs necessary to do so, can look like. The recommended scenarios in this report have helped SINAI’s clients to identify the optimal and unique strategies that have positioned their transition to a low-carbon economy.

Term	Definition
Decarbonization	Removing the carbon from the process chain, and avoiding the combustion of fossil fuels to reduce the emissions of carbon dioxide to the atmosphere.
Low-carbon economy	Low-fossil-fuel economy, or decarbonized economy is an economy based on low-carbon power sources that therefore has a minimal output of greenhouse gas emissions into the atmosphere, specifically carbon dioxide.
Scenario	A scenario describes a hypothetical future and the path leading to that future. These futures are storylines created to identify hidden risks and opportunities, test the impact of potential outcomes, and develop strategies that build resiliency and frame decision-making (source: SBTi).
Offsets	A carbon offset is the reduction or removal of GHG emissions in order to compensate for GHG emissions emitted elsewhere.

II. 'Business as Usual' Scenario

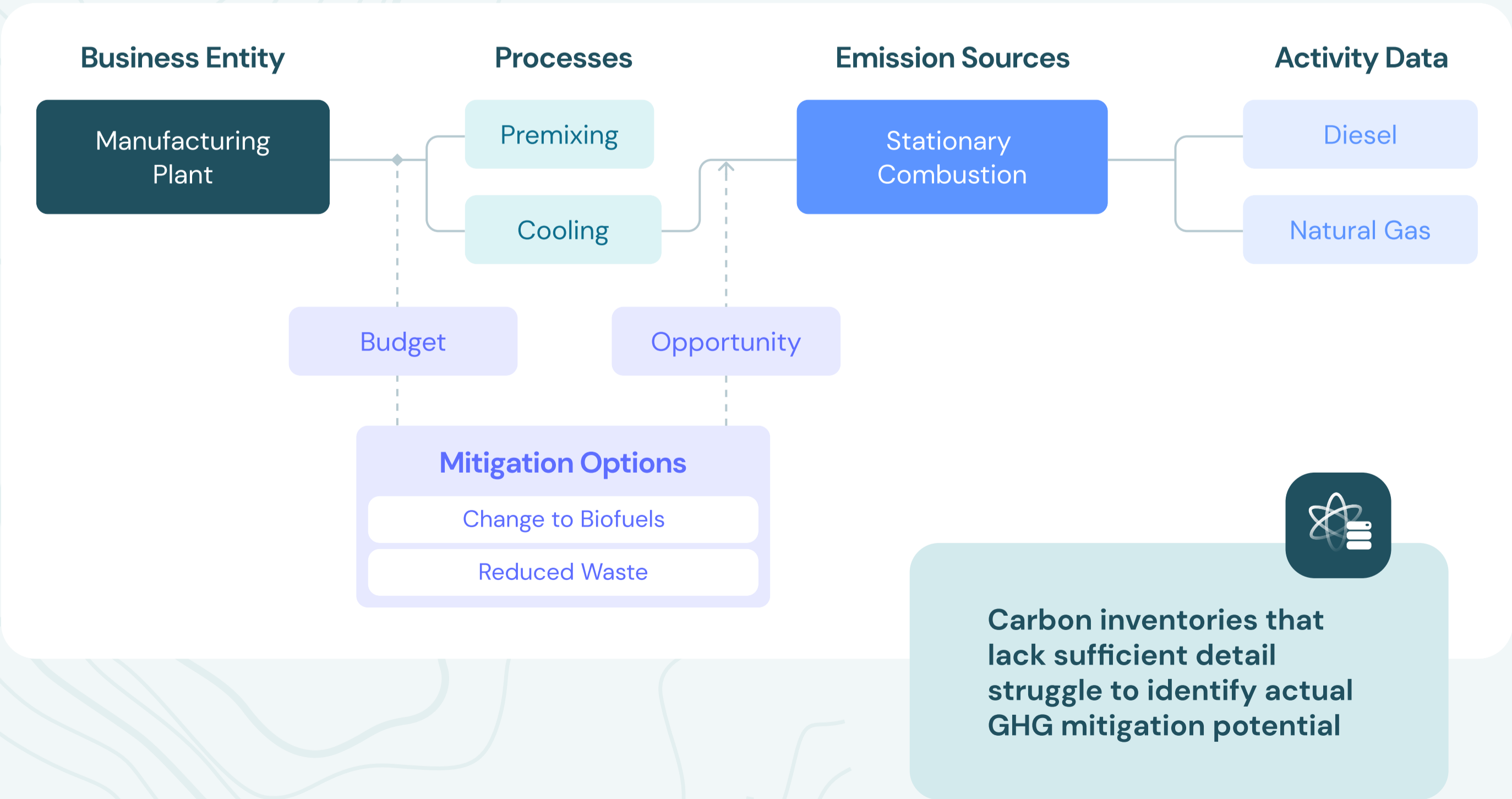
Just as companies take stock of other types of resources or supplies, it is important for organizations to assess their carbon budget in order to understand which areas of business activities have the greatest opportunities for impact.

Tracking emissions over multiple years not only enables an organization to have a better understanding of its recent historical GHG emissions trends but also enables an organization to grasp the business trajectory and associated potential future emissions. A GHG emissions inventory concept of direct and indirect emissions, also known as Scope 1, Scope 2, and Scope 3 emissions was introduced by GHG Protocol to ensure that two organizations will not account for GHG emissions under the same scope, preventing double-counting.

Building a detailed emissions inventory containing primary data is key to building an effective baseline scenario and to decarbonization efforts down the road.

Primary data usually refers to the raw data from an organization and secondary data refers to benchmarks or estimation that is not from specific activities within a company's activities. Such a GHG inventory provides management with the ability to understand GHG emissions across different business units and make data-informed decisions, for example, by having specific fuel type information according to projected business growth, or understanding how carbon-intensive specific regions' electric grids are going to behave in the future where the company operates.

