

COMP3900

Computer Science Project



Project 8: ESG Management System

ESGlow Final Report

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Please note that the user manual is provided at the end of this report.

1. Overview

1.1 Environmental, Social and Corporate Governance in the 21st Century

In the modern, interconnected globalised economy, not only has the depth and breadth of different investment opportunities expanded greatly, but also the differing types of information, both financial and non-financial, available to both retail and institutional investors. In contrast to past investing models using mainly financial information, modern investors are increasingly including extra information in their investing approach and models, influencing investors' decision-making process across the world.

Of particular relevance is the rise of alternative investing frameworks and guidelines, including Environmental, Social and Corporate Governance, an investing decision-making guideline which places greater emphasis on non-financial metrics of individual companies and firms, revolving primarily around their corporate policies and past history in addressing issues like climate change, employee health and societal responsibility. Over the recent two decades, investor demand for ESG ratings has grown rapidly, with 57% of companies citing it as their top motivation for engaging with ESG raters (Amel-Zadeh & Serafeim, 2018).

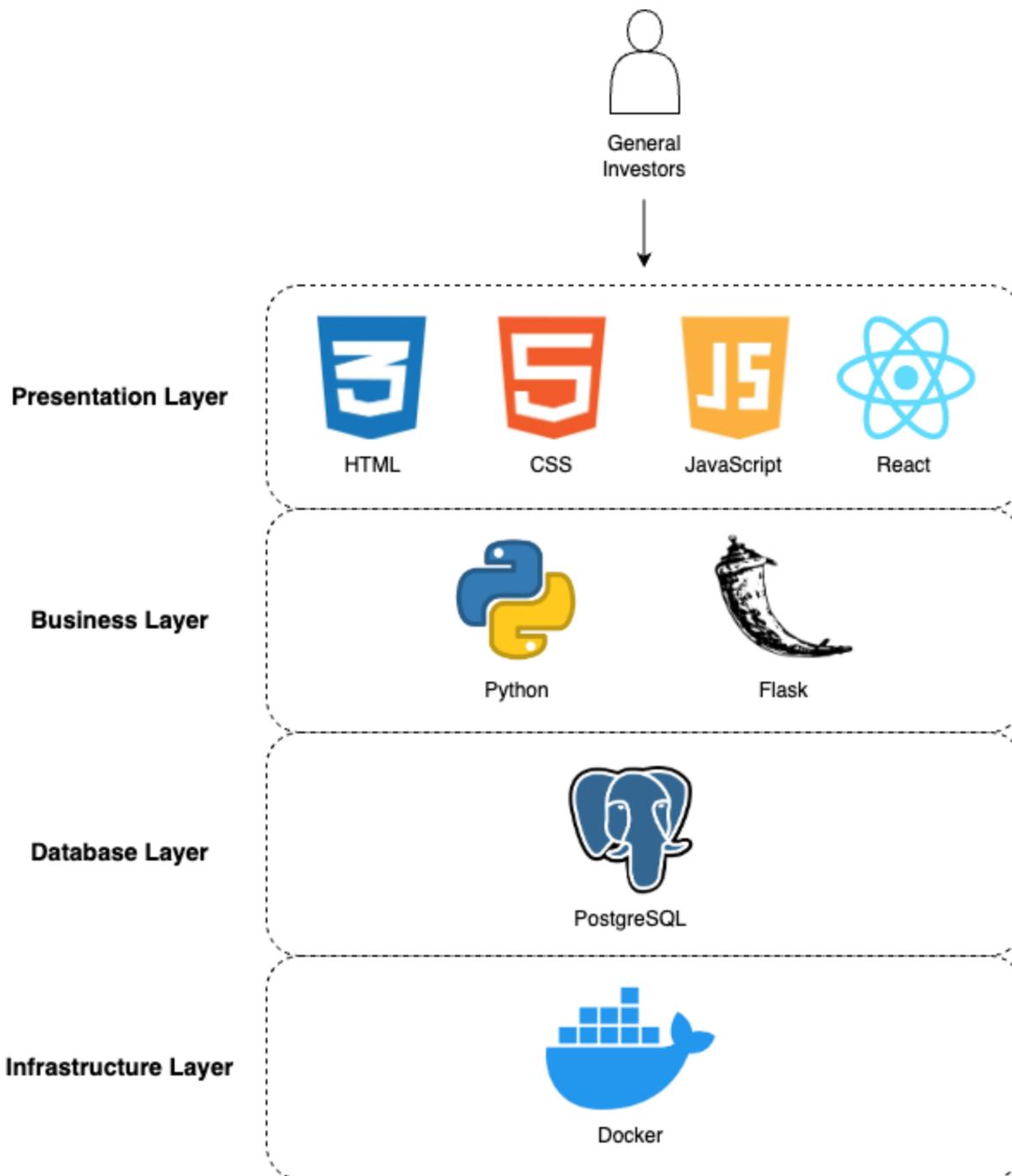
However, in the application of ESG criteria, there are significant problems permeating the whole industry; unlike financial information, which publicly listed companies are legally obligated to release, ESG data is not subject to the same stringent requirements, resulting in a patchwork of individually selected frameworks, metrics and indicators for different companies that makes any coherent collection and comparison of companies extremely difficult, especially for the general public.

1.2 Our Solution

Our project seeks to create a simple, intuitive way for the general public and retail investors to access available ESG information from available companies, allowing them to fashion custom queries and frameworks to better inform their own investments and decision-making processes. Through our web application, ESGlow, we store and display strictly ESG-related frameworks, metrics and indicators for easy access and customisation by users. We seek to inform through both numerical and visual methods the particular performances of companies and firms through multiple different time periods.

1.3 Overall Design and Architecture

From our initial project proposal, our project architecture was primarily split into four layers: Presentation, Business, Database and Infrastructure.



1.3.1 Presentation Layer

The frontend for ESGlow was made in React, which is a JavaScript library for building user interfaces. It allows existing UI (user interface) components to be reused, manages the state of the application and handles user events efficiently, which will ultimately lead to a more organised codebase during the development of this web application.

React components were built using Material UI, which is a user interface framework that speeds up the development of a simple web application and ensures a consistent design. The react-router-dom package

will be used to enable navigation among pages of the dynamic website (from login to selecting companies and performing analysis). Recharts or similar charting libraries will also be necessary in order to display the ESG data in a graphical form, as well as for novelty features such as comparing the performance between two companies.

Behind the scenes, HTML is used for forming the backbone of web pages and providing the basic structure of the website. CSS is used to create an aesthetically pleasing interface that aligns with the professional and informative nature of the ESG platform. JavaScript is used to make the site interactive with dynamic changes and is widely supported by all major browsers.

1.3.2 Business Layer

In our business or backend layer, we maintained our Flask server, written in Python. The main purpose of this layer was to serve any and all requests from the frontend to construct graphs, display data or any other functionalities requiring queries to our PostgresSQL Database. The backend primarily acted as a way to serve multiple different end users without over-straining the frontend with tedious, slow calculations, providing a variety of functionalities ranging from authorizing and authenticating users, to fetching data values for individual indicators and industries as a whole.

1.3.3 Database Layer

The second layer of our project architecture is the database layer, which contains all data for the entire system, from user info to indicators to custom frameworks. This mainly consisted of our PostgreSQL database used throughout the entire project, the primary datastore. It holds all users and their data as well as ESG frameworks, indicators and metrics. Known for its ACID compliance, this relational database will allow for relationships between all tables to be established and is highly reliable for storing sensitive information as required by this project.

To link the business and database layers, we used SQLAlchemy. SQLAlchemy is an ORM (Object Relational Mapping) library that provides a set of high-level APIs to connect to relational databases, which translates high-level operations into SQL commands and ultimately allows for more secure, Pythonic code whilst ensuring data integrity. In order to facilitate the interaction between the Python Flask application and the PostgreSQL database, Psycopg2 will act as the underlying driver.

1.3.4 Infrastructure Layer

This layer is a Docker container around the other three layers of the project, allowing for easy deployment, updating and user interaction. With this layer, the user no longer needs to set up all 3 other separate layers individually and have them interact, but rather, use Docker and the setup instructions at the bottom to run the project seamlessly.

Note that a clearer analysis of the third-party inclusions and justifications is outlined in the Third-Party Functionalities section.

2. Project Functionalities

The goal of this project is to develop a web application to help users manage ESG (Environmental, Social, Governance) data. Users can select an ESG framework of interest, browse and add ESG metrics, request ESG indicators, adjust metrics' weights according to defined standards or stakeholder needs, and identify corresponding data sources. Below is a list of specific requirements and how the functionalities developed by our team address them.

2.1 Account management

Users can register/create their account and log in.

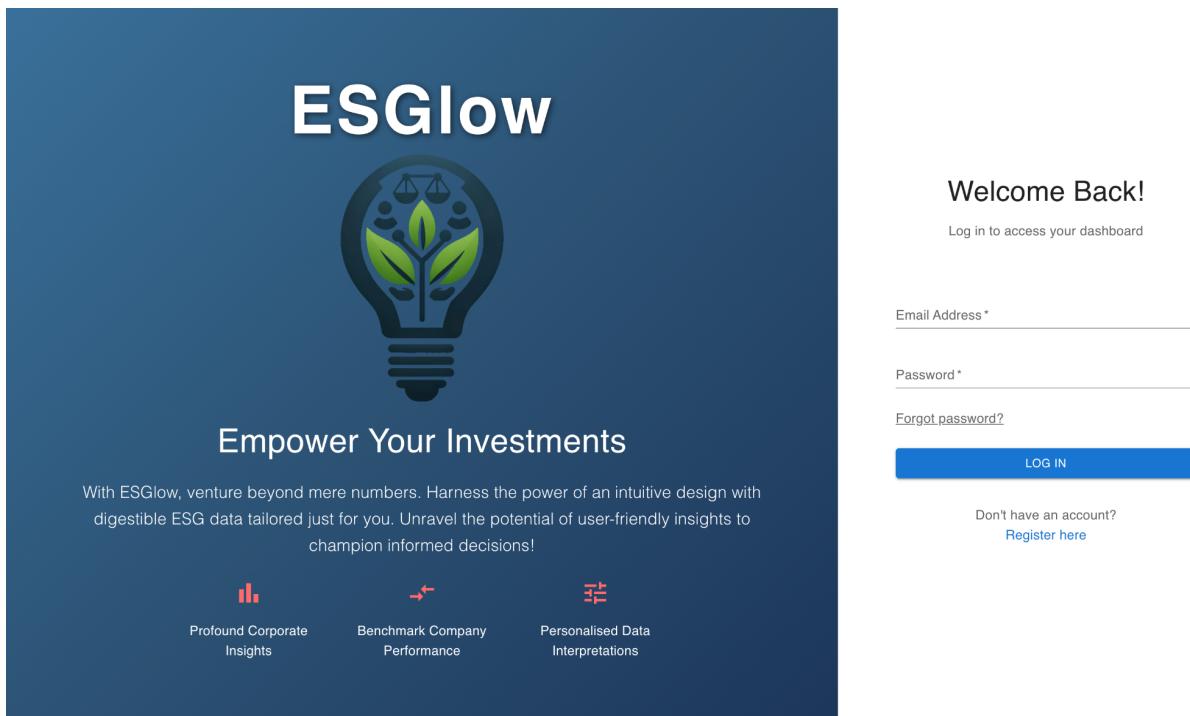
The start pages are composed of the website information, including the logo of ESGlow on the left-hand side, and the input fields on the right-hand side. The landing page the user is met with at the very start presents a login screen that directs them to enter their email and password.

Three paths are possible:

- a) Logging in with pre-existing user details (Refer to 2.1.1)
→ Redirects to Dashboard
- b) Registering a new account (Refer to 2.1.2)
→ Redirects to Dashboard
- c) Resetting the password of a pre-existing account (Refer to 2.1.3)
→ Redirects to Login

2.1.1 Login With Existing Account

If users have a valid account, they are able to enter their details on the landing page to log in. This redirects them to the Dashboard on success.



Any invalid input will induce an error message. Specifically, a user will receive an error message and fail to log in if:

- a) the email address or password input is empty,
- b) they are a new user, or
- c) the password is incorrect.

2.1.2 Register New Account

If they do not have an account, they can navigate to the Register page, which prompts them to input their name, email, and password. On valid user account details, registration is successful and the user is redirected to the Dashboard.

Create Your Account!

Enter your details to get started

Name *

Email Address *

Password *

Confirm Password *

REGISTER

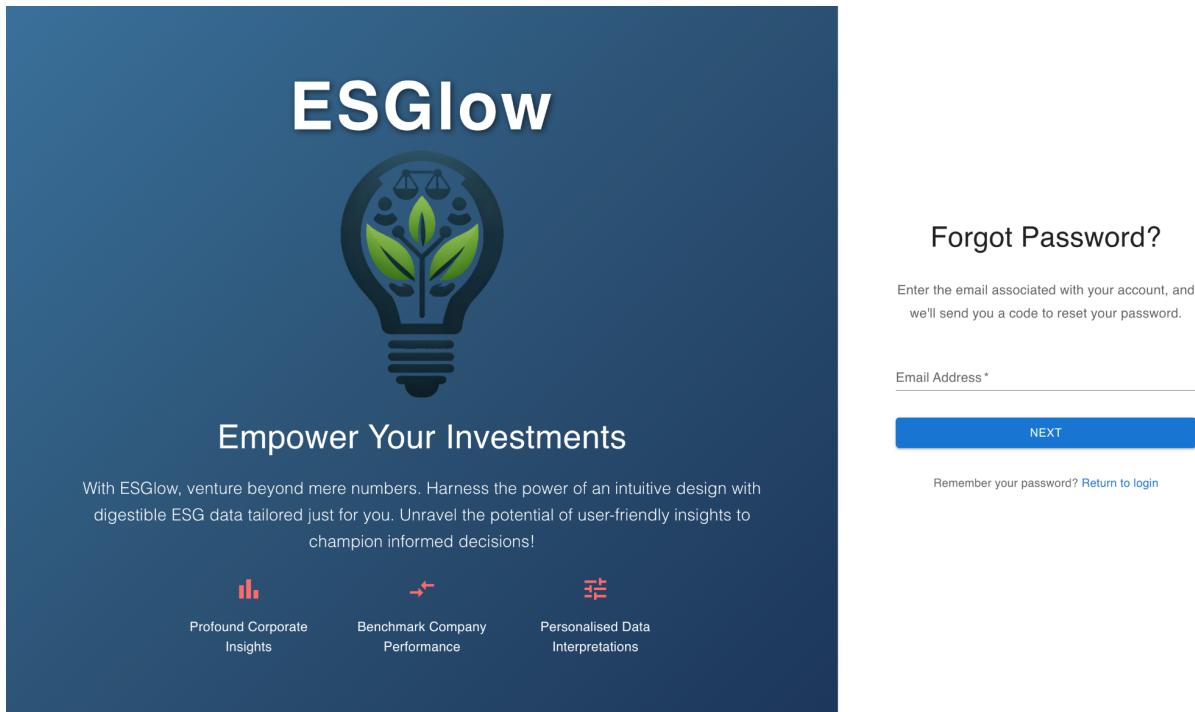
Already have an account? [Log in here](#)

Any invalid input will induce an error message. Specifically, a user will receive an error message and fail to register if:

- a) the name is not between 3 and 50 characters,
- b) the email address is not valid,
- c) the passwords are not between 3 and 50 characters and do not match, and
- d) the user already exists.

2.1.3 Reset Forgotten Password to Existing Account

If the user were to forget their password, they are directed to navigate to the Reset-Password page, which prompts the user for their email.



A verification code will then be sent to that email, for the user to copy into the input box of a second screen.

ESGlow Password Reset Code ➔ Inbox ×

 **xuerichard1@gmail.com**
to me ▾

Hello Melanie Wu,

You have recently requested to reset your password for ESGlow. Your verification code is:

ZZ1F61

If you have not requested to reset your password, please ignore this email.

Kind Regards,

ESGlow



Verify Your Code

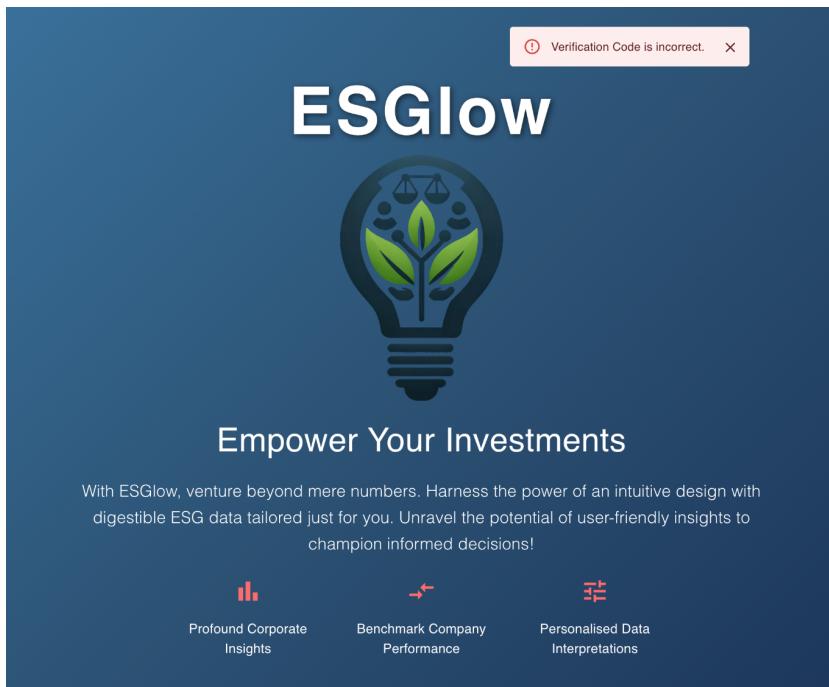
Enter the verification code sent to
melaniewu762@gmail.com.