Figure 2 — Enabling mitigation opportunity identification through detailed emissions scoping



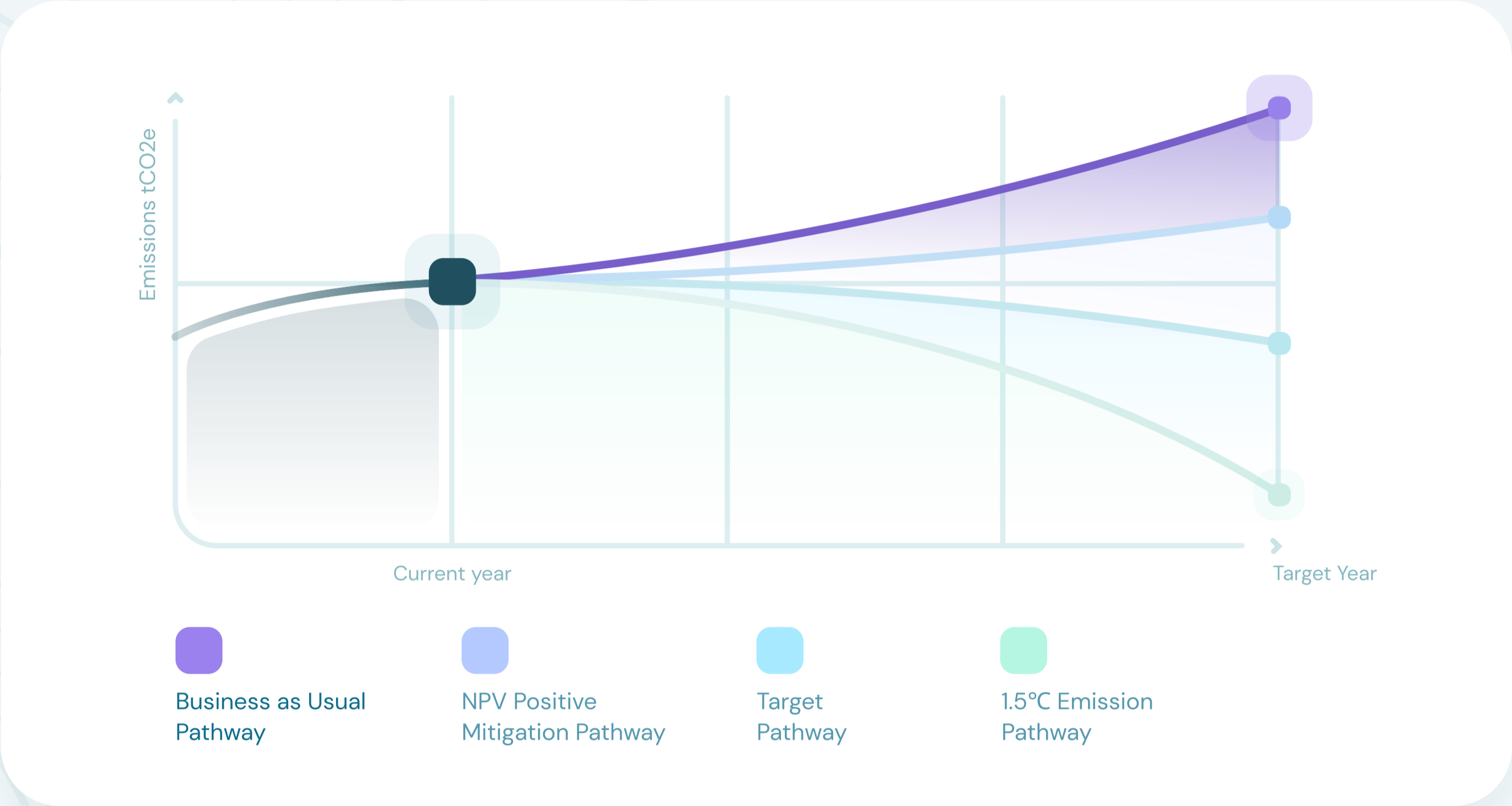
The “Business as usual” scenario, or “emissions baseline” projects GHG emissions based on the assumption that only the current projects or policies are implemented whatsoever.

This established historical benchmark and the associated forward-looking scenario will be used to evaluate the success of subsequent efforts to reduce emissions using a base year as a reference. The base year is the period a company use to track emission performance and set up targets. Without the knowledge of baseline emissions, it is impossible to reliably judge the success of any decarbonization efforts.

When weighed against a company target, establishing the base-line scenario will allow your organization to start answering a key question in evaluating climate and transition risks, in particular:

“How much will it cost to maintain business as usual.”

Figure 3 — ‘Business as Usual’ Scenario



Term	Definition
Business as Usual' Scenario (aka Baseline, Baseline Scenario)	The 'Business as Usual' Scenario refers to the benchmark of carbon emissions from business activities. This is typically a one (or more) year(s') snapshot that serves as a reference point for organizations to understand and track their changing emissions over time.
Emissions inventory	An emissions inventory is an important tool for identifying the source of pollutants and quantitative expression of pollution load in a defined area at a particular time.

III. Mitigation Pathways

‘NPV Positive Mitigation’ Pathway scenario analysis is a way to explore potential financial and environmental impact of mitigation and adaptation opportunities. What is the abatement potential of switching to hydrogen fuel, for example? How close will switching to this fuel get you to your emissions reductions targets? How much will this cost?

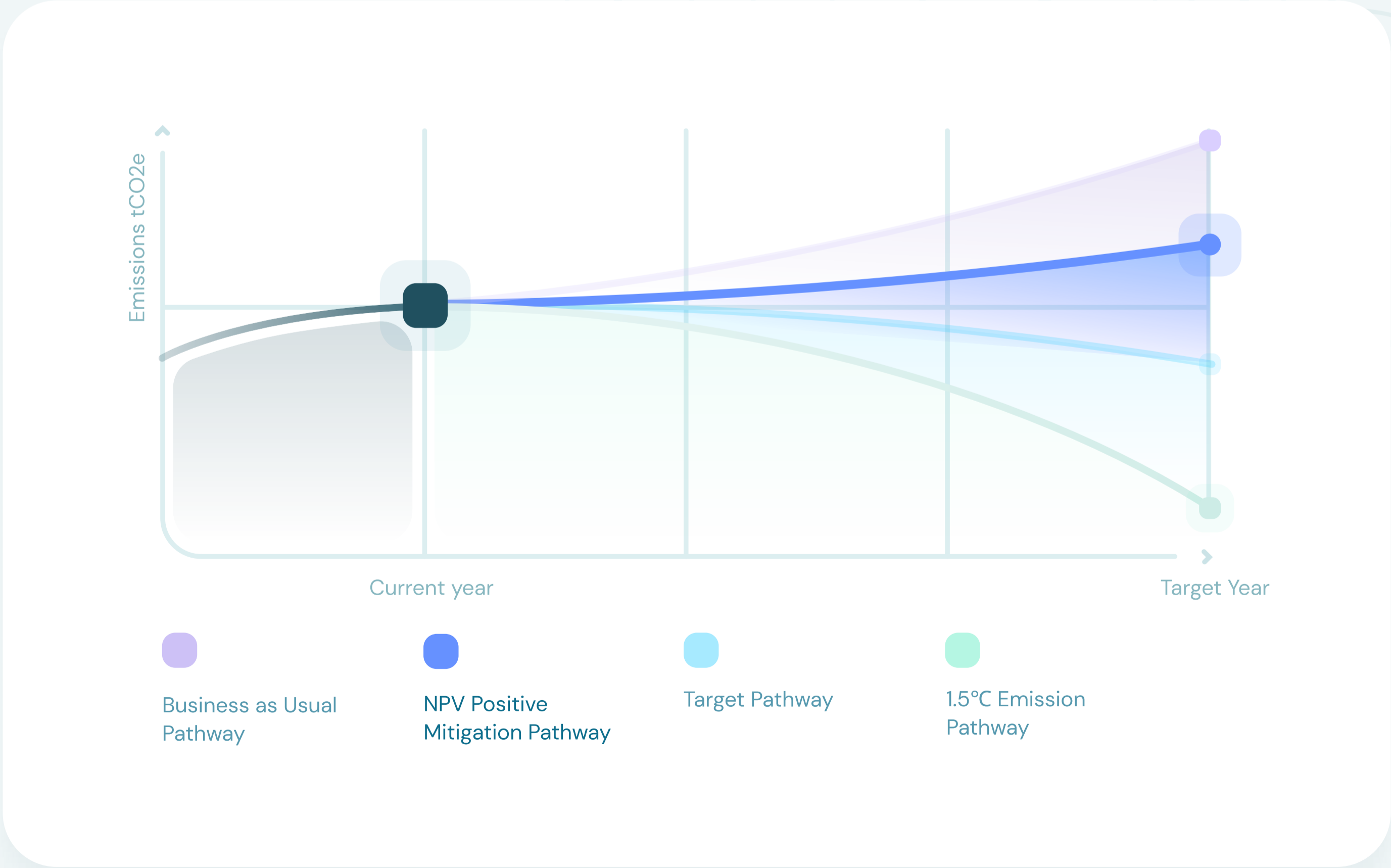
Building ‘low-carbon’ scenarios will help you understand how close available opportunities will get your organization to it’s emissions targets.

One of the most effective tools to understand the answer to these questions and weigh decarbonization opportunities side by side is a ‘Marginal Abatement Cost Curve.’

MAC curves can help an organization understand its internal emissions abatement potential. For companies that have yet to set an ambitious public goal, a MAC curve provides a high-level understanding of where abatement opportunities exist in their operations and their net impact. Marginal Abatement or Levelized Cost Curves incorporate financial data around the short and long-term implications of abatement projects, in addition to emissions abatement potential – meaning you can understand:

- 01 What does your organization’s abatement portfolio look like?
- 02 What are the costs of implementing the abatement options in this portfolio?
- 03 How close would these abatement opportunities bring your organization to its reduction target?