Verification Code *

VERIFY

[Go back to login page](#)

To ensure the user's account security, an incorrect input will prompt an error message.



Verify Your Code

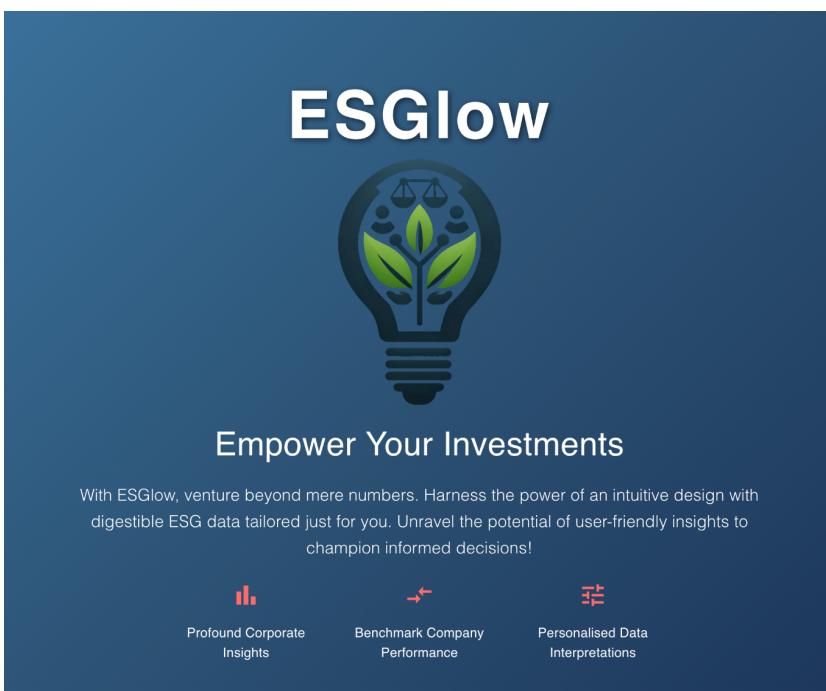
Enter the verification code sent to
melaniewu762@gmail.com.

Verification Code *
test

VERIFY

[Go back to login page](#)

Once the code is verified, the user is prompted to enter a new password and then redirected back to the Login page.



2.2 Select Framework

Users can choose a framework of interest from a list of frameworks.

Once the user is logged in, they are redirected to the dashboard preset to “Single Mode”. In this mode, the user is prompted to select a company. As displayed below, only the “Industry” search bar is highlighted, whilst the other functionality is disabled. Thus, a user must select an industry before selecting a company.

Upon selecting an industry and company, the “Overview” accordion is populated with a description of the company, its ESG rating (a number and a line chart), and industry mean and ranking.

Leading the forefront in technological advancements, GreenTech Innovations is dedicated to creating state-of-the-art solutions that champion greener, more sustainable urban environments.

70.2
ESG Rating

71.3
Industry Mean

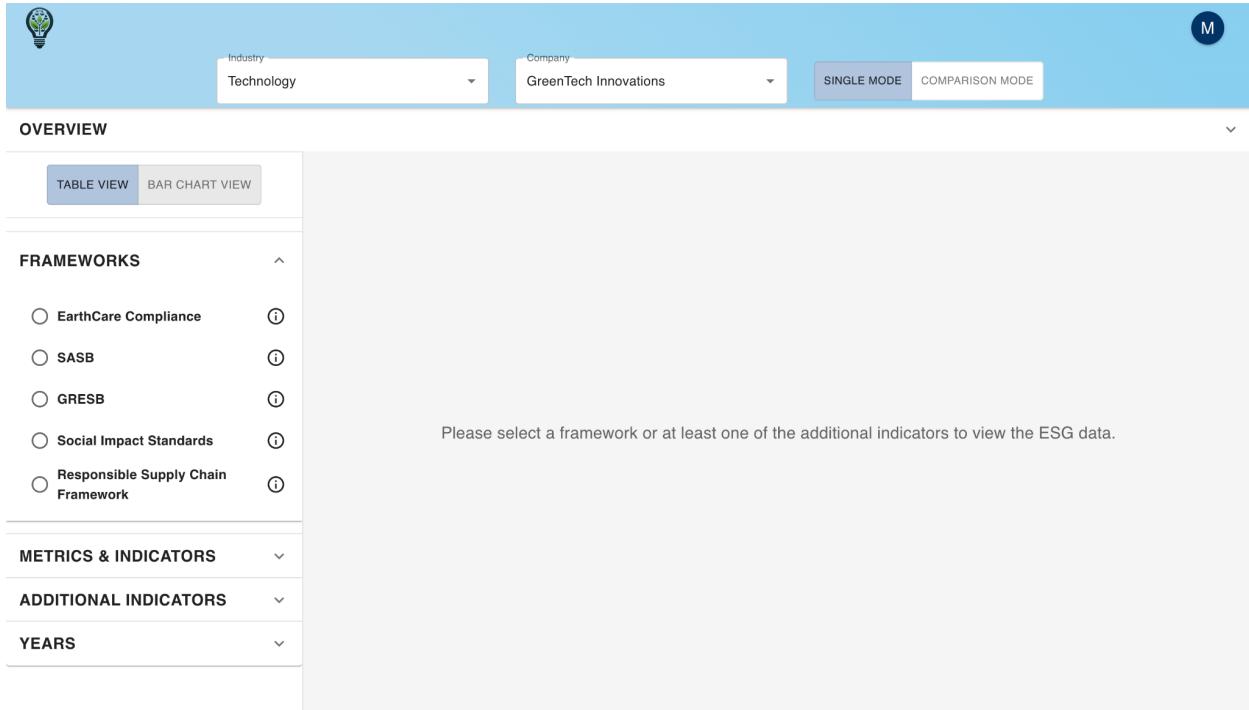
2/2
Industry Ranking

ESG Rating

Year	ESG Rating
2018	75
2019	78
2020	72
2021	68
2022	74
2023	71

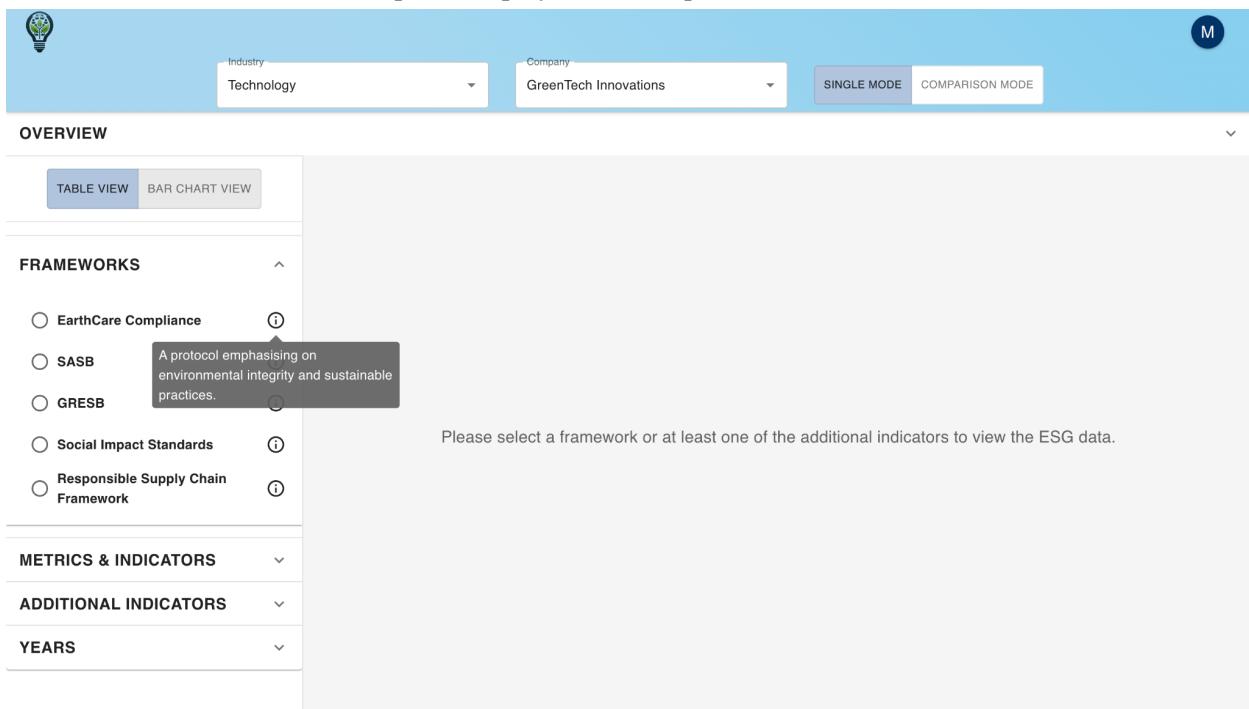
Please select a framework or at least one of the additional indicators to view the ESG data.

Below the “Overview” accordion is the “Frameworks” accordion. Upon opening, the user is able to select a single framework from a list of frameworks that the company reports on.



The screenshot shows the ESGlow application interface. At the top, there is a header bar with a logo, dropdown menus for 'Industry' (Technology) and 'Company' (GreenTech Innovations), and mode buttons for 'SINGLE MODE' and 'COMPARISON MODE'. Below the header is an 'OVERVIEW' section with 'TABLE VIEW' and 'BAR CHART VIEW' buttons. Underneath is a 'FRAMEWORKS' section containing five items: EarthCare Compliance, SASB, GRESB, Social Impact Standards, and Responsible Supply Chain Framework. A tooltip message 'Please select a framework or at least one of the additional indicators to view the ESG data.' is displayed next to the frameworks list. Below the frameworks are sections for 'METRICS & INDICATORS', 'ADDITIONAL INDICATORS', and 'YEARS'.

Beside each framework is a tooltip that displays the description of the framework.



This screenshot is similar to the previous one but includes a tooltip for the 'SASB' framework. The tooltip content is: "A protocol emphasising on environmental integrity and sustainable practices." An arrow points from the tooltip to the 'SASB' framework item. The rest of the interface elements are identical to the first screenshot.

Upon selecting a framework, the data display section at the bottom right is populated.

OVERVIEW

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

FRAMEWORKS

- EarthCare Compliance
- SASB
- GRESB
- Social Impact Standards
- Responsible Supply Chain Framework

METRICS & INDICATORS

ADDITIONAL INDICATORS

YEARS

DOWNLOAD Please click 'UPDATE SCORE' to display the Adjusted ESG Score.

SAVE CUSTOM FRAMEWORK **UPDATE SCORE**

2.3 Browse Metrics

Users can browse ESG metrics related to the selection framework.

When a framework is selected, the “Metrics & Indicators” accordion is populated with the relevant metrics and indicators of the selected framework.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

OVERVIEW

FRAMEWORKS

- EarthCare Compliance
- SASB
- GRESB
- Social Impact Standards
- Responsible Supply Chain Framework

METRICS & INDICATORS

- Product Responsibility (0.35)
- Digital Integration (0.25)
- Diversity & Inclusion (0.4)

Indicator

DOWNLOAD

Please click 'UPDATE SCORE' to display the Adjusted ESG Score.

Each metric is an accordion that when opened, displays the relevant indicators.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

OVERVIEW

METRICS & INDICATORS

- Product Responsibility (0.35)
- CO2 Emission Compliance (0.5)
- Energy Efficiency Rating (0.5)
- Digital Integration (0.25)
- Healthcare Initiatives (0.6)
- Innovation Initiatives (0.4)
- Diversity & Inclusion (0.4)
- Recall Instances (0.7)
- Waste Reduction Score (0.3)

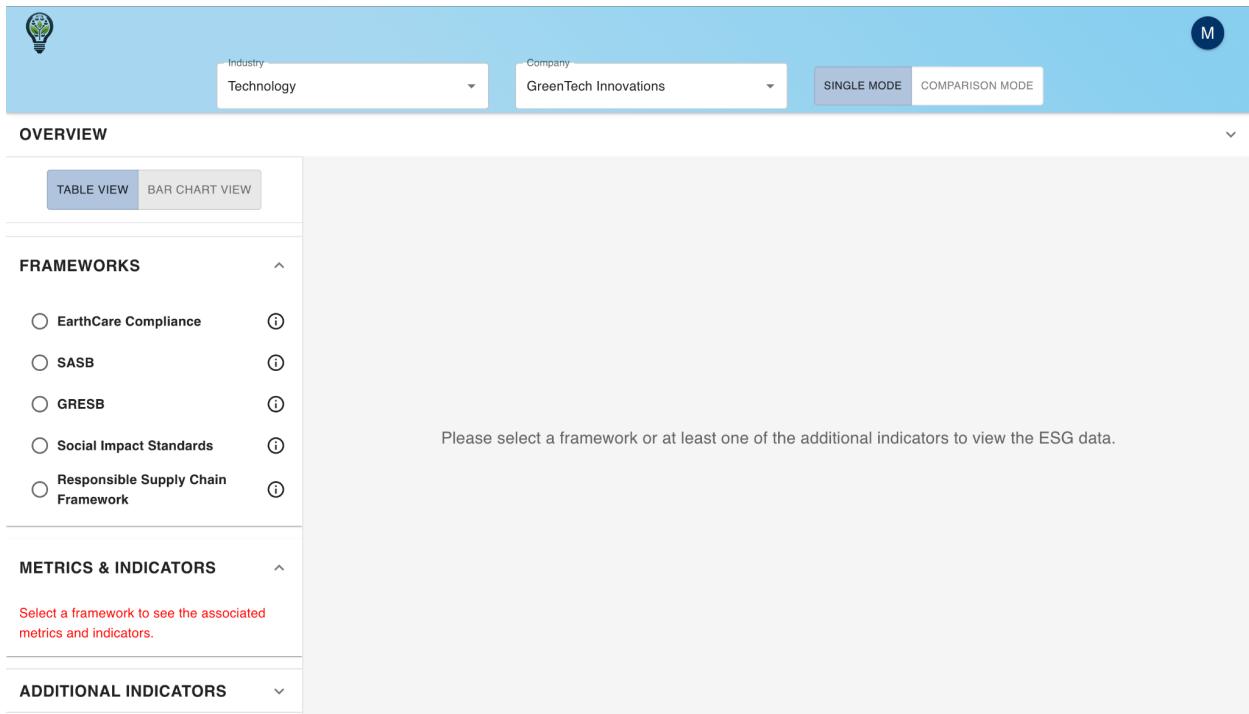
Indicator

DOWNLOAD

Please click 'UPDATE SCORE' to display the Adjusted ESG Score.

ADDITIONAL INDICATORS

If the user does not select a framework, the “Metrics & Indicators” accordion does not display any metrics or indicators.



The screenshot shows the ESGlow application interface. At the top, there is a header bar with a lightbulb icon, dropdown menus for 'Industry' (Technology) and 'Company' (GreenTech Innovations), and mode buttons for 'SINGLE MODE' and 'COMPARISON MODE'. Below the header is a navigation bar with 'OVERVIEW' and a dropdown arrow. Under 'OVERVIEW', there are two view options: 'TABLE VIEW' (selected) and 'BAR CHART VIEW'. The main content area is divided into sections: 'FRAMEWORKS', 'METRICS & INDICATORS', and 'ADDITIONAL INDICATORS'. The 'FRAMEWORKS' section contains five items, each with a circular icon and a detailed description. A message in the center of the screen says: 'Please select a framework or at least one of the additional indicators to view the ESG data.' The 'METRICS & INDICATORS' section has a red message: 'Select a framework to see the associated metrics and indicators.' The 'ADDITIONAL INDICATORS' section has a dropdown arrow.

2.4 Add Metrics

Users can add ESG metrics based on defined standards or needs.

A user can add or remove any metrics within the framework by selecting or deselecting the associated checkbox. The associated coloured chip will turn red upon deselection.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Recall Instances	84	72	88	63	85	74
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

OVERVIEW

METRICS & INDICATORS

- Product Responsibility ⓘ 0.35
- CO2 Emission Compliance ⓘ 0.5
- Energy Efficiency Rating ⓘ 0.5
- Digital Integration ⓘ 0.25
- Healthcare Initiatives ⓘ 0.6
- Innovation Initiatives ⓘ 0.4
- Diversity & Inclusion ⓘ 0.4
- Recall Instances ⓘ 0.7
- Waste Reduction Score ⓘ 0.3

ADDITIONAL INDICATORS

DOWNLOAD

Please click 'UPDATE SCORE' to display the Adjusted ESG Score.

2.5 Check Indicators

Users can request ESG indicators.

In the “Additional Indicators” accordion, the user is able to add indicators that are not associated with the selected framework.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

Upon selecting an indicator, the chip will turn blue and a weight of 0.5 is defaulted. The selected additional indicators will appear highlighted in purple, in the table below the pre-existing indicators.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68
Use of Clean Energy	76	75	76	56	62	61
Hazardous Waste Management	71	80	85	80	98	51
Education & Training	50	70	68	58	63	52

Beside each indicator is a tooltip with a description of the indicator.