Figure 4 — NPV positive Mitigation Pathway





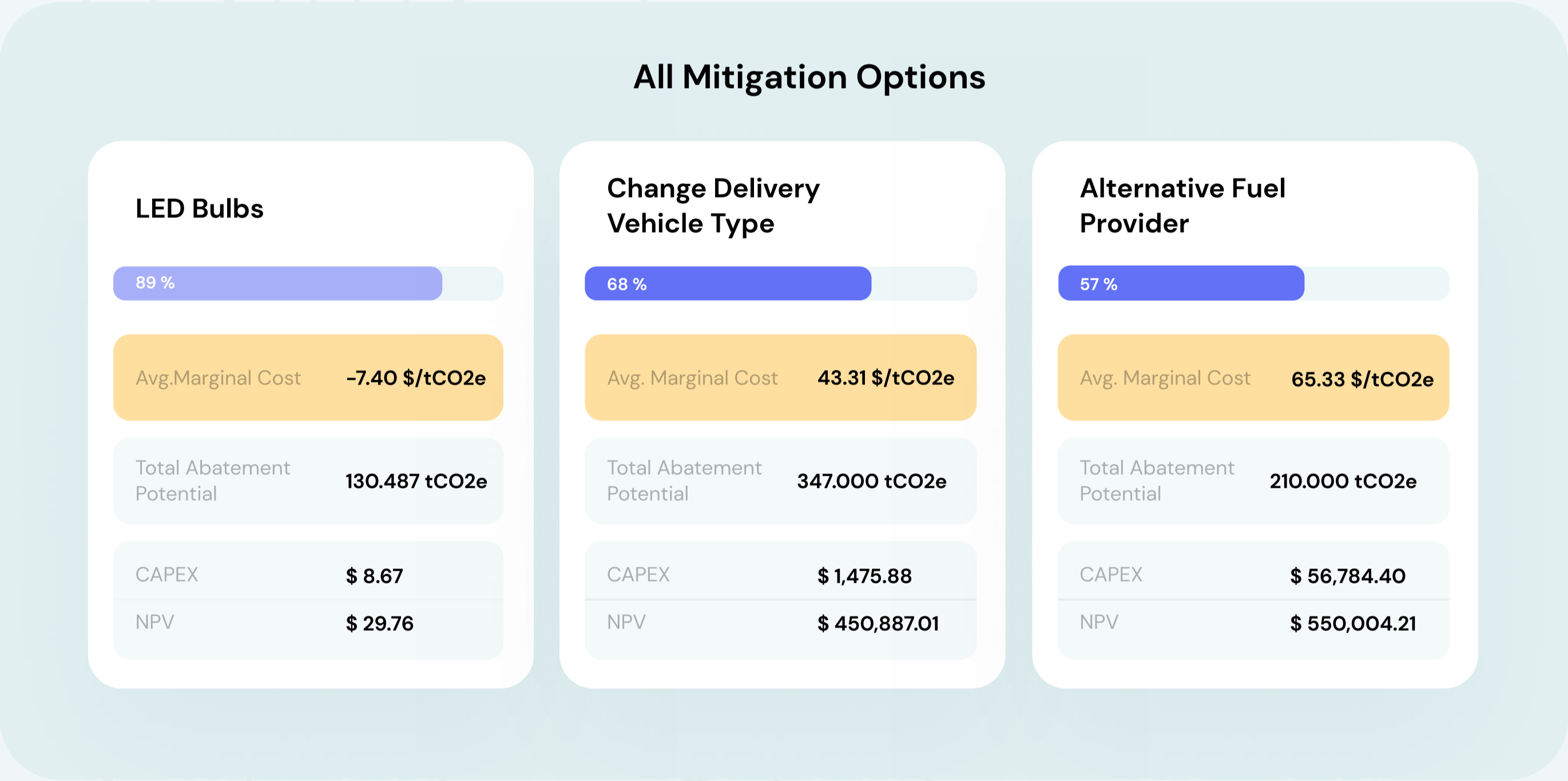
Pro tip:

MAC curves can be cumbersome to build, since they require up-to-date financial and environmental data. If there are constant updates to the data, models need to be constantly updated to reflect new investments. Data collection and update is often siloed in large organizations and laborious to be done in excel spreadsheets. A decarbonization platform makes data manageable and allows for the real time updating of MAC curves.

MAC Curves provide wide comparability of carbon reducing projects that vary in technology, financial and environmental impact. Creating a comparable portfolio of mitigation options can reduce strain in decision-making and budgeting processes, and enable carbon-related initiatives to inform capital planning processes with confidence. However, modeling mitigation or abatement opportunities are largely dependent on the quality of data available — the more primary data and detailed figures that go into the model, the better.

For example, utility organizations are driven by operational complexity that requires high levels of data resolution to uncover executable opportunities. Carbon inventories conducted solely for reporting purposes, that use sector-level data, or rely heavily on non-primary data often lack sufficient detail to identify actual GHG abatement potential. Facility-specific operational expense and emissions data is better than publicly available country or regional data, and can be used to better inform the financial implications to the business to implement a low carbon solution.

Figure 5 — Company Mitigation Portfolio



Conversely, companies that have ambitious goals benefit from using MAC curves to understand the portfolio of measures for achieving the ambitious goal as well as help companies understand where gaps may exist in their decarbonization journey. Companies need to focus on the triple bottom line of doing well for the planet while maintaining (and ideally improving) profitability. The most cost-effective measures are easy to identify on a MAC curve.

Whether or not your organization uses a MAC Curve, Levelized Cost Curve, or other tools for exploring and evaluating mitigation and adaptation strategies, such analyses are a necessity to answer:

- 01

What are our viable mitigation and adaptation options?
- 02

How much are we going to spend to get to that scenario?

Where do carbon offsets & removals fit in?

As stated previously, a carbon offset is a reduction of GHG emissions or an increase in carbon storage that is used to compensate for GHG emissions emitted elsewhere. A carbon removal should not be confused with a carbon offset, and a carbon removal is the process of actually removing carbon dioxide from the atmosphere and locking it away for centuries or millennia either in the form of a natural or technological removal.

Purchasing carbon offsets reduces overall emissions as if you emit one tonne of carbon, one tonne of carbon is avoided elsewhere by building a wind farm or evading deforestation, for example. Carbon offsets enable companies to invest in environmental projects around the world to balance out their carbon emissions, however it is important to note that the original tonne of carbon still exists in our atmosphere. Many organizations evaluate offsets as a mechanism for reducing the gap between their emissions trajectory and carbon-neutral or net-zero emissions targets, however on a global scale, additional emissions are still being pumped into our atmosphere.

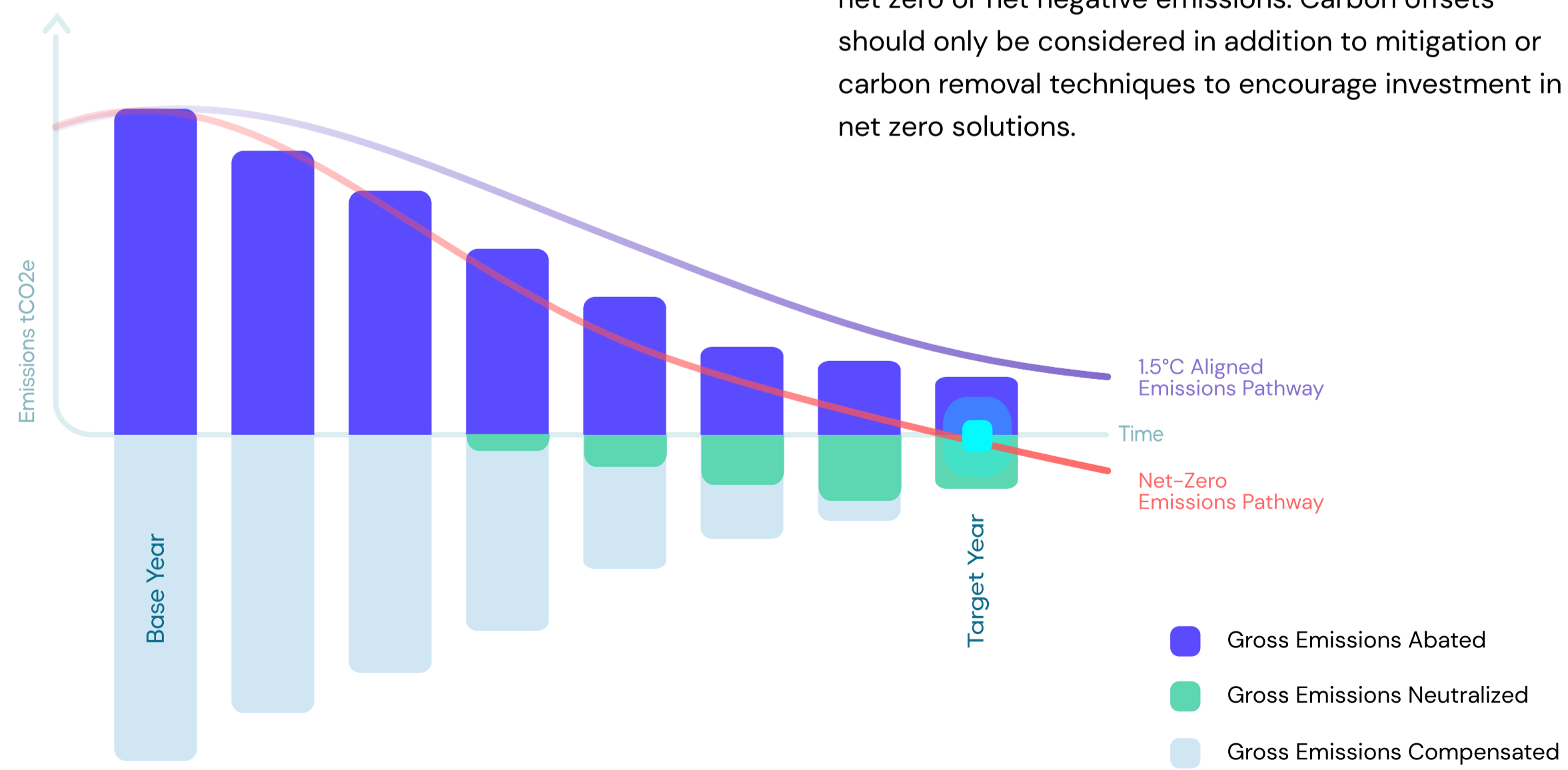
Offsetting projects simply don't deliver what's needed from a risk aversion perspective – a reduction in the carbon emissions entering the atmosphere. As a result, offsetting allows emissions-intensive organizations to continue with unsustainable behavior while shifting responsibility for the climate, and costs, onto the consumer.

As carbon removals actually remove carbon from the atmosphere (and don't offset the addition of more carbon), removals are expected to be a part of an important part of a comprehensive decarbonization strategy, according to organizations like the IPCC. Nature-based carbon removals include opportunities such as tree restoration or agricultural soil management, and technological-based carbon removals include opportunities such as direct air capture. The implementation of these solutions is expected to be required in order to meet global climate goals, however many removal technologies are in the early stages of development, making them costly and inefficient to implement.

As per SBTi recommendations, mitigation options should first be evaluated for a value chain to meet the 1.5°C aligned emissions pathway, and removals can then be evaluated to balance any residual emissions in order to meet net zero.

From the investor and consumer perspective, a company will be much more likely to succeed in a low-carbon economy once it has formed a transition plan that relies primarily on conventional mitigation followed by investment in carbon removals to close the gap to net zero or net negative emissions. Carbon offsets should only be considered in addition to mitigation or carbon removal techniques to encourage investment in net zero solutions.

Figure 6 —Net Zero-Aligned Pathway



Term	Definition
Mitigation	Refers to efforts to reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior (UNFCCC).
Adaptation	Climate change adaptation is the process of adjusting to current or expected climate change and its effects.
MAC (Marginal Abatement Cost) Curve	A model that aggregates the abatement potential and costs of opportunities to reduce emissions in a given time period.
‘NPV Positive Mitigation Options’ Pathway	Refers to pathways in which the longer term financial value of implementing one or multiple mitigation options is positive, and brings financial returns.

IV. Company Target Pathway

“There are more than 1,000 companies setting 1.5°C-aligned science-based targets and one third of the companies have already completed validation of their near-term emission reduction targets.”