OVERVIEW

ADDITIONAL INDICATORS

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68
Use of Clean Energy	76	75	76	56	62	61
Hazardous Waste Management	71	80	85	80	98	51
Education & Training	50	70	68	58	63	52

DOWNLOAD Please click 'UPDATE SCORE' to display the Adjusted ESG Score.

The screenshot shows a list of additional indicators on the left, each with a checkbox, a tooltip icon, and a score. The 'Use of Clean Energy' indicator is selected, and its tooltip is visible: "Initiatives for local education and Accuracy training programs." The 'Education & Training' indicator also has a tooltip: "Initiatives for local education and Accuracy training programs."

2.6 Adjust Metrics

Users can adjust metrics and indicators' weights according to defined standards or stakeholder needs.

Beside each metric and indicator is a weight (inside a coloured oval chip). This weight is adjustable by clicking on the chip.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

Upon clicking the chip, a modal pops up that asks for the user to enter the new weight.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	82	88	63	85	74	
Innovation Initiatives	88	65	84	93	79	
Waste Reduction Score	77	71	54	73	97	
Energy Efficiency Rating	88	54	57	76	68	

If the user input is not a valid number, the input box will be outlined in red and an error message will appear below the box to prompt a correction.

The screenshot shows the ESG glow application interface. At the top, there are dropdown menus for 'Industry' (Technology) and 'Company' (GreenTech Innovations), and buttons for 'SINGLE MODE' and 'COMPARISON MODE'. Below this is an 'OVERVIEW' section with a 'METRICS & INDICATORS' panel on the left containing various checkboxes and numerical weights. On the right is a table showing 'Indicator' names and their values from 2018 to 2023. A modal dialog box titled 'Enter New Weight' is open over the table, containing a text input field with 'test' typed in, which is highlighted with a red border. Below the input field is an error message: 'Please enter a value with at most 3 decimal places.' At the bottom of the modal are 'CANCEL' and 'SAVE' buttons. To the right of the table, the text 'Adjusted ESG Score: 70.835' is displayed.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	83	59	67	91	58	74
Recall Instances	82	88	63	85	74	79
Innovation Initiatives	88	65	84	93	79	77
Waste Reduction Score	77	71	54	73	97	88
Energy Efficiency Rating	83	54	57	76	68	70

As long as the input is a number, the new input is immediately reflected on save. The chip updates with the new weight and changes to an orange colour to indicate that the weight has been modified.

The screenshot shows the ESG glow application interface, similar to the previous one but with a different weight for 'Product Responsibility'. The 'METRICS & INDICATORS' panel now shows a weight of 0.55 for 'Product Responsibility', which is highlighted with an orange circle. The table on the right shows the adjusted ESG score as 70.835. The 'DOWNLOAD' button is visible at the bottom of the table area.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

Both metrics and indicators can have their weights modified.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

Once the user clicks the “Update Score” button at the bottom of the sidebar, the adjusted ESG score—which takes into account the weights of each indicator—is updated.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

The adjusted ESG score is calculated by taking each selected indicator's weight as a proportion of the total sum of selected indicators within the metric and multiplying the proportion with the indicator score; and similarly, by taking each selected metric's weight as a proportion of the total sum of selected metrics and multiplying the proportion with the metric score (calculated from the indicators). Instead of restricting the user to ensure the indicators sum to 1 and the metrics sum to 1, this allows for a more intuitive user interface.

2.7 Identify Data Source

Users can identify each metric and indicator's data sources.

Within each indicator cell in the data display table, beside each indicator is a tooltip with the data source that displays on hover. If there are multiple sources, each source is separated into a new line, with the title (bolded for clarity), followed by a short description in parentheses.

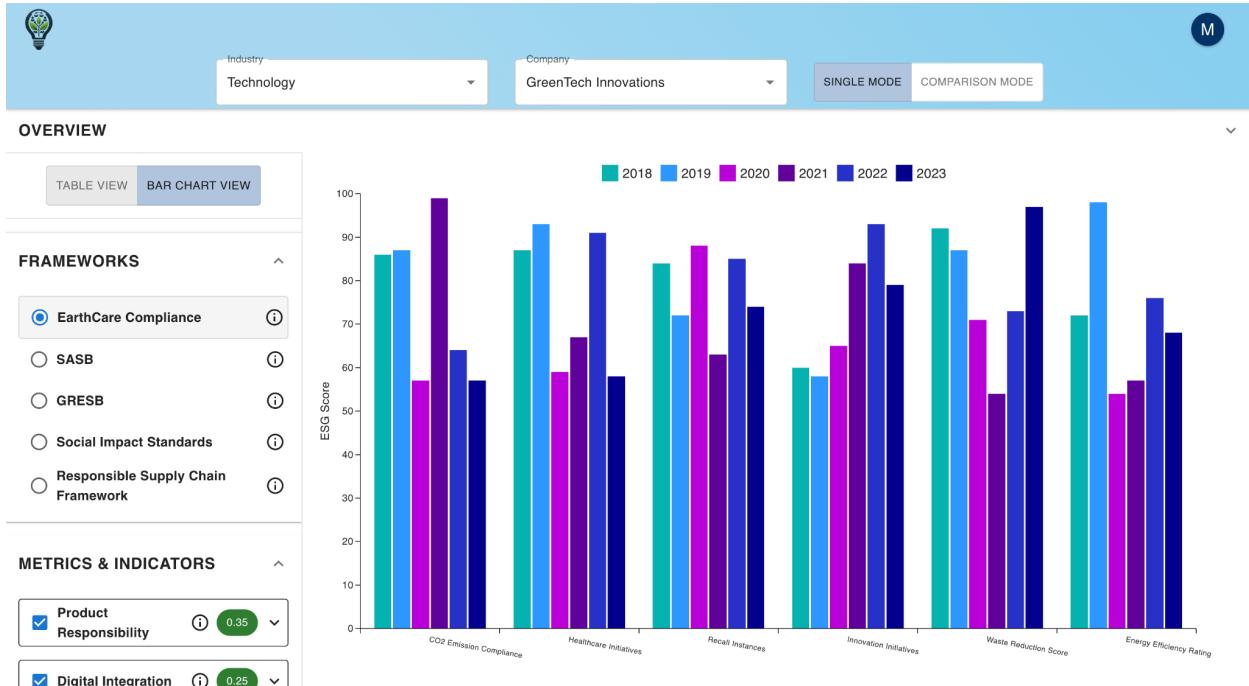
The screenshot shows the ESGlow platform interface. At the top, there are filters for 'Industry' (Technology) and 'Company' (GreenTech Innovations), and mode buttons for 'SINGLE MODE' and 'COMPARISON MODE'. Below this is a navigation bar with 'OVERVIEW' and dropdown menus for 'FRAMEWORKS', 'METRICS & INDICATORS', 'ADDITIONAL INDICATORS', and 'YEARS'. The main area displays a data table with columns for 'Indicator' and years from 2018 to 2023. A tooltip is shown over the 'Healthcare Initiatives' cell in 2018, listing three data sources: 'Source 1: PlanetCare Reports (Comprehensive analyses and reports on global emissions)', 'Source 2: EcoMetrics (Database of worldwide ecological statistics and metrics)', and 'Source 3: AquaStats (Global water and agriculture statistics database)'. A 'DOWNLOAD' button is also visible in the table row.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	Source 1: PlanetCare Reports (Comprehensive analyses and reports on global emissions)	93	59	67	91	58
Recall Instances		72	88	63	85	74
Innovation Initiatives		58	65	84	93	79
Waste Reduction Score	87	71	54	73	97	
Energy Efficiency Rating	98	54	57	76	68	

Please click 'UPDATE SCORE' to display the Adjusted ESG Score.

2.8 *View Bar Chart

This is a novelty feature. In Single Mode, A user is able to visualise the table data in a bar chart format. By selecting the “Bar Chart” toggle above the “Frameworks” accordion, the user is entitled to view a bar chart composed of the selected indicators and years.



A modification of metrics and indicators, additional indicators, and years will be reflected in the bar chart immediately.



2.9 *Compare Companies

This is a novelty feature. A user can compare up to three companies. Upon selecting a company, it is added to the search bar as a chip. Clicking the “x” button removes the selected company.

The screenshot shows the ESGlow application's main interface. On the left, there are filters for 'OVERVIEW', 'YEARS' (with options for 2018, 2019, 2020, 2021, 2022, 2023), and 'INDICATORS'. The central part of the screen has a large input field labeled 'Company' containing a list of companies. Below this list is a message: 'Please select at least one company to view the ESG data.' At the top right, there is a user icon with the letter 'M' and a 'SINGLE MODE' / 'COMPARISON MODE' switch, which is currently set to 'COMPARISON MODE'.

Once three companies have been selected, the remaining companies will be disabled. The user must first deselect a company to view a new one.

The screenshot shows the ESGlow application after three companies have been selected: GreenTech Innovations, CareCommunity Health, and FairTrade Enterprises. These companies are listed in the 'Company' dropdown menu with checked checkboxes. The main content area displays the 'Portfolio ESG Rating' for each company, with GreenTech Innovations having a rating of 75.5. To the right, a chart titled 'Portfolio Breakdown' shows the distribution of the portfolio across the three companies. The 'YEARS' filter at the bottom is set to 2020. The 'SINGLE MODE' / 'COMPARISON MODE' switch is now set to 'SINGLE MODE'.

Once the user clicks outside of the search bar, the search bar will minimise to its original size, displaying the first selected company and an indication of how many other companies were selected.

OVERVIEW

GreenTech Innovations | CareCommunity Health | FairTrade Enterprises

75.5
Portfolio ESG Rating ⓘ

78.3 Best Performer

70.1 Worst Performer

Portfolio Breakdown

Company	Rating
GreenTech Innovations	70
CareCommunity Health	78
FairTrade Enterprises	78

TABLE VIEW GRAPH VIEW

YEARS ^

Please select a year to view the ESG data.

2018 2019 2020
2021 2022 2023

Upon selecting a company, the “Overview” accordion is populated, and updates with any change of the companies. The overview includes the portfolio ESG rating (with a tooltip describing the calculation), the best performer and worst performer in the portfolio, and a bar graph of the ESG ratings of each company.

OVERVIEW

GreenTech Innovations | CareCommunity Health | FairTrade Enterprises

75.5
Portfolio ESG Rating ⓘ

78.3 Best Performer

70.1 Worst Performer

The Portfolio ESG Rating is calculated by averaging the most recent ESG ratings of the selected companies:
- GreenTech Innovations: 70 (2023)
- CareCommunity Health: 78 (2023)
- FairTrade Enterprises: 78 (2023)

Portfolio Breakdown

Company	Rating
GreenTech Innovations	70
CareCommunity Health	78
FairTrade Enterprises	78

TABLE VIEW GRAPH

YEARS ^

Please select a year to view the ESG data.

2018 2019 2020
2021 2022 2023

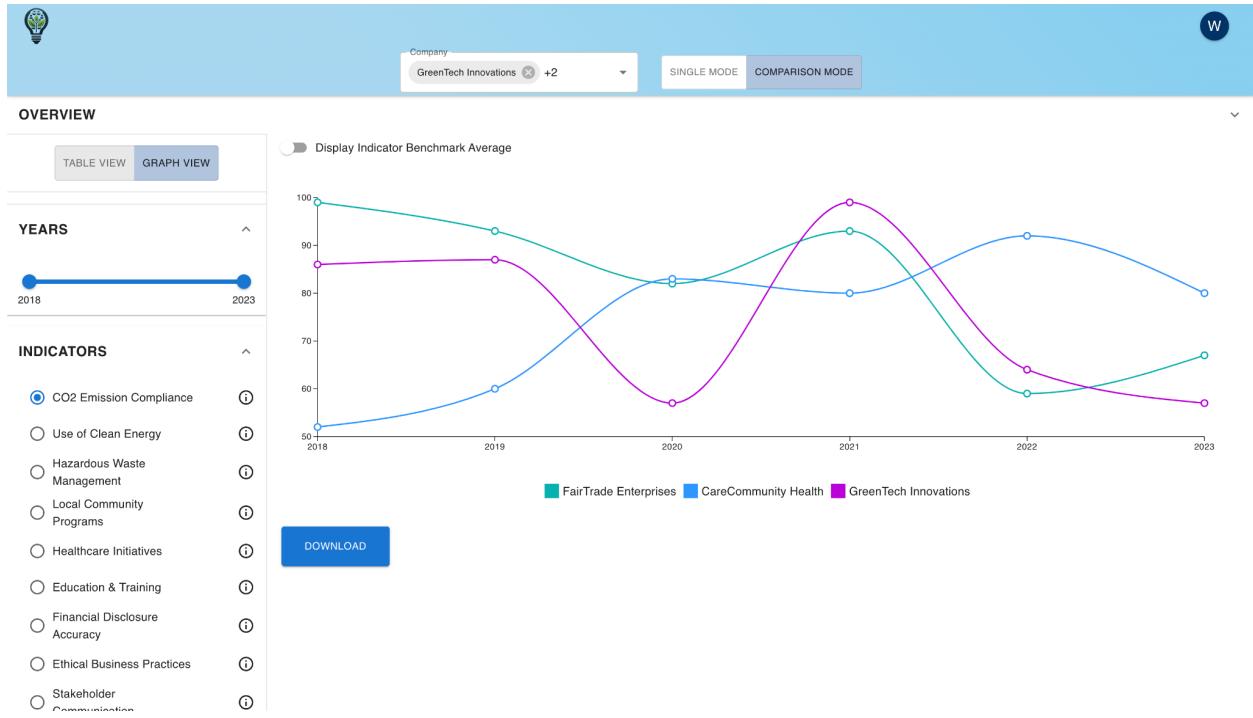
In “Comparison Mode”, the user chooses a single year to compare indicator scores across companies.

The data display table populates upon a selection of a year and an indicator.

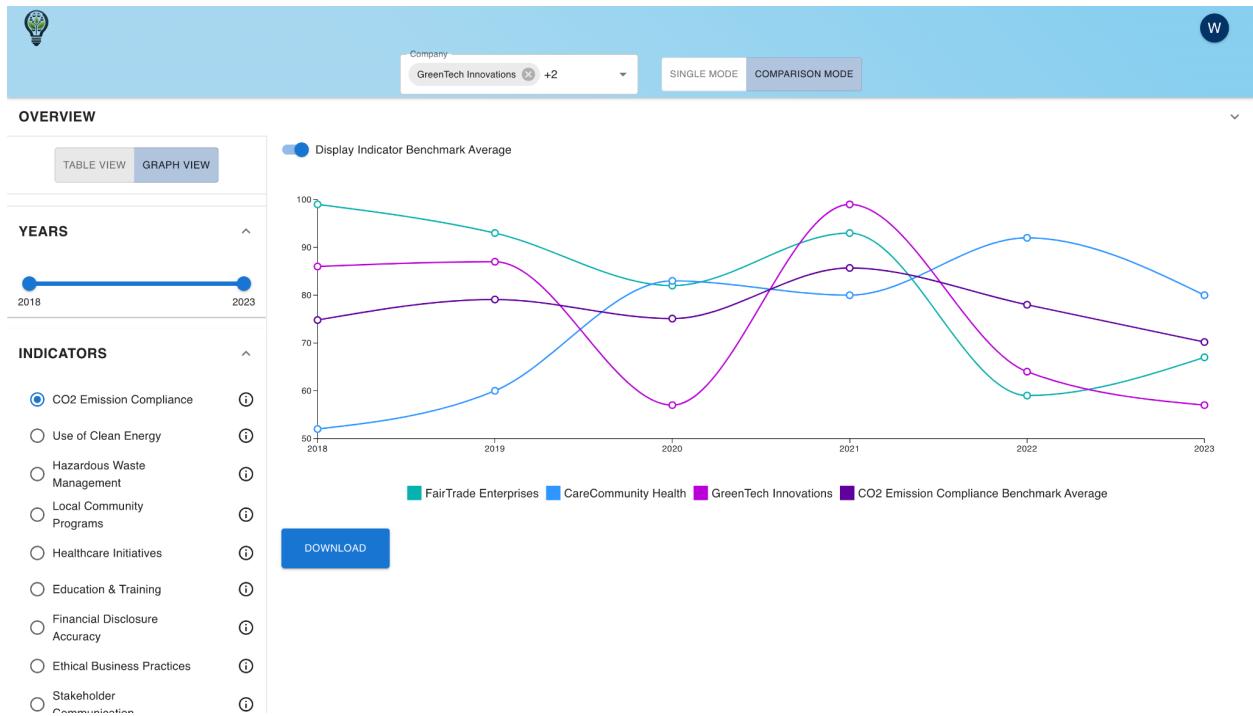
Indicator	GreenTech Innovations	CareCommunity Health	FairTrade Enterprises
CO2 Emission Compliance	86	52	99
Use of Clean Energy	76	53	65
Hazardous Waste Management	71	58	57

2.10 *View Line Graph

This is a novelty feature. In Comparison Mode, a user can view the indicator benchmark average. Given a selection of companies, years, and an indicator, a line graph is generated in the data display section.



The user can click the “Display Indicator Benchmark Average” toggle to include the benchmark average in the line graph.



2.11 *Customise Frameworks

This is a novelty feature. A user can create a customised framework. Given any selection of indicators, the user can save the selection.