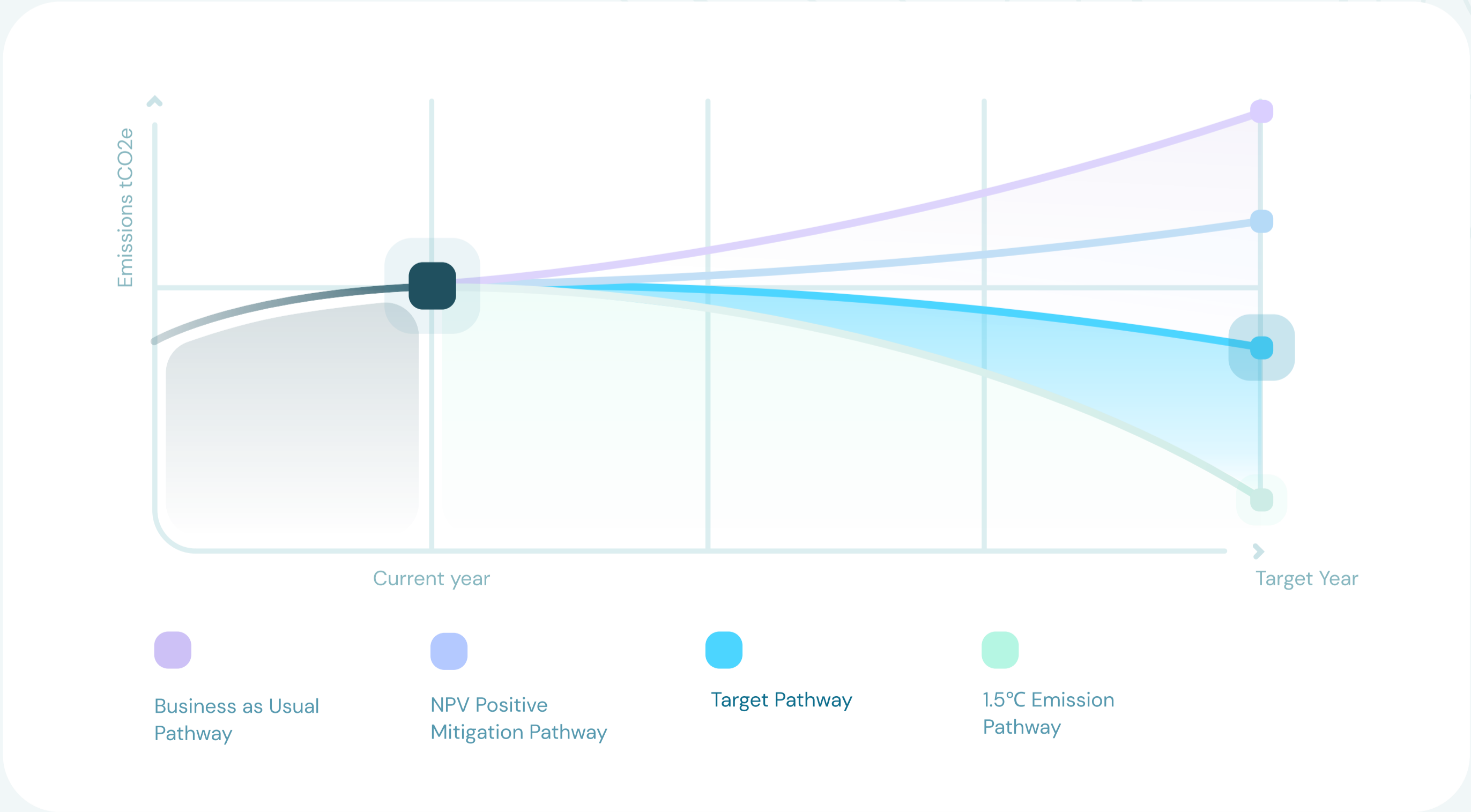
— Science Based Target Initiative

Upon surveying the landscape of organizational climate commitments, it is not uncommon to hear about attention-grabbing goals like setting a science-based target, going carbon neutral, achieving, net-zero, or even climate positive. The type of target an organization chooses is determined largely by its products and production methods, relevant policies, peer benchmarks, and business models. Additionally, goals and targets, like net-zero targets, can also apply to supply chain purchases or value chain product use.

While an organization can choose to adopt a target that is standard on a sector level, companies often choose to build organization-specific targets that reflect their ambition, as well as reduction opportunities available for their unique operations. In order to set an achievable science-based target, companies should first compare the abatement potential of reduction opportunities available against their baseline or ‘business as usual’ scenario.

Setting a science based target in the best way to define a company target pathway. For more information on setting a science based target, take a look at the [SBTi’s resources](#).

Figure 7 — Company Target Pathway



Once an organization has committed to a target, how does it begin to reach it?

Looking around your own organization, it may be difficult to imagine how the fragmented efforts that are taking place within different business units and on different timelines can come together to form a coherent story about achieving ambitious targets.

The key to getting started is to establish an emissions baseline (see ‘Business as usual’ scenario, section II). Once a company baseline is formed, organizations can conduct peer benchmarking exercises, evaluate their market position, and begin to conduct impact assessments of mitigation opportunities (see Mitigation Pathways, section III) to compare against the carbon budget established by company targets.

Additionally, voluntary and mandatory climate-related reporting can help keep organizations accountable for outlining detailed decarbonization strategies. There are many organizations being forced to report their climate-related data and strategies due to policies or investor pressure. Most recently, the US Securities and Exchange Commission (S.E.C.) proposed rules to enhance and standardize climate-related disclosures that will obligate companies to disclose climate-related data in their registration statements and periodic reports. It includes information about climate-related risks that are likely to have a material impact on their business and certain climate-related financial statement metrics.

TCFD Reporting



The Task Force on Climate-Related Financial Disclosure (TCFD) offers organizations a common framework for assessing, managing and disclosing the financial dimensions of climate-related risks and opportunities.

Today, the reporting aspects of the TCFD’s recommendations are mainstream across business leaders and regulators. In countries like the UK and New Zealand, TCFD Disclosure has already become mandatory. Additionally, other sustainability disclosure standards (CDP, CDSB, GRI, IR, and SASB) are also now officially working to harmonize around TCFD’s core, along with IFRS and IOSCO.

Transition Risk-related scenario analyses are a major component of TCFD disclosure alignment. The TCFD believes that scenario analysis is an important and useful tool for both assessing potential business implications of climate-related risks and for informing stakeholders about how the organization is positioning itself in light of these risks and opportunities.

Companies must be able to demonstrate that they have thoughtfully formulated their transition to a low-carbon economy. The scenarios outlined in this report, particularly baseline scenarios and mitigation pathway scenarios, are crucial to align with and navigate the “governance” component of TCFD reporting.

Term	Definition
Net Zero Target	A company ensures that emissions from its value-chain activities create no net climate impact.
Carbon Neutral	Carbon emissions caused by a company have been balanced out by funding (neutralizing) an equivalent amount of carbon savings elsewhere in the world.
Carbon Budget	A finite amount of CO2e that can be emitted into the atmosphere before warming will exceed specific temperature thresholds. A carbon budget is an estimate of cumulative CO2, methane, and other Kyoto gases that can be emitted over a period of time, while limiting temperature rise to a specific amount.

V. 1.5°C Degree Pathway

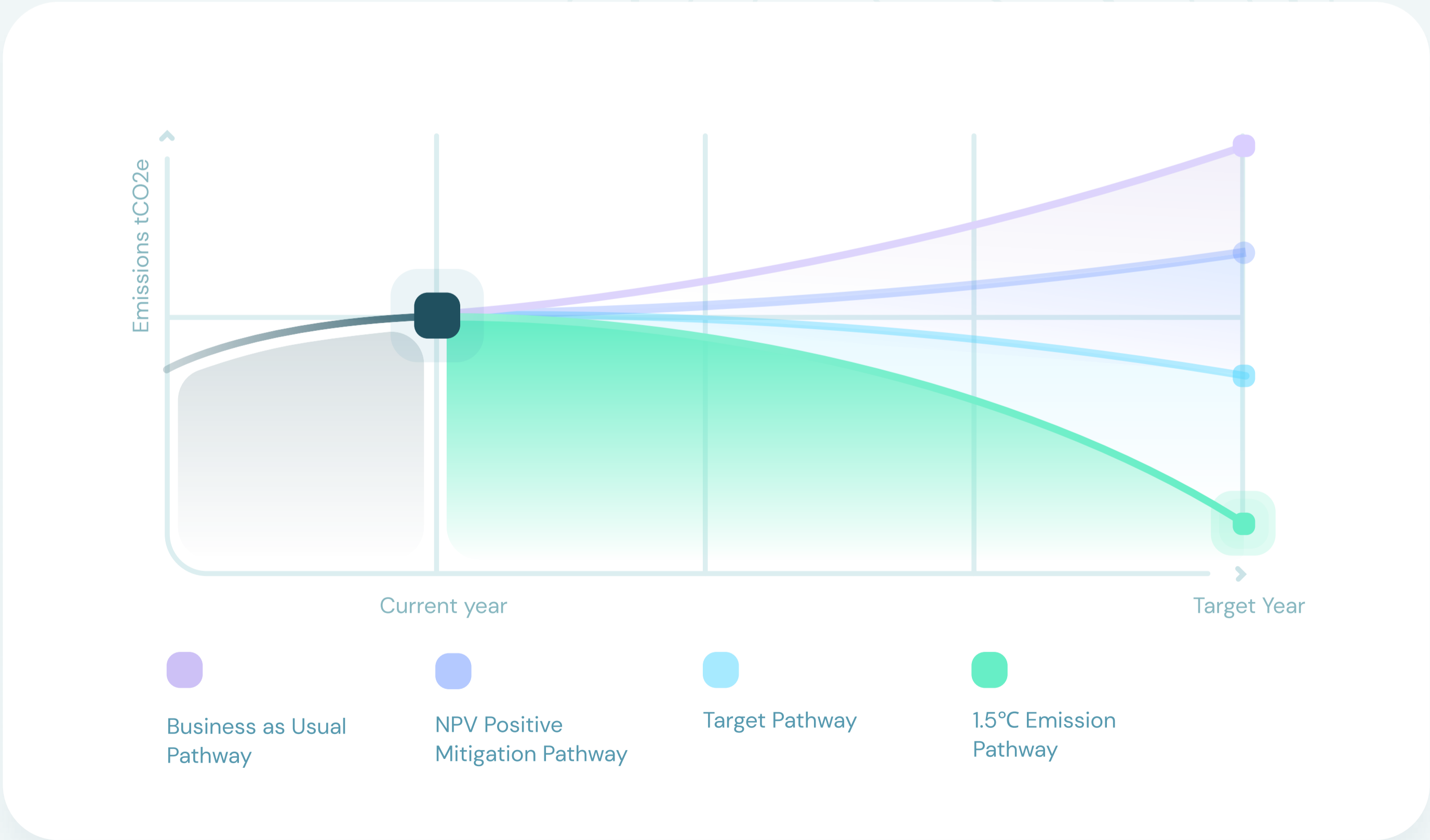
In order to achieve a company pathway that is aligned with the 1.5°C-degree pathway, companies should perform scenario analysis to understand and quantify the risks and uncertainties it may face under different hypothetical futures. It helps in decision-making and allows businesses to shape their strategy.

BlackRock, the world's largest fund manager, uses sustainability strategies in its investments. Companies that have more than 25% of their revenue derived from thermal coal will be withdrawn and pledge to vote against management teams that do not publish reports in line with TCFD recommendations and Sustainability Accounting Standard Boards.