The screenshot shows the ESGlow platform's Overview page. At the top, there are dropdown menus for Industry (Technology) and Company (GreenTech Innovations), and buttons for SINGLE MODE and COMPARISON MODE. Below this is a table titled 'OVERVIEW' with columns for 'Indicator', '2021', '2022', and '2023'. The table contains data for various metrics like CO2 Emission Compliance, Healthcare Initiatives, etc. On the left, a sidebar has sections for 'FRAMEWORKS', 'METRICS & INDICATORS', and 'ADDITIONAL INDICATORS'. Under 'YEARS', it shows checkboxes for 2018, 2019, 2020, 2021 (checked), 2022 (checked), and 2023 (checked). At the bottom of the sidebar are 'SAVE CUSTOM FRAMEWORK' and 'UPDATE SCORE' buttons. A note at the bottom right says 'Please click 'UPDATE SCORE' to display the Adjusted ESG Score.'

Indicator	2021	2022	2023
CO2 Emission Compliance	99	64	57
Healthcare Initiatives	67	91	58
Innovation Initiatives	84	93	79
Energy Efficiency Rating	57	76	68
Use of Clean Energy	56	62	61
Hazardous Waste Management	80	98	51

Upon clicking the “Save Custom Framework” button at the bottom of the sidebar, a modal is displayed, prompting the user to enter a name and optionally, a description.

The screenshot shows the ESGlow platform with a modal dialog over the main interface. The dialog is titled 'Save Custom Framework' and contains fields for 'Unique Custom Framework Name*' and 'Description (Optional)'. It also includes 'CANCEL' and 'SAVE' buttons. The background shows the same Overview page with the 'SAVE CUSTOM FRAMEWORK' button highlighted in purple.

The screenshot shows the ESGlow interface with a modal dialog titled "Save Custom Framework". The dialog contains fields for "Unique Custom Framework Name" (set to "My Framework") and "Description (Optional)" (set to "This is my unique selection of indicators and years."). There are "CANCEL" and "SAVE" buttons at the bottom. The background shows a table of indicators for the years 2021, 2022, and 2023.

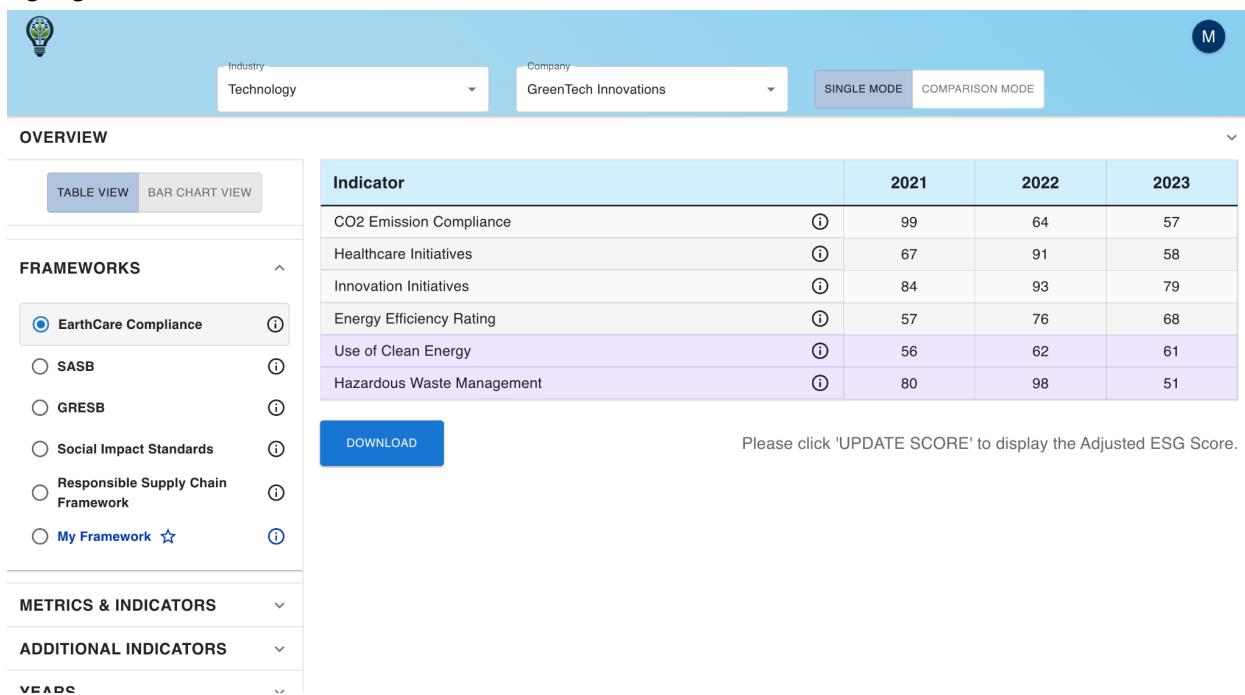
Indicator	2021	2022	2023
CO2 Emission Compliance	99	64	57
Healthcare Initiatives	67	91	58
Innovation Initiatives	84	93	79
Energy Efficiency Rating	57	76	68
Use of Clean Energy	56	62	61
Hazardous Waste Management	80	98	51

On save, a success message is displayed at the bottom of the page.

The screenshot shows the ESGlow interface with a success message at the bottom: "Custom framework saved successfully." The background table of indicators is identical to the one in the previous screenshot.

Indicator	2021	2022	2023
CO2 Emission Compliance	99	64	57
Healthcare Initiatives	67	91	58
Innovation Initiatives	84	93	79
Energy Efficiency Rating	57	76	68
Use of Clean Energy	56	62	61
Hazardous Waste Management	80	98	51

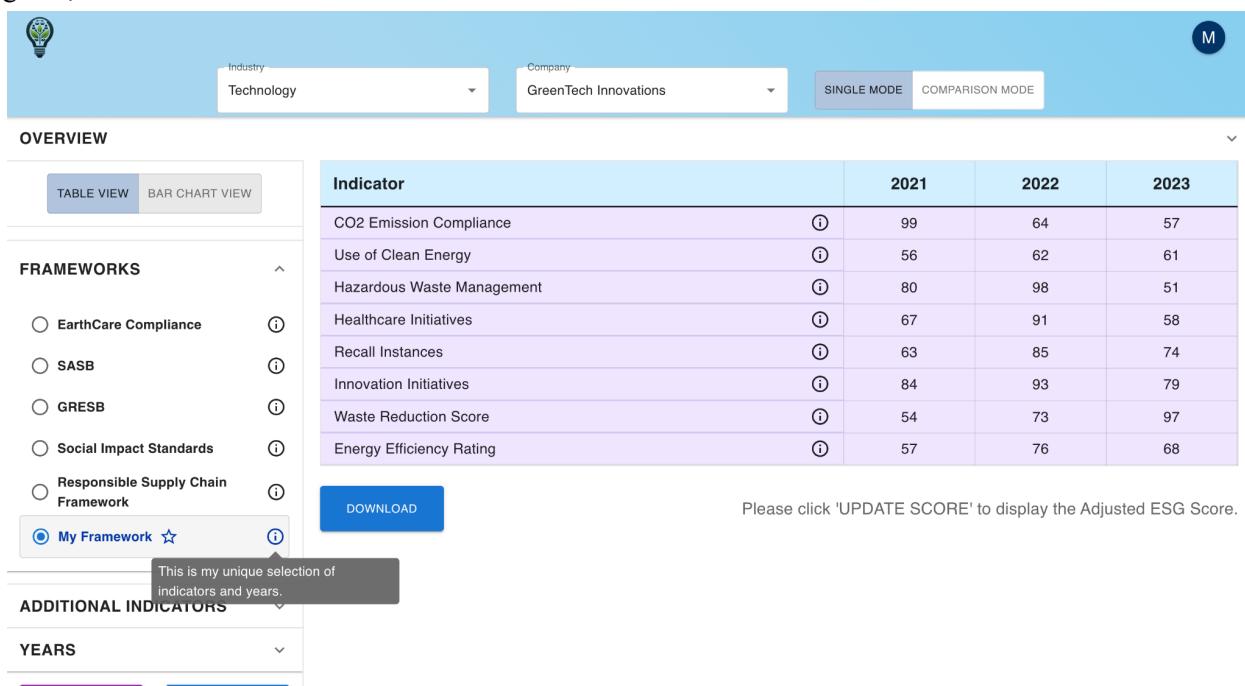
Scrolling to the “Frameworks” accordion, the newly saved custom framework is now available, highlighted in blue text with a star.



The screenshot shows the ESGlow platform's interface. At the top, there are dropdown menus for 'Industry' (Technology) and 'Company' (GreenTech Innovations), and buttons for 'SINGLE MODE' and 'COMPARISON MODE'. Below this is a navigation bar with 'OVERVIEW', 'TABLE VIEW' (selected), and 'BAR CHART VIEW'. A sidebar on the left has sections for 'FRAMEWORKS', 'METRICS & INDICATORS', and 'ADDITIONAL INDICATORS', with 'YEARS' at the bottom. In the 'FRAMEWORKS' section, 'My Framework' is selected and highlighted with a blue background and a star icon. The main content area displays a table of indicators for the years 2021, 2022, and 2023. A 'DOWNLOAD' button is at the bottom left, and a note at the bottom right says 'Please click 'UPDATE SCORE' to display the Adjusted ESG Score.'

Indicator	2021	2022	2023
CO2 Emission Compliance	99	64	57
Healthcare Initiatives	67	91	58
Innovation Initiatives	84	93	79
Energy Efficiency Rating	57	76	68
Use of Clean Energy	56	62	61
Hazardous Waste Management	80	98	51

On hover, the tooltip beside the custom framework includes the inputted description. If no description was given, it defaults to “Custom Framework”.



This screenshot is similar to the previous one but includes a tooltip. The 'My Framework' entry in the 'FRAMEWORKS' sidebar has a tooltip pointing to it with the text 'This is my unique selection of indicators and years.' The rest of the interface is identical to the first screenshot.

The user can view and manage their custom frameworks by clicking on their profile in the top right corner. Then click “Manage Custom Frameworks”.

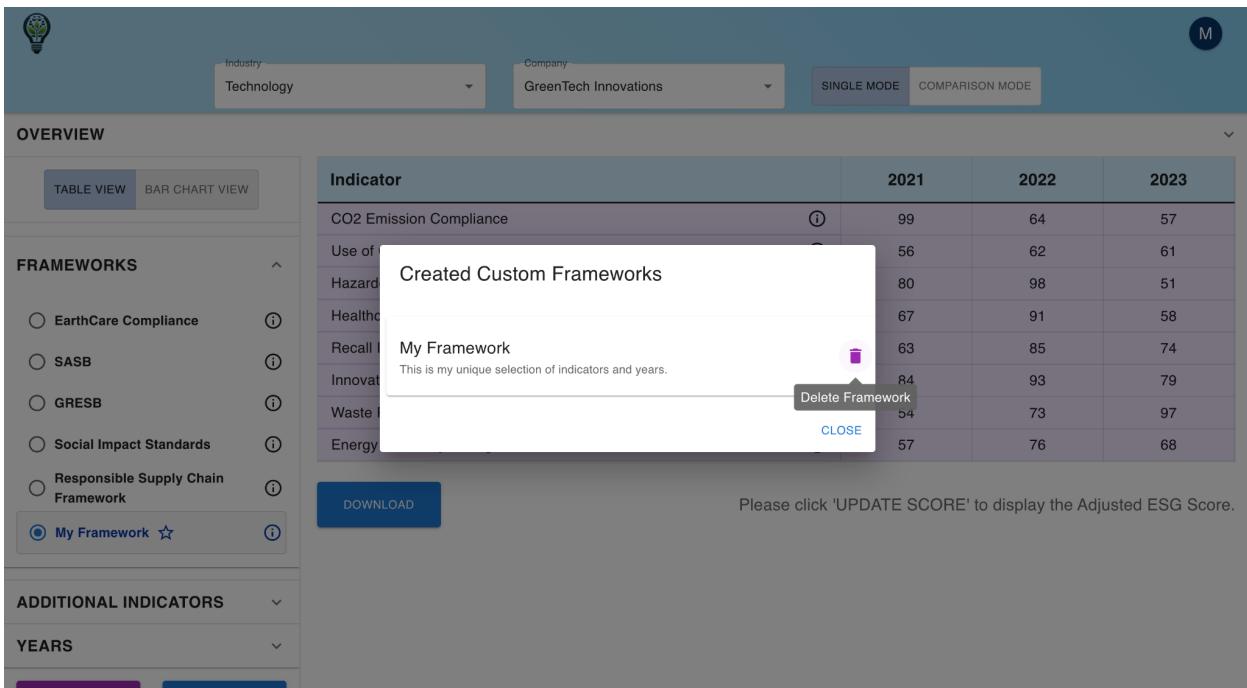
This screenshot shows the ESGlow platform's overview page. At the top, there are dropdown menus for 'Industry' (Technology) and 'Company' (GreenTech Innovations). Below these are buttons for 'SINGLE MODE' and 'COMPARISON MODE'. A user profile icon with the letter 'M' is in the top right. A dropdown menu from this icon includes 'Manage Custom Frameworks' and 'Logout'. The main area has tabs for 'OVERVIEW', 'TABLE VIEW' (which is selected), and 'BAR CHART VIEW'. On the left, there's a sidebar with sections for 'FRAMEWORKS' (EarthCare Compliance, SASB, GRESB, Social Impact Standards, Responsible Supply Chain Framework, My Framework), 'ADDITIONAL INDICATORS', and 'YEARS'. The main content area displays a table of indicators for the years 2021, 2022, and 2023. A 'DOWNLOAD' button is at the bottom left, and a note at the bottom right says 'Please click 'UPDATE SCORE' to display the Adjusted ESG Score.'

Indicator	2021	2022	2023
CO2 Emission Compliance	99	64	57
Use of Clean Energy	56	62	61
Hazardous Waste Management	80	98	51
Healthcare Initiatives	67	91	58
Recall Instances	63	85	74
Innovation Initiatives	84	93	79
Waste Reduction Score	54	73	97
Energy Efficiency Rating	57	76	68

A modal displays all the user's custom frameworks, including the name and description.

This screenshot shows the same overview page as above, but with a modal window open over it. The modal is titled 'Created Custom Frameworks' and contains the text 'My Framework' followed by the subtext 'This is my unique selection of indicators and years.' There is a 'CLOSE' button at the bottom right of the modal. The rest of the interface is dimmed to indicate the modal is active.

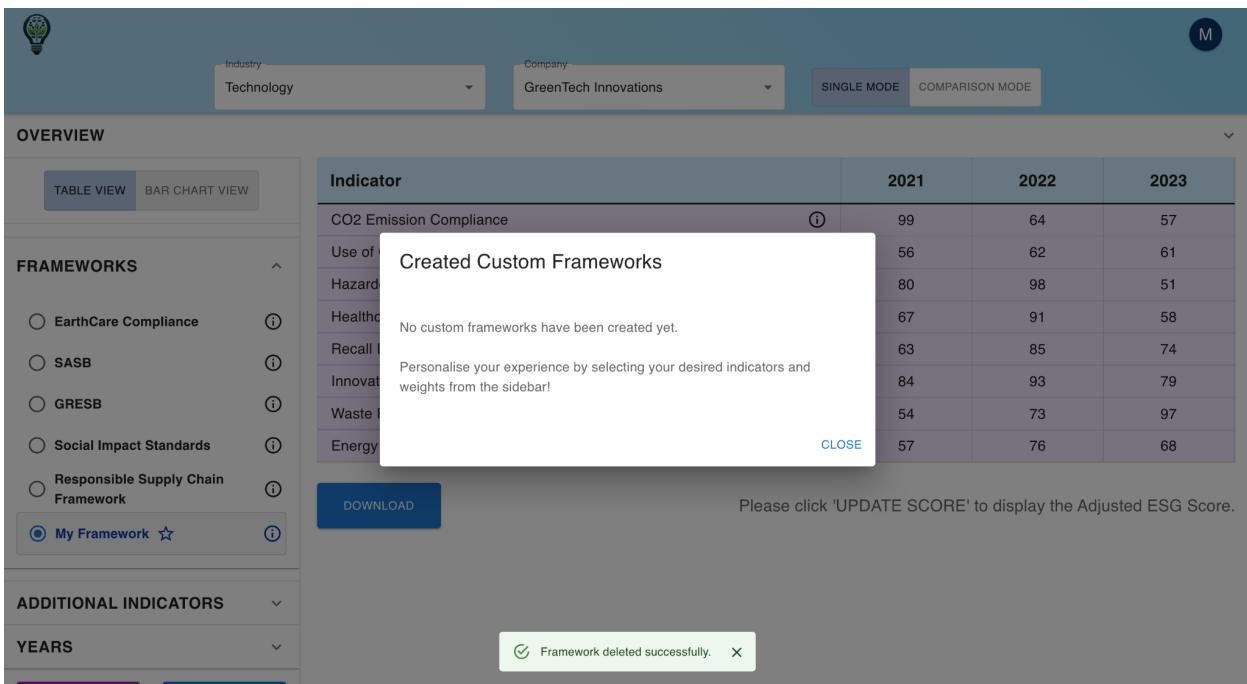
Beside each framework is a “Delete Framework” button.



The screenshot shows the ESGlow platform's overview page for GreenTech Innovations. A modal window titled "Created Custom Frameworks" is open over a table of indicators. The table includes columns for Indicator, 2021, 2022, and 2023. The "My Framework" row is highlighted. A "Delete Framework" button is visible at the bottom right of the modal. The background table shows various ESG metrics like CO2 Emission Compliance, Use of Hazardous Chemicals, and Energy Use, with values ranging from 54 to 99.

Indicator	2021	2022	2023
CO2 Emission Compliance	99	64	57
Use of Hazardous Chemicals	56	62	61
Hazardous Waste Management	80	98	51
Healthcare and Safety	67	91	58
Recall Rate	63	85	74
Innovation and Research	84	93	79
Waste Recycling	54	73	97
Energy Use	57	76	68

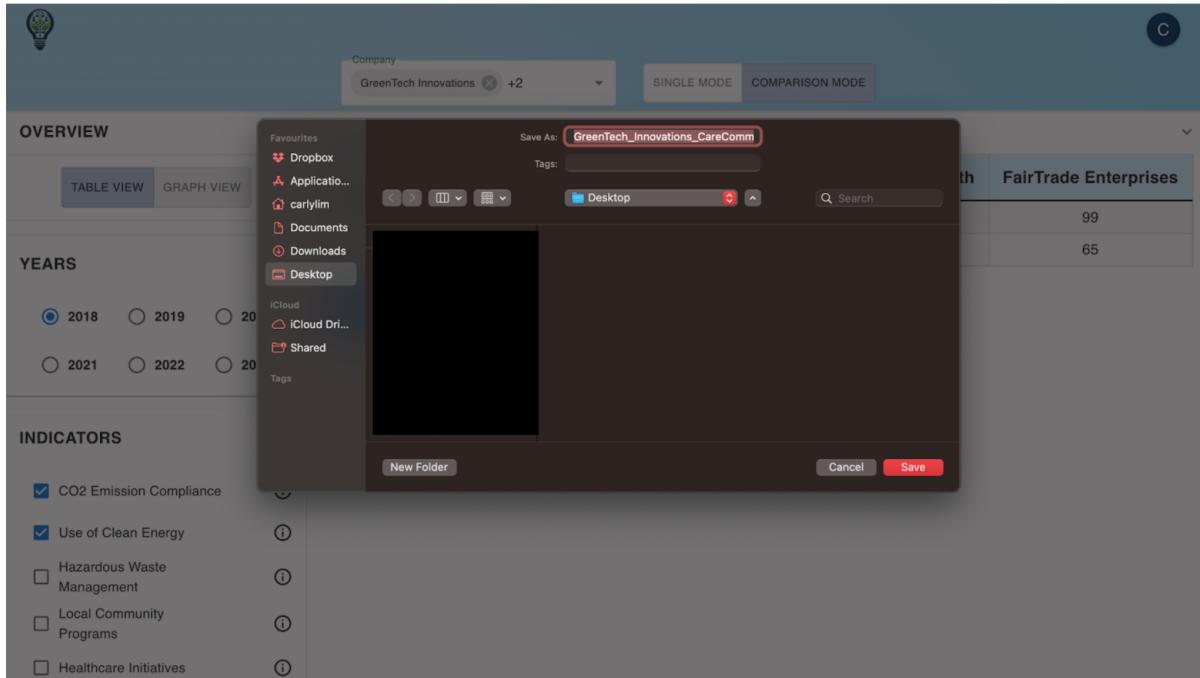
Upon clicking the delete button, a success message appears at the bottom of the page. If there are no custom frameworks, there is placeholder text that describes the role of the modal.



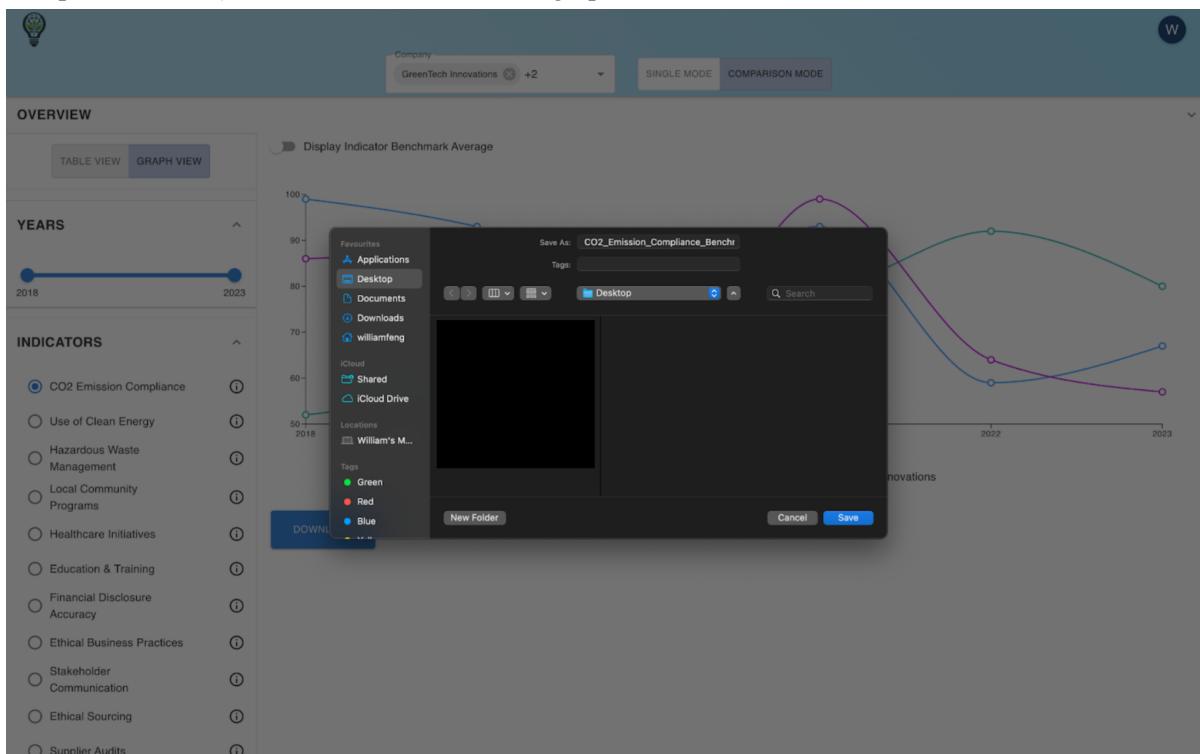
The screenshot shows the same ESGlow interface after a framework has been deleted. The modal now displays a message: "No custom frameworks have been created yet." Below the modal, a success message in a toast notification says "Framework deleted successfully." The rest of the interface remains the same, showing the overview table and sidebar options.

2.12 *Download Data

This is a novelty feature. A user can download the table as a CSV file, and the line graph as a SVG file. In the bottom left corner of the data display is a “Download” button that allows the user to download and save the table/graph to their computer.

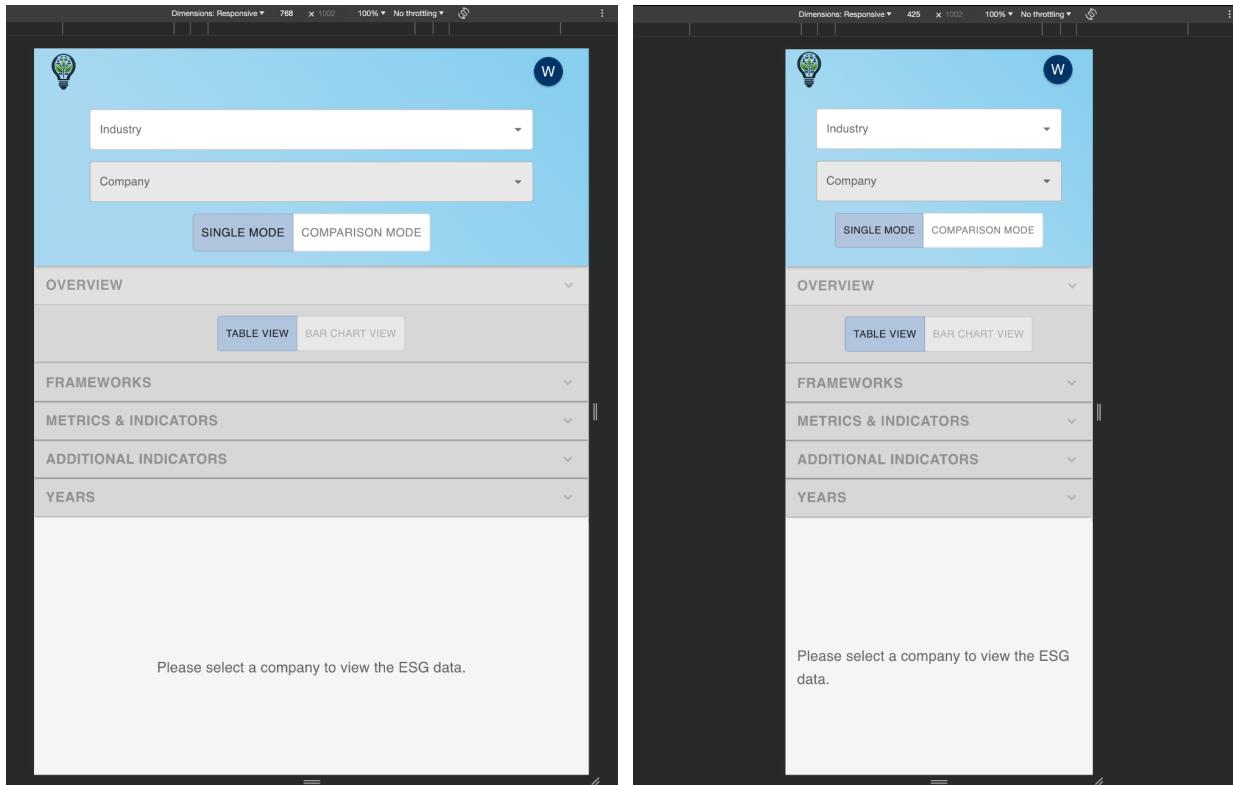


The file name for the table includes the selected company (for Single Mode) or companies (for Comparison Mode). The file name for the line graph includes the selected indicator.



2.13 Mobile Responsiveness

Although it is recommended for a user to open this app on a desktop for the best user experience, they are also able to view it on a tablet or mobile. At tablet size (768px) and mobile size (425px), the accordions become stacked and fill up the horizontal axis. All the functionality remains the same.



3. Third-Party Functionalities

3.1 Frontend

JavaScript vs TypeScript

In choosing the language for our Frontend, we were deciding between JavaScript and TypeScript. Our team is more familiar with JavaScript, having had prior experience writing in it, and given the limited time we have to spend on this project as well as the size of the project itself, using a simpler language is more efficient. Although TypeScript is more readable and maintainable than JavaScript, its benefits are only useful for a larger-scale project, and hence unproductive when considering the hurdle for our team to learn a new language. JavaScript has a vast ecosystem of libraries and frameworks, namely ReactJS, which promotes a component-based architecture that allows the use of modular and reusable components. This makes it easier to manage and maintain the code, which is especially useful for our project given the number of similar components across our code base. React also uses a virtual DOM to update the actual DOM, so that instead of updating the entire DOM when a change occurs, React only updates the parts that have changed. This leads to improved performance, especially for our application which boasts a dashboard that entails the frequent changing of data.

MUI

Material UI (MUI) is the popular choice for React UI frameworks as it follows Google's Material Design principles. It provides a consistent and professional user interface design. MUI offers a comprehensive set of pre-designed and customisable components, including buttons, accordions, tables and charts. By using these pre-built components, our team can spend more time on functionality rather than on design elements. Furthermore, MUI is designed with a mobile-first approach, ensuring a responsive application across different platforms and screen sizes.

While MUI provides ready-to-use components out of the box, it also allows for extensive customisation. We can easily adjust the look and feel of components to match our specific design requirements. This flexibility ensures that our application maintains a unique visual identity.

LICENSE: <https://mui.com/x/introduction/licensing/>

3.2 Backend

Python 3.11.x

In the process of selecting a language for our Backend to use, we considered a variety of different factors and development languages, especially in evaluating our product's design requirements and purposes, as well as ability to interact with both our Frontend and Database sections. As a language, Python3 was something our backend developers had pre-existing experience in using, especially for server and database purposes. Due to compatibility issues with the newer Python 3.12 and our intended libraries, we opted for the 3.11 version instead. Python's ease of usage with external libraries and modules, especially those our developers were familiar with, meant that when it came to serving our project's goals, Python3 was the best choice available.

Of major consideration as competition was Javascript, especially considering our usage choice of Javascript/Flask in our frontend. Sharing a lot of similar features such as extensive module support for backend servers and relative ease of use, we discarded Javascript in favour of Python primarily due to the previous experience of our backend developers, which did not all have Javascript knowledge or expertise, especially with deployment and serving endpoints.

Flask

Flask is a lightweight web framework for Python. We chose this as it was easier to learn, use and has less overhead, and is more flexible than other options like Django. Flask's status as a microframework meant it did not require external libraries or tools to use, simplifying the project architecture significantly. Flask is also well supported by community and developers, as well as being a framework that our backend developers had prior experience in using, having previously deployed remotely Flask backends written in Python3 in the past.

LICENSE: <https://flask.palletsprojects.com/en/1.1.x/license/>

Flask-RESTx

Flask RESTx is a fork of Flask-RESTPlus that supports newer versions of Python. It is an extension of Flask that simplifies the creation of REST APIs. It also supports input validation via models, and automatic Swagger documentation. This was especially useful for spontaneous, manual testing of existing APIs for when the need arose, as Swagger can act as an API client, serving HTTP requests to test the parameters, returns and status codes of our backend endpoints without having to write automatic tests or utilise a third party API client like Postman.

LICENSE: <https://github.com/python-restx/flask-restx/blob/master/LICENSE>

Flask-JWT-Extended

This library provides JSON Web Token (JWT) functionality, used for handling authentication and authorisation. Specifically, this library handled creating tokens, decoding and validating tokens as well as providing user identity for verifying access to existing backend endpoints through a secure, well-established industry practice. The inclusion of JWTs allowed for the protection of individual identities, to prevent others from accessing user-specific custom frameworks and data, without adding significant overhead or complications to existing engineering.

LICENSE: <https://github.com/vimalloc/flask-jwt-extended/blob/master/LICENSE>

Flask-SQLAlchemy

An API that allows our Flask App to connect to our database using SQLAlchemy, abstracting direct database interactions. This module let us easily manipulate, sort and filter the large amount of data we worked with over the course of this project, in a way that was familiar to all our backend/database developers. We considered using Psycopg2 only, but SQLAlchemy represented a modern, more Pythonesque way of development, with considerably higher ease of usage, support and expandability. Over the course of the project, our multiple sprints and from feedback accrued from our client, we had to adapt and expand our database schema repeatedly throughout the project, and SQLAlchemy helped cut down on the time spent refactoring our backend and subsequent queries.

LICENSE: <https://flask-sqlalchemy.palletsprojects.com/en/2.x/license/>

Flask-BCrypt

This module provides the functionality of Bcrypt hashing in password storage, for obvious security reasons when persisting data. It also allows us to verify entered passwords without decoding the stored hashes.

LICENSE: <https://github.com/maxcountryman/flask-bcrypt/blob/master/LICENSE>

Flask-Cors

This package allows for Cross Origin Resource Sharing in Flask, which is vital to allow for cross origin requests to function properly across our frontend and backend, as well as helps abstract away deciding whether or not CORS is active for all routes across our application. Depending on the way our application could be productionised in the future, this serves as important to prevent unauthorised access to the backend link.

LICENSE: <https://github.com/corydolphin/flask-cors/blob/main/LICENSE>

Pytest

The quintessential testing library for Python. We used this library for unit testing, ensuring that our features worked as intended, especially for the API endpoints.

LICENSE: <https://docs.pytest.org/en/7.1.x/license.html>

SMTP SSL:

In order to automate resetting passwords in Python, we decided to send verification codes through email to our customers to authenticate identity and set new passwords. With Python's standard SSL and SMTP libraries, we could create and send emails upon request.

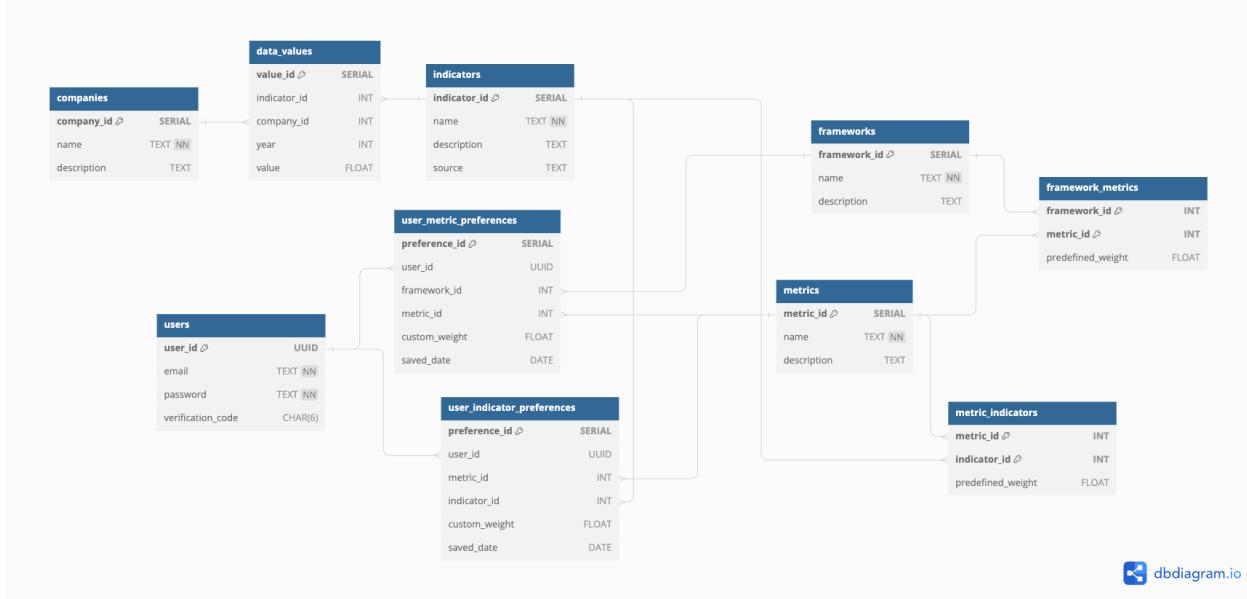
LICENSE: Most libraries have MIT or BSD licenses which are very permissive open-source licenses that allow for use in commercial applications. Therefore, the libraries used did not impose any significant restrictions on our application.