Companies targeting the 1.5°C-degree pathway will be less exposed to climate risks, more adept at surviving and thriving in a low-carbon economy, and remain competitive as future regulation shifts.

As such, the 1.5°C-degree scenario for your organization should align with your organization's science-based target. 1.5°C-aligned targets are now the most common choice for businesses, representing 66% of all submissions to the SBTi in 2021, and recently SBTi has begun no longer accepting 'well below 2°C temperature targets. Particularly if your organization is emissions-intensive, a 1.5°C target is necessary to curb the worst impacts of climate change.

Figure 8 — 1.5°C-Aligned Degree Pathway



Summary

Climate change presents environmental and economic challenges, but also economic opportunities through the development and adoption of new decarbonized technologies and services.

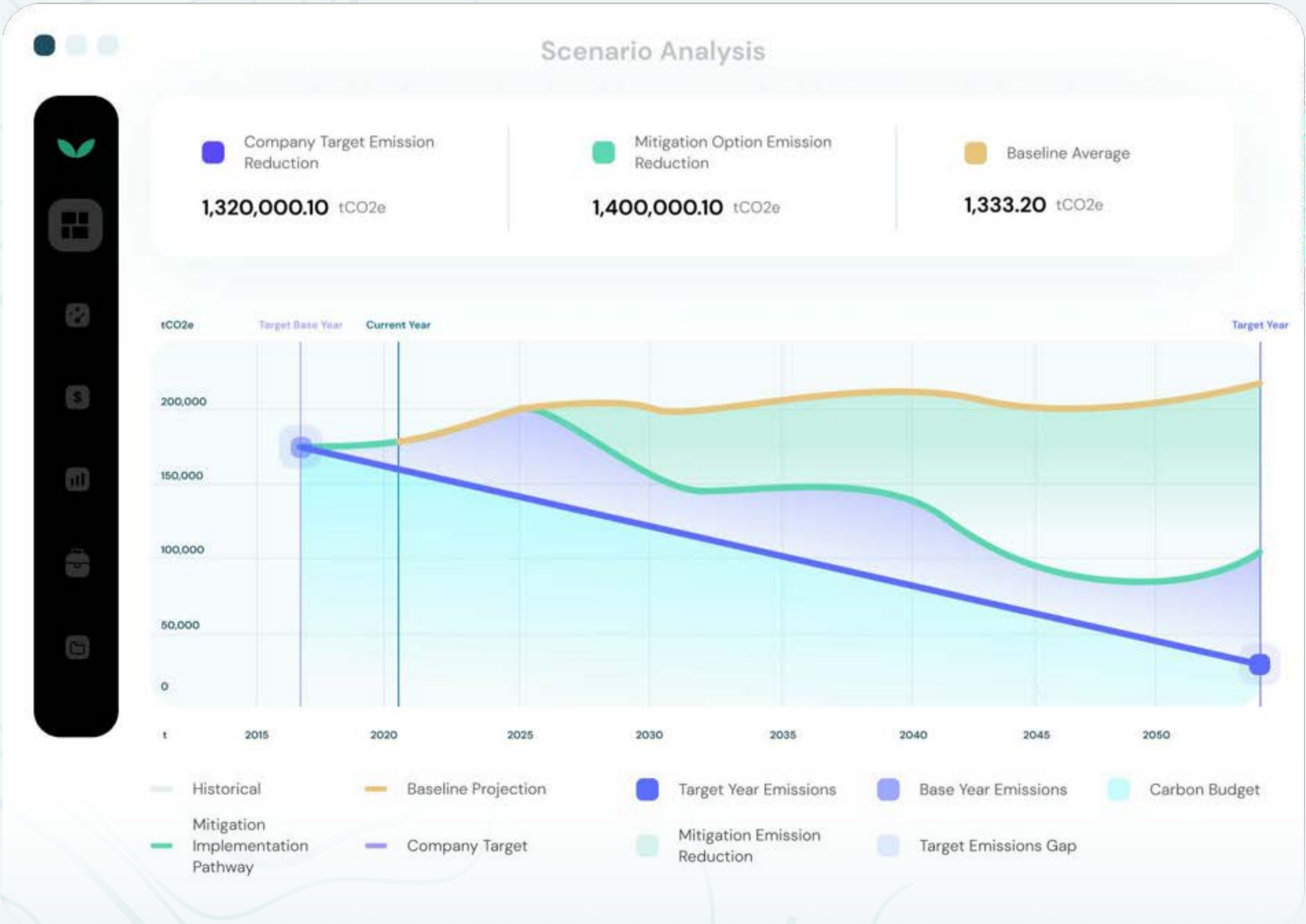
The purpose of this report is to provide guidance on building transition strategies, and what the inputs necessary to do so can look like. In working with some of the most complex and emissions-intensive organizations to form decarbonization strategies, climate experts at SINAI have identified that the scenario-building exercises outlined in this report are key to engaging stakeholders in decarbonization efforts.

- 01 Baseline Scenarios
- 02 Mitigation Pathways
- 03 Company Target Pathway
- 04 1.5°C Degree Aligned Pathway

The recommended scenarios in this report have helped SINAI's clients to identify the optimal and unique strategies that position their transition to a low-carbon economy.

In order to enable modeling scenarios and opportunities, software is almost mandatory. Software allows organizations to consolidate a climate agenda into a single source of truth, leapfrog capacity gaps, and create dynamic scenario analyses that enable organizations to find the best path forward.

Figure 9 —SINAI Software, Scenario Modeling



Glossary

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‘NPV Positive Mitigation Options’ Pathway	Refers to pathways in which the longer term financial value of implementing one or multiple mitigation options is positive, and brings financial returns.



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