3.3 Database

PostgreSQL

In our project, to help manage the mock ESGData we would use in our web application, we required a strong, robust database management system that was intuitive and well-supported. We chose PostgreSQL as our relational database management system in conjunction with our choice to use SQLAlchemy throughout our backend as a reflection of our team's experience; all developers working on the backend/database had experience managing PostgreSQL databases, and as a result, this choice felt most natural. Not only did the system fit well into our architecture, but its overall popularity, ease of use and considerable support from its open-source nature and longevity made it a perfect fit for our needs in managing so much ESG-related data.

A diagram of the database schema used in our repository can be seen below.



3.4 Other

Docker

During the course of our project, we knew it was vital to continually test and build our entire web application throughout our multiple different sprints, especially with a constantly changing database. We used Docker and Docker Desktop to contain our PostgreSQL database and make the process of running and testing our application much easier.

However, one of the concerns we had with using the actual web application was the ease of usage, especially for non-technical customers like our target demographic, revolving around the general public. With our separate frontend, database and backend applications, users would have to have all three services running simultaneously for proper function. To resolve this issue, we used Docker to package all these services together to provide a seamless, single-source interface for customers to interact with, allowing the backend and database to be abstracted away as a background process. This method of development allows us to further make changes to each of the parts separately, before packaging up the product as its own standalone instance inside a Docker container.

4. Implementation Challenges

4.1 Authentication and Security

As with any application where sensitive user information like passwords are stored for user authentication and authorisation, we took steps to ensure user data is properly secured. With the Flask-BCrypt module, all passwords were hashed prior to storage, to ensure any potential leak would not release any raw passwords. With resetting a password, we decided to go for a randomised security code sent to the recipient's original email address, while ensuring that if the token was not correct, it would be immediately expired to prevent any misuse or potential malicious resetting.

4.2 Maintaining APIs and interfaces

Throughout the project, one of the major considerations we had as a team while working was both the code and knowledge gap between our members, specifically the requirements, parameters and returns of our backend APIs in communicating to and from our frontend display. In adhering to Agile development frameworks, and asynchronous work on different tickets and user stories, we sought to standardise our general APIs before any given functionality to ensure the knowledge level of each developer was flat, reducing assumptions and required backtracking if our requirements or implementation changed. By programming to a shared interface, we helped reduce specific implementation clashes, standardising and abstracting away how the backend and frontend worked with well-documented Flask-REST X endpoints. Automatically generated Swagger documentation helped put this information in an easily accessible and interactive form.

4.3 Docker and Pytest

Our backend depended on a running instance of our Postgres Database, which ran in a Docker container. Initially, we would have to restart the database every time we wanted to run the backend Pytests, to ensure the correct data was loaded for the tests. Not only was this inconvenient, but tests should be able to be run independently of the real production database. Therefore, we decided to create a separate database for testing, with its own data and running in a separate container to the production database. However, getting the container to automatically spin up when the user ran the tests proved to be challenging, in addition to rolling back all database transactions between tests, then finally tearing down the database and container.

4.4 Test-Driven Development

During the first sprint, we found it easy to stick to test-driven development, especially since the backend had little complexity at this stage. However, it became much harder to uphold test-driven development as features became increasingly complex, as it was often more intuitive to start writing functionality to actually get an understanding of what cases needed to be tested. In the later stages of the project, we definitely struggled to maintain TDD principles due to this increasing complexity in addition to time constraints where it seemed like tests were not the best use of time. However, we adapted to finding the right balance between having sufficient test coverage and avoiding excessive testing of trivial functionalities, saving us some time and making it easier to uphold the TDD principles. Most importantly, we were also able to guarantee that the backend functions and API endpoints were working as expected, bug-free, and always returning the correct values to the frontend.

4.5 Modularising Components

As our project evolved, we identified instances of overlap among components, leading to unnecessary repetition in our codebase. Recognising the need for efficiency and maintainability, we strategically addressed this challenge by modularising common components, such as Sidebar accordions. Prior to developing any new components, we adopted a more comprehensive code design approach, allowing us to foresee potential overlaps and proactively prepare modularised components. Custom hooks for all the API endpoints were also created and categorised into a separate folder, since this proved necessary to reduce the amount of clutter within a file, allowing components to potentially use the same fetch request without duplication or complicated state management. Likewise, the inclusion of useContext to prevent excessive prop drilling between components proved effective when refactoring our code, fostering clearer development in the future. This strategic shift not only minimised redundancy but also enhanced reusability, making our codebase more organised and easier to maintain.

4.6 Dynamic Data Fetch

In our development process, we opted for a dynamic calculation of ESG scores displayed in the Overview section, as opposed to fetching fixed data from the database. This decision allowed our application to adapt seamlessly to changes in company data, whether it's updates, additions, or deletions of ESG score data. By embracing dynamic calculations, our application becomes more flexible and ready for future extensions, ensuring it remains robust and adaptable to evolving data scenarios. Likewise, the inclusion of 'messy data' (for example industries without companies or indicators that appear in more than one metric) meant that our web application handles the edge cases nicely, reflecting real world challenges.

4.7 Feedback Implementation and Engineering Practice

We encountered challenges in managing pre-existing user stories and integrating feedback from both the tutor and the client from the first sprint. While the insights were invaluable, the introduction of new functionalities sometimes proved overwhelming, especially when communicated late into the sprint due to the client's busy schedule. Learning from the initial hurdles in the first sprint, we adopted a more strategic approach in the subsequent sprints. By prioritising and completing the majority of user stories early, we positioned ourselves to handle any additional workload. This adjustment allowed us to strike a balance between fulfilling user stories, incorporating tutor feedback, and meeting the client's evolving requirements to their utmost satisfaction. Our effective teamwork and collaboration, agile practices from sprint planning to standups, code reviews (including GitHub pull request comments and approvals) and adopting the positives and improvements from the retrospective played a pivotal role in achieving this.

4.8 Comprehensive Documentation

As our collaborative efforts intensified throughout the project, our codebase expanded, presenting challenges related to code clarity and seamless collaboration. Instances of ambiguity in variable and function names, coupled with insufficient communication about previous changes, led to confusion and increased debugging time for subsequent developers. Recognizing the critical role of documentation, we took proactive measures to enhance communication not only for future users but also among the development team. We prioritised writing detailed commit messages and comprehensive pull request descriptions, summarizing each update. This deliberate documentation strategy significantly accelerated our ability to understand previous work, creating a more efficient and streamlined workflow.

5. Installation Documentation

Please note that more detailed documentation about the installation and code structure is provided in the GitHub repository through the README files within the three directories. A user manual is also provided at the end of this report.

5.1 Method 1: docker-compose

Our docker-compose file will automatically install all required dependencies for the app, then startup the frontend, backend and database. The method using Docker containerises the web application, allowing it to run regardless of the user's installed versions or dependencies, or the specific operating system (compatible for Windows, Mac and Linux).

Requirements

- Download the latest version of Docker Desktop at <https://docs.docker.com/desktop/install>

Instructions

1. From the root directory, execute the startup script: `./start.sh`
The terminal should show the dependencies being installed, then the services starting up.
Expect the total install time to be 3-10 minutes depending on the machine.
2. Navigate to `http://localhost:3000`

5.2 Method 2: Manual Installation

However, if you would prefer to run the backend, frontend and database separately for development purposes, there is an option to do so.

Requirements

- The latest version of Docker Desktop
- Node 21.1.0
- Pip
- Python 3.11.x

Instructions

1. Navigate to the backend directory: `backend/`
Execute `pip install --no-cache-dir -r requirements.txt`
2. Navigate to the frontend directory: `frontend/`
Execute `npm install`
3. Navigate to the database directory:
Execute `./init_db.sh`
4. In a separate terminal, navigate to the backend directory
Execute `python run.py`
5. In a separate terminal, navigate to the frontend directory
Execute `npm start`
6. The website should open in your browser at the link <http://localhost:3000/>.

6. References List

- Amel-Zadeh, A. and Serafeim, G. (2018) ‘*Why and how investors use ESG information: Evidence from a global survey*’, *Financial Analysts Journal*, 74(3), pp. 87–103. doi:10.2469/faj.v74.n3.2.
- Docker community (2023) *Docker Documentation*. Available at: <https://docs.docker.com/> (Accessed: 17 November 2023).
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- Flask community (2023) *SQLAlchemy*. Available at: <https://flask-sqlalchemy.palletsprojects.com/en/3.1.x/> (Accessed: 14 November 2023).
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- Python community (2023) *Welcome to Python.org* Available at: <https://www.python.org/> (Accessed: 10 November 2023).
- React Reference Overview (2023) *React*. Available at: <https://react.dev/reference/react> (Accessed: 14 November 2023).

1.1 Login with existing user account



The screenshot shows the ESGlow login page. At the top, the word "ESGlow" is written in large white letters. Below it is a stylized lightbulb icon containing a green plant and a balance scale. The tagline "Empower Your Investments" is centered below the icon. A descriptive paragraph follows, stating: "With ESGlow, venture beyond mere numbers. Harness the power of an intuitive design with digestible ESG data tailored just for you. Unravel the potential of user-friendly insights to champion informed decisions!" At the bottom, there are three service icons: "Profound Corporate Insights" (bar chart), "Benchmark Company Performance" (double arrow), and "Personalised Data Interpretations" (graph). A red downward arrow points from the "LOG IN" button on the right side of the login form towards the "3. Access Dashboard" section.

Welcome Back!

Log in to access your dashboard

1. Input login details

Email Address *

Password *

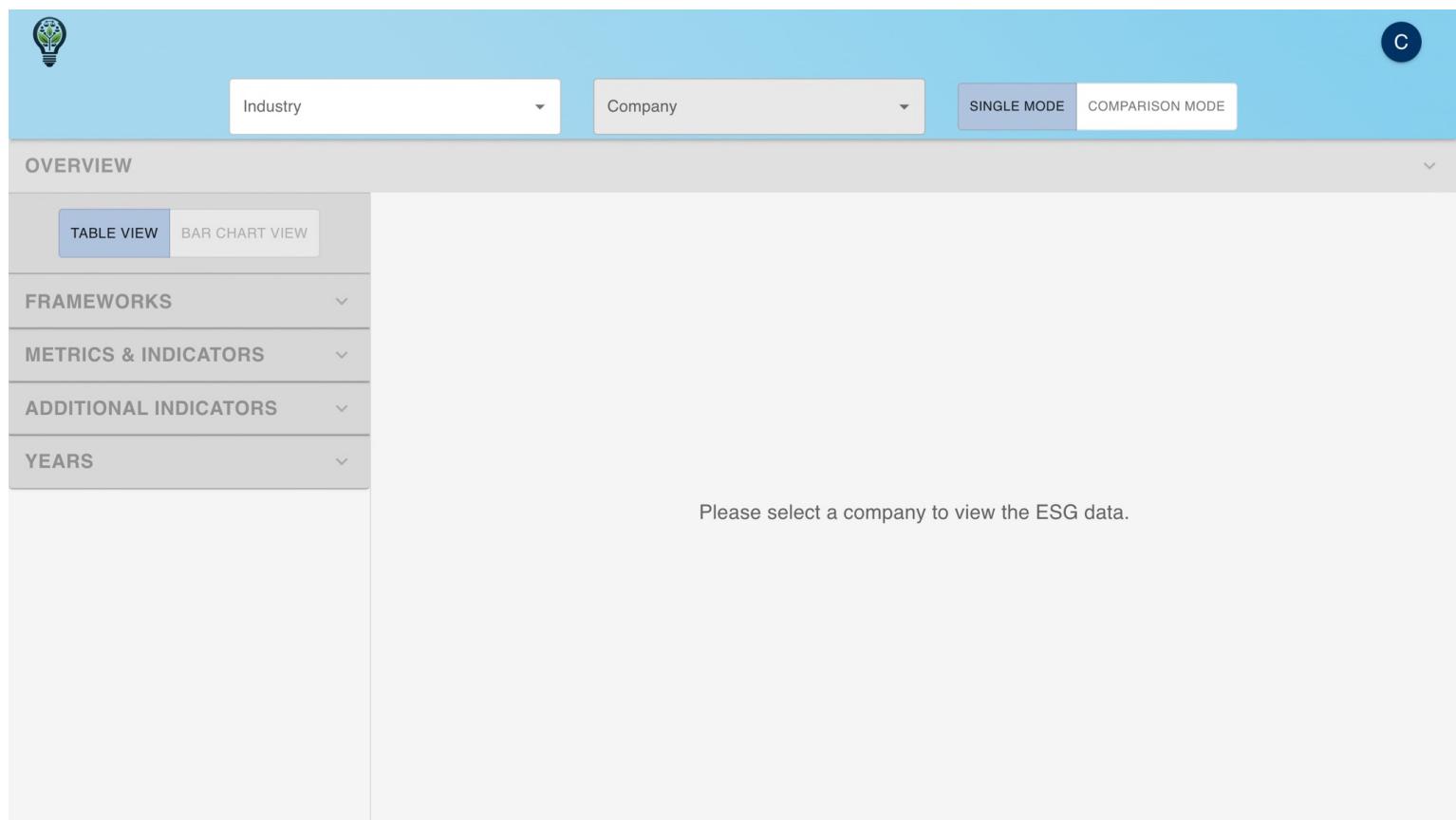
[Forgot password?](#)

LOG IN

Don't have an account?
[Register here](#)

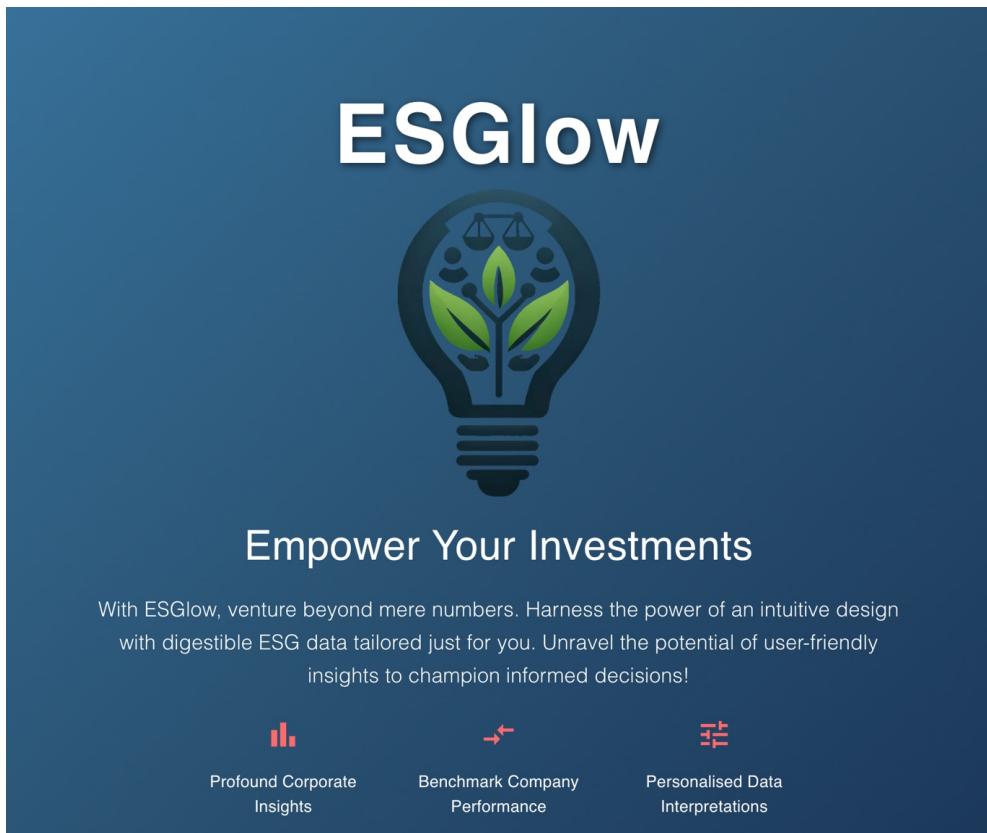
2. Click "LOG IN"

3. Access Dashboard (See Section 2 and onwards)



The screenshot shows the ESGlow dashboard. At the top, there are dropdown menus for "Industry" and "Company", and buttons for "SINGLE MODE" and "COMPARISON MODE". On the left, a sidebar lists filter categories: "OVERVIEW", "TABLE VIEW" (selected), "BAR CHART VIEW", "FRAMEWORKS", "METRICS & INDICATORS", "ADDITIONAL INDICATORS", and "YEARS". The main content area displays a message: "Please select a company to view the ESG data." A red downward arrow points from the "LOG IN" button on the login page towards this message.

1.2 Register a new user account



The screenshot shows the ESGlow homepage with a dark blue background. At the top is the ESGlow logo, which is a lightbulb containing a green leaf and a balance scale. Below the logo is the tagline "Empower Your Investments". Underneath this, there is a brief description: "With ESGlow, venture beyond mere numbers. Harness the power of an intuitive design with digestible ESG data tailored just for you. Unravel the potential of user-friendly insights to champion informed decisions!" At the bottom of the page are three sections with icons and text: "Profound Corporate Insights" (bar chart icon), "Benchmark Company Performance" (arrow icon), and "Personalised Data Interpretations" (balance scale icon).

Welcome Back!

Log in to access your dashboard

Email Address *

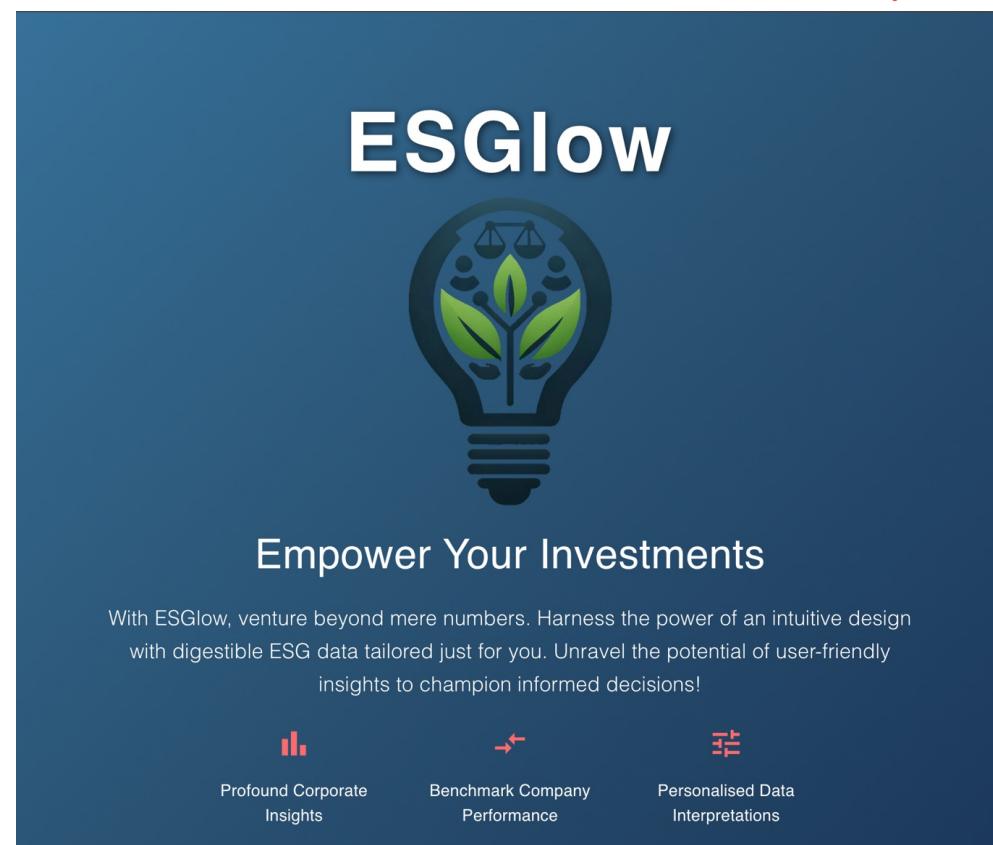
Password *

[Forgot password?](#)

[LOG IN](#)

Don't have an account?
[Register here](#)

1. Click "Register here"



The screenshot shows the ESGlow registration page. It features the same dark blue header and logo as the homepage. Below the logo is the tagline "Empower Your Investments". A brief description follows: "With ESGlow, venture beyond mere numbers. Harness the power of an intuitive design with digestible ESG data tailored just for you. Unravel the potential of user-friendly insights to champion informed decisions!" At the bottom are the three feature sections: "Profound Corporate Insights", "Benchmark Company Performance", and "Personalised Data Interpretations". To the right of the registration form, there is a note: "Already have an account? [Log in here](#)".

2. Enter new user account details

Create Your Account!

Enter your details to get started

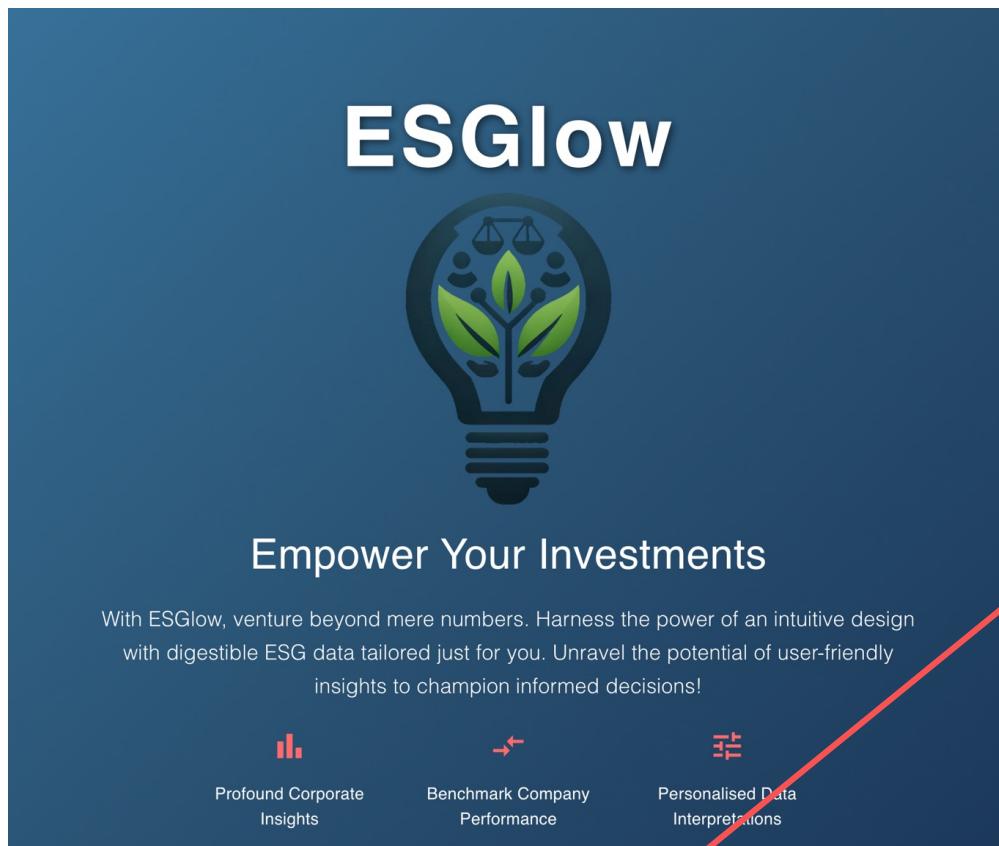
Name *
<input type="text"/>
Email Address *
<input type="text"/>
Password *
<input type="password"/>
Confirm Password *
<input type="password"/>
REGISTER

Already have an account? [Log in here](#)

3. Click "REGISTER"

The page will navigate to Dashboard (See Section 2 and onwards)

1.3 Find forgotten password of an existing account



1. Click “Forgot password?”

Forgot Password?

Enter the email associated with your account, and we'll send you a code to reset your password.

Email Address *

NEXT

Remember your password? [Return to login](#)

2. Enter a valid email to receive reset password code

Verify Your Code

Enter the verification code sent to

Verification Code *

VERIFY

Go back to [login page](#)

3. Enter verification code sent to email specified in step 2

Set New Password

Enter your new password below.

New Password*

...

Confirm New Password*

...

CONFIRM

Remembered your password? Return to login

4. Enter new password

Password Reset Successful

You can now use your new password to log in.

GO TO LOGIN

5. Upon confirmation of successful password reset, click "GO TO LOGIN"

This will redirect to the landing page. Log in using the new password (See Section 1.1)

ESGlow



Empower Your Investments

With ESGlow, venture beyond mere numbers. Harness the power of an intuitive design with digestible ESG data tailored just for you. Unravel the potential of user-friendly insights to champion informed decisions!

Profound Corporate
Insights

Benchmark Company
Performance

Personalised Data
Interpretations

Welcome Back!

Log in to access your dashboard

Email Address *

Password *

[Forgot password?](#)

LOG IN

Don't have an account?

[Register here](#)

2. Dashboard : Summary

The screenshot shows the ESG Dashboard interface. At the top, there is a navigation bar with a lightbulb icon, dropdown menus for 'Industry' and 'Company', and three mode selection buttons labeled A, B, and C. Buttons A and B are highlighted with red circles, while C is a solid blue circle. Below the navigation bar is a section titled 'OVERVIEW' with tabs for 'TABLE VIEW' (selected) and 'BAR CHART VIEW'. On the left, there is a sidebar with dropdown menus for 'FRAMEWORKS', 'METRICS & INDICATORS', 'ADDITIONAL INDICATORS', and 'YEARS'. The main content area displays a message: 'Please select a company to view the ESG data.'

Toggle between the two modes:

- Single Mode
- Comparison Mode

A. Single Mode (See section 2.1)

Get all the ESG score information you need for a single company. This includes:

- A qualitative overview of company description
- Dynamic table view of frameworks, metrics and indicators scores, filtered by chosen set of years
- Bar chart visualization of above data
- Save the table and/or bar chart
- Tooltips displaying data source
- Custom indicator weight & resultant Adjusted ESG score
- Custom framework able to be saved and accessed in future

B. Comparison Mode (See Section 2.2)

Compare ESG score between selected companies. This includes:

- An overview of average, best, worst ESG scores of chosen companies
- Dynamic table view of chosen indicators scores, filtered by chosen year
- Graph visualization of companies indicators scores across chosen range of years, with indicator benchmark average
- Tooltips displaying data source

2.1 Single Mode

The screenshot shows the ESG Data Platform's user interface in Single Mode. At the top, there are two dropdown menus: 'Industry' and 'Company'. Below them are buttons for 'SINGLE MODE' and 'COMPARISON MODE'. On the left, a sidebar lists 'OVERVIEW', 'FRAMEWORKS', 'METRICS & INDICATORS', 'ADDITIONAL INDICATORS', and 'YEARS'. In the center, a message says 'Please select a company to view the ESG data.' A large red arrow points downwards from the top menu area towards the expanded dropdowns.

1. Select an industry

The screenshot shows the 'Industry' dropdown expanded. The 'Technology' option is highlighted and selected. A red box surrounds the 'Industry' dropdown, and a red arrow points to the list of industry options: Technology, Healthcare, Finance, Manufacturing, and Energy.

2. Select a company

The screenshot shows the 'Company' dropdown expanded. The 'GreenTech Innovations' option is highlighted and selected. A red box surrounds the 'Company' dropdown, and a red arrow points to the list of company options: GreenTech Innovations and FutureDriven Tech.

This is the page displayed upon selecting a company. There are three main sections:

A

OVERVIEW

Industry: Technology Company: GreenTech Innovations

SINGLE MODE COMPARISON MODE

GreenTech Innovations

Leading the forefront in technological advancements, GreenTech Innovations is dedicated to creating state-of-the-art solutions that champion greener, more sustainable urban environments.

71.4 ESG Rating ⓘ

71.1 Industry Mean

1/2 Industry Ranking

ESG Rating

80
70
60

2018 2019 2020 2021 2022 2023

B

TABLE VIEW BAR CHART VIEW

FRAMEWORKS METRICS & INDICATORS ADDITIONAL INDICATORS YEARS

C

Please select a framework or at least one of the additional indicators to view the ESG data.

A. Overview

This section is a summary of the selected company and their ESG standing compared to the industry associated. All information displayed in the Overview is dynamically fetched from the backend database upon new selection of company.

OVERVIEW

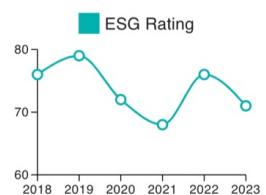
GreenTech Innovations

Leading the forefront in technological advancements, GreenTech Innovations is dedicated to creating state-of-the-art solutions that champion greener, more sustainable urban environments.

71.4

ESG Rating ⓘ

71.1
Industry Mean
1/2
Industry Ranking



Tooltip for more information on the calculation for ESG score

Graph of ESG score over the years

Brief introduction of the company

Company's performance compared to the Industry

B. Sidebar

This section is composed of:

- toggle between Table View and Bar Chart View
- accordions reveal for users to select frameworks, metrics & indicators, additional indicators (any not included in selected framework, if any was chosen), and years
 - user selection dynamically changes section C. Data Display
- save custom frameworks button
 - user can save custom frameworks with specified weights
- update score button
 - adjusted ESG score is calculated with newly selected indicator(s) and weight(s)

TABLE VIEW

BAR CHART VIEW

i. FRAMEWORKS

ii. METRICS & INDICATORS

iii. ADDITIONAL INDICATORS

iv. YEARS

SAVE CUSTOM
FRAMEWORK

UPDATE SCORE

i. Frameworks (Single select)

FRAMEWORKS

- EarthCare Compliance** (i)
- SASB** A protocol emphasising on environmental integrity and sustainable practices.
- GRESB** (i)
- Social Impact Standards** (i)
- Responsible Supply Chain Framework** (i)
- abc ★** (i)

Any custom frameworks saved shows up here

Hover over tooltip for more information on the framework

ii. Metrics & Indicators (Multi select + User input field)

Each metric is a drop-down, consisting of indicators associated to the metric

METRICS & INDICATORS

Hover over tooltip for more information on the metric / indicator

- Product Responsibility** (i) 0.35 ▾
 - CO2 Emission Compliance (i) 0.5
 - Energy Efficiency Rating (i) 0.5
- Digital Integration** (i) 0.25 ▾
- Diversity & Inclusion** (i) 0.4 ▾

Click on pre-defined weight field to enter custom weight

iii. Additional Indicators (Multi select + User input field)

ADDITIONAL INDICATORS ^

Use of Clean Energy

(i) 0

Click on weight field to enter custom weight

Hazardous Waste Management

(i) 0

Local Community Programs

(i) 0

Education & Training

(i) 0

Financial Disclosure Accuracy

(i) 0

Hover over tooltip for more information on the indicator

Ethical Business Practices

(i) 0

Stakeholder Communication

(i) 0

Ethical Sourcing

(i) 0

Supplier Audits

(i) 0

Employee Satisfaction

(i) 0

*Indicators displayed are those that are not part of the framework chosen in (i) Framework accordion.

Thus, if nothing was selected in (i) Frameworks accordion, users can expect to see ALL indicators possible to populate this accordion. (See Section 2.1.3)

iv. Years (Multi select)

YEARS ^

2018

2019

2020

2021

2022

2023

This accordion is populated with the years which ESG data is available for

C. Data Display

This section changes dynamically upon any new user selection in section B. Sidebar. There is also an option to download the current data display. At the bottom right corner, an “Adjusted ESG Score” is displayed upon clicking “UPDATE SCORE” in B. Sidebar

This is an example display of Table View

Indicator		2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	(i)	86	87	57	99	64	57
Healthcare Initiatives	(i)	87	93	59	67	91	58
Recall Instances	(i)	84	72	88	63	85	74
Innovation Initiatives	(i)	60	58	65	84	93	79
Waste Reduction Score	(i)	92	87	71	54	73	97
Energy Efficiency Rating	(i)	72	98	54	57	76	68

DOWNLOAD

For tables, a .csv file is saved.

For graphs, a .svg file is saved.

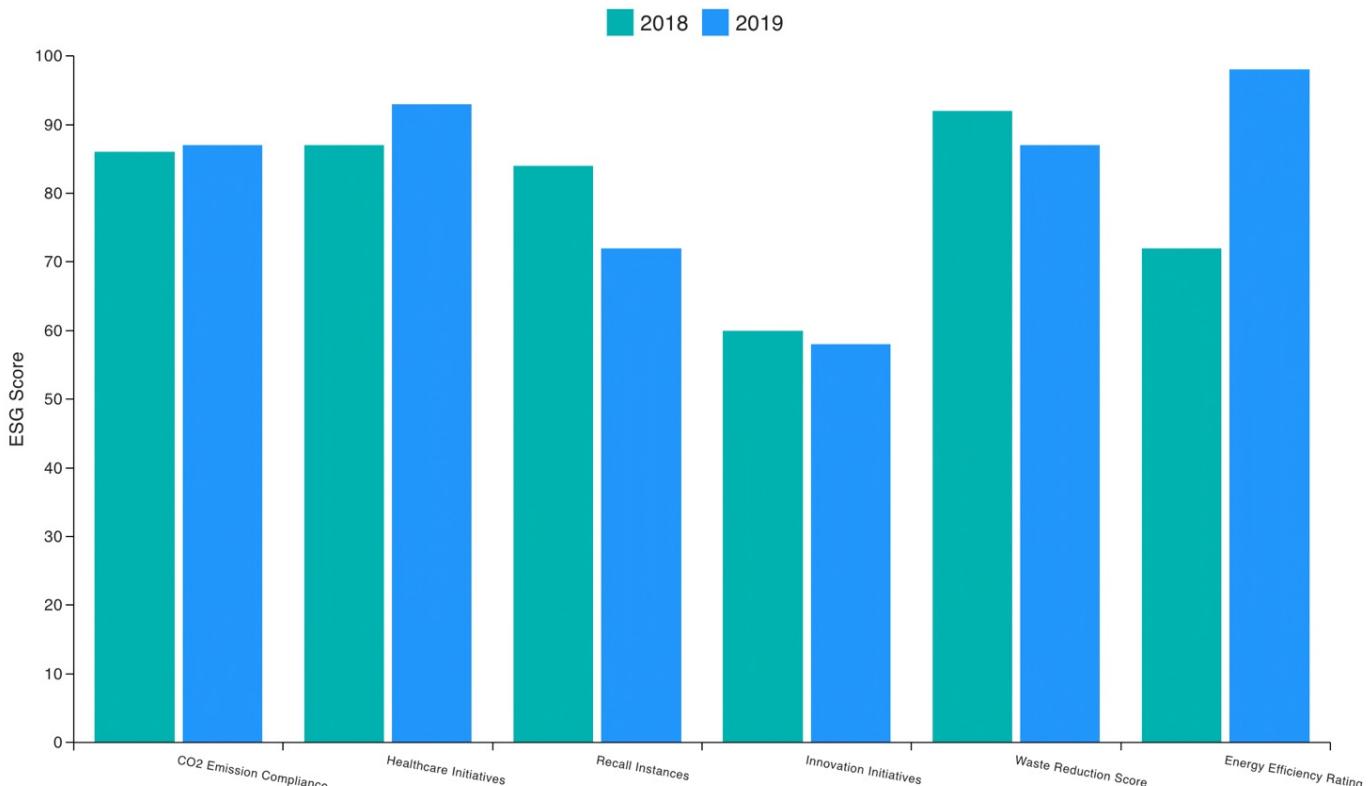
Please click 'UPDATE SCORE' to display the Adjusted ESG Score.

Hover over tooltip for more information on the source of data

Adjusted ESG Score: **70.835**

Example display upon clicking “UPDATE SCORE”

This is an example display of Bar Chart View



2.1.1 Single Mode Example: Simple selection of framework, deselection of metric / indicators

1. Select a framework

The screenshot shows a user interface for an ESG score dashboard. At the top, there are dropdown menus for 'Industry' (Technology) and 'Company' (GreenTech Innovations), and buttons for 'SINGLE MODE' and 'COMPARISON MODE'. A red arrow points from the 'FRAMEWORKS' section to the 'EarthCare Compliance' option, which is highlighted with a red box. Below this, a table displays scores for various indicators across years 2018 to 2023. A red box highlights the 'Indicator' column header. A red arrow points from the 'METRICS & INDICATORS' section down to the 'Metrics & Indicators' accordion, which is also highlighted with a red box. Inside the accordion, several metrics are listed with their weights: Product Responsibility (0.35), CO2 Emission Compliance (0.5), Energy Efficiency Rating (0.5), Digital Integration (0.25), and Diversity & Inclusion (0.4). A red box highlights the 'Product Responsibility' row. A red arrow points from the 'METRICS & INDICATORS' section down to the 'Metrics & Indicators' accordion.

All years are pre-selected as default

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

Table displays scores from pre-selected years and metrics
Please click 'UPDATE SCORE' to display the Adjusted ESG Score.

*By default, no adjusted ESG score displays until "UPDATE SCORE" is clicked manually

Metrics & Indicators accordion populates automatically with the associated metrics of the chosen framework, all pre-selected, which populates Data Display section

Weight inputs are pre-filled as well.

METRICS & INDICATORS

- Product Responsibility (0.35)
- CO2 Emission Compliance (0.5)
- Energy Efficiency Rating (0.5)
- Digital Integration (0.25)
- Diversity & Inclusion (0.4)

Upon clicking “UPDATE SCORE”, the Adjusted ESG Score appears

The screenshot shows the 'METRICS & INDICATORS' section with the following selected items:

- Product Responsibility (0.35)
- CO2 Emission Compliance (0.5)
- Energy Efficiency Rating (0.5)
- Digital Integration (0.25)
- Diversity & Inclusion (0.4)

Below this section are 'ADDITIONAL INDICATORS' and 'YEARS' dropdowns. At the bottom are 'SAVE CUSTOM FRAMEWORK' and 'UPDATE SCORE' buttons, with the 'UPDATE SCORE' button highlighted by a red box.

The main area displays a table of indicators from 2018 to 2023. The 'Indicator' column lists: CO2 Emission Compliance, Healthcare Initiatives, Recall Instances, Innovation Initiatives, Waste Reduction Score, and Energy Efficiency Rating. The '2018' column shows values: 86, 87, 84, 60, 92, and 72 respectively. The 'Adjusted ESG Score' is displayed as 70.835.

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	86	87	57	99	64	57
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68

Adjusted ESG Score is calculated using the most recent scores of the selected indicators, applying the ratio of each respective weight provided.

2. Deselect metrics / indicators

A large red checkmark is placed over the 'METRICS & INDICATORS' heading. The 'Product Responsibility' item is now deselected, indicated by an empty checkbox. The other indicators remain selected: CO2 Emission Compliance, Energy Efficiency Rating, Digital Integration, and Diversity & Inclusion.

The 'UPDATE SCORE' button is highlighted by a red box. Below it, a success message box says "Selections updated successfully." The 'Adjusted ESG Score' is now 75.323.

The table data remains the same as in the previous screenshot.

Indicator	2018	2019	2020	2021	2022	2023
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97

Table rows update instantly upon deselection

Adjusted ESG Score: 75.323

Selections updated successfully.

Upon clicking “UPDATE SCORE” after deselecting, a new score displays, calculated newly from the indicators still selected

2.1.2 Single Mode Example: Input custom weight for indicator, get new Adjusted ESG Score

OVERVIEW

METRICS & INDICATORS

Indicator	2018	2019	2020	2021	2022	2023
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	79	97	68	75.323		
Waste Reduction Score	79	97	68	75.323		
Energy Efficiency Rating	0.5	0.5	0.5	0.5	0.5	0.5
Digital Integration	0.25	0.25	0.25	0.25	0.25	0.25
Diversity & Inclusion	0.4	0.4	0.4	0.4	0.4	0.4

ADDITIONAL INDICATORS

YEARS

SAVE CUSTOM FRAMEWORK UPDATE SCORE

Enter New Weight
Please enter a value with at most 3 decimal places.

2. Input a new weight (value of 3 decimal places) and click "SAVE"

1. Click a weight input field for modal to pop up

METRICS & INDICATORS

Indicator	2018	2019	2020	2021	2022	2023
Healthcare Initiatives	87	93	59	67	91	58
Recall Instances	84	72	88	63	85	74
Innovation Initiatives	60	58	65	84	93	79
Waste Reduction Score	92	87	71	54	73	97
Energy Efficiency Rating	72	98	54	57	76	68
Digital Integration	0.25	0.25	0.25	0.25	0.25	0.25
Diversity & Inclusion	0.4	0.4	0.4	0.4	0.4	0.4

ADDITIONAL INDICATORS

YEARS

SAVE CUSTOM FRAMEWORK UPDATE SCORE

Adjusted ESG Score 72.760

Orange background indicates custom weight inputted

Selections updated successfully.

3. Click "UPDATE SCORE" to update new Adjusted ESG score. This calculation is done with the new custom weight

2.1.3 Single Mode Example: Additional indicators selected

This is an example of selecting Additional Indicators after selecting a framework

ADDITIONAL INDICATORS	
<input checked="" type="checkbox"/> Use of Clean Energy	(i) 0.5
<input checked="" type="checkbox"/> Hazardous Waste Management	(i) 0.5
<input type="checkbox"/> Local Community Programs	(i) 0
<input type="checkbox"/> Education & Training	(i) 0
<input type="checkbox"/> Financial Disclosure Accuracy	(i) 0
<input type="checkbox"/> Ethical Business Practices	(i) 0
<input type="checkbox"/> Stakeholder Communication	(i) 0
<input type="checkbox"/> Ethical Sourcing	(i) 0

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	(i) 86	87	57	99	64	57
Healthcare Initiatives	(i) 87	93	59	67	91	58
Recall Instances	(i) 84	72	88	63	85	74
Innovation Initiatives	(i) 60	58	65	84	93	79
Waste Reduction Score	(i) 92	87	71	54	73	97
Energy Efficiency Rating	(i) 72	98	54	57	76	68
Use of Clean Energy	(i) 76	75	76	56	62	61
Hazardous Waste Management	(i) 71	80	85	80	98	51

DOWNLOAD
Adjusted ESG Score: **63.692**

Note the Additional Indicators only show indicators not included in chosen framework

Additional indicators are distinguished by purple background to the table rows

This is an example of selecting Additional Indicators without selecting a framework

Industry

Technology

Company

GreenTech Innovations

C

SINGLE MODE
COMPARISON MODE

OVERVIEW

TABLE VIEW
BAR CHART VIEW

FRAMEWORKS
METRICS & INDICATORS

ADDITIONAL INDICATORS

Indicator	2018	2019	2020	2021	2022	2023
CO2 Emission Compliance	(i) 86	87	57	99	64	57
Use of Clean Energy	(i) 76	75	76	56	62	61

DOWNLOAD

Please click 'UPDATE SCORE' to display the Adjusted ESG Score.

Selecting a framework is *optional*. Data display can populate from selection of only Additional Indicators.

2.1.4 Single Mode Example: Custom frameworks

Upon selecting any combination of pre-existing framework and/or additional indicators, with any custom weights, users can decide to save it as their own unique custom framework to reuse it again.

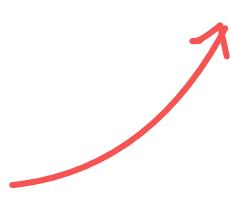
The screenshot shows the ESG Scorecard interface. At the top, there are filters for 'Industry' (Technology), 'Company' (GreenTech Innovations), and mode selection ('SINGLE MODE' is selected). On the left, there are sections for 'OVERVIEW', 'FRAMEWORKS', 'METRICS & INDICATORS', 'ADDITIONAL INDICATORS', and 'YEARS'. The 'SAVE CUSTOM FRAMEWORK' button is highlighted with a red box. In the center, a modal dialog box titled 'Save Custom Framework' is open, asking for a name and description. The 'Unique Custom Framework Name*' field contains 'New Custom'. A red box highlights this input field. To the right of the dialog, a callout box with a red border contains the instructions: '2. Enter a name and optionally, a description of custom framework then click "SAVE"'. Below the dialog, the 'DOWNLOAD' button is visible. In the bottom right corner, the 'Adjusted ESG Score: 63.418' is displayed.

FRAMEWORKS

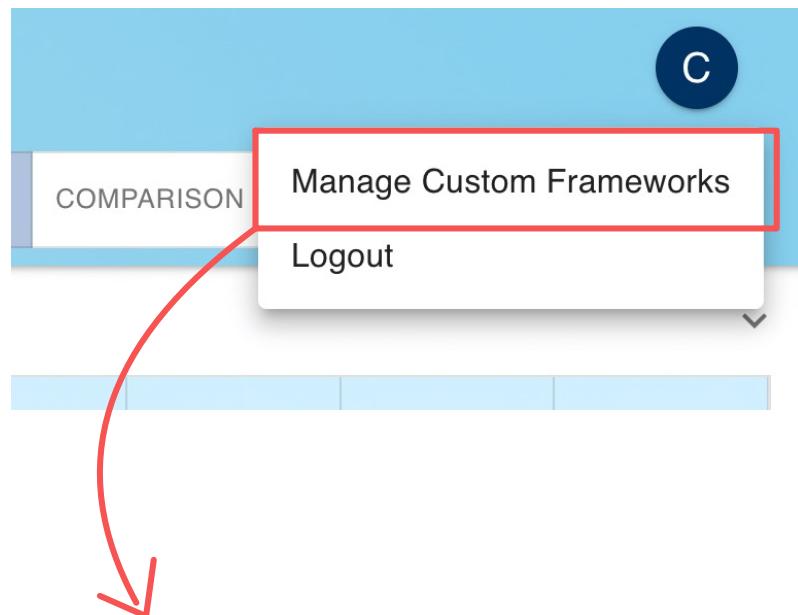
- EarthCare Compliance (i)
- SASB (i)
- GRESB (i)
- Social Impact Standards (i)
- Responsible Supply Chain Framework (i)
- New Custom ★ (i)

The custom framework now exists in the Frameworks accordion, available for selection.

It is colored blue with a star emoticon as a distinction to pre-existing frameworks.



Click into the profile icon in the right top hand corner to manage custom frameworks



A screenshot of the main dashboard. At the top, there are filters for 'Industry: Technology' and 'Company: GreenTech Innovations', and mode buttons for 'SINGLE MODE' and 'COMPARISON MODE'. On the left, there's a sidebar with sections like 'R CHART VIEW', 'Partners', 'Standards', 'Supply Chain', and 'ATORS'. The main area shows a table with columns for 'Indicator' (partially visible), '2019', '2020', '2021', and '2022'. One row shows 'CO2 Emission Compliance' with a value of 86. A modal window titled 'Created Custom Frameworks' is open over the table. It contains a list item 'New Custom Framework' with a small purple trash bin icon next to it. A red circle highlights this trash bin icon. In the bottom right corner of the modal, there's a 'CLOSE' button. A red arrow points from the 'Logout' step in the first screenshot to this trash bin icon in the second screenshot. Another red arrow points from the trash bin icon to a callout box at the bottom right of the dashboard.

Any custom frameworks are listed here

Created Custom Frameworks

New Custom Framework

CLOSE

Clicking the bin icon will delete the custom framework

Note that this custom framework is unique to the user's account. In other words, no other user is able to access this custom framework

2.2 Comparison Mode

The screenshot shows the top navigation bar of the ESG Data Platform. On the left is a lightbulb icon. In the center is a search bar with the placeholder "Company". To the right of the search bar are two buttons: "SINGLE MODE" and "COMPARISON MODE", with "COMPARISON MODE" being highlighted. Below the navigation bar is a grey sidebar labeled "OVERVIEW" with "YEARS" and "INDICATORS" dropdown menus. The main content area is currently empty and displays the message "Please select at least one company to view the ESG data." A red arrow points from the "Company" search bar down to the company selection modal.

A modal window titled "Company" is displayed. It contains a list of selected companies: "GreenTech Innovations", "CareCommunity Health", and "FairTrade Enterprises", each with a close button (X). To the right of the modal, a red text overlay reads "Select up to three companies to compare". Below the modal is a list of companies with checkboxes: "GreenTech Innovations" (checked), "CareCommunity Health" (checked), "FairTrade Enterprises" (checked), "FutureDriven Tech" (unchecked), "UnityGlobal Services" (unchecked), and "MediTech Solutions" (unchecked).

Company	Status
GreenTech Innovations	Selected
CareCommunity Health	Selected
FairTrade Enterprises	Selected
FutureDriven Tech	Not Selected
UnityGlobal Services	Not Selected
MediTech Solutions	Not Selected

This is the page displayed upon selecting one or more companies. The three sections of Overview, Sidebar, Data Display remain the same as Single Mode.

The screenshot shows the 'OVERVIEW' section of the application. At the top, there is a search bar with 'Company' placeholder text, a dropdown menu showing 'GreenTech Innovations +2', and mode buttons for 'SINGLE MODE' and 'COMPARISON MODE'. Below this, a large red circle labeled 'A' highlights the main summary area. This area displays the 'Portfolio ESG Rating' (76.6), 'Best Performer' (79.5), and 'Worst Performer' (71.3). To the right is a bar chart titled 'Portfolio Breakdown' comparing the three selected companies. Below the summary area is a sidebar with 'TABLE VIEW' and 'GRAPH VIEW' buttons, and dropdown menus for 'YEARS' and 'INDICATORS'. A red circle labeled 'B' highlights the sidebar. A red circle labeled 'C' highlights the message 'Please select a year to view the ESG data.' at the bottom of the sidebar.

A. Overview

This section is a summary of the selected companies ESG Scores. All information displayed in the Overview is dynamically fetched from the backend database upon any new selection of company.

The screenshot shows the 'OVERVIEW' section of the application with several annotations in red. A red circle highlights the 'Portfolio ESG Rating' value of 76.6. A red arrow points down from this value to a tooltip: 'Tooltip for more information on the calculation for ESG score'. Another red arrow points down from the 'Best Performer' value of 79.5 to another tooltip: 'Summary of best and worst performers out of selected companies'. A third red arrow points down from the 'Worst Performer' value of 71.3 to a tooltip: 'Bar Chart breakdown comparing ESG scores of the selected companies'. The main content area displays the 'List of companies selected' (GreenTech Innovations, CareCommunity Health, FairTrade Enterprises) and the 'Portfolio Breakdown' bar chart.

B. Sidebar

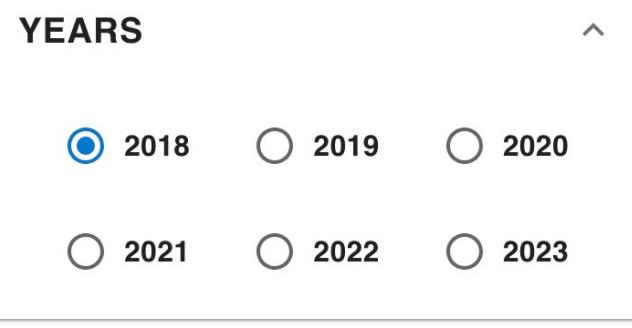
This section is composed of:

- toggle between Table View and Graph View
 - this changes the type of selection for both Years and Indicators accordions
- accordions reveal for users to select years and indicators
 - user selection dynamically changes section C. Data Display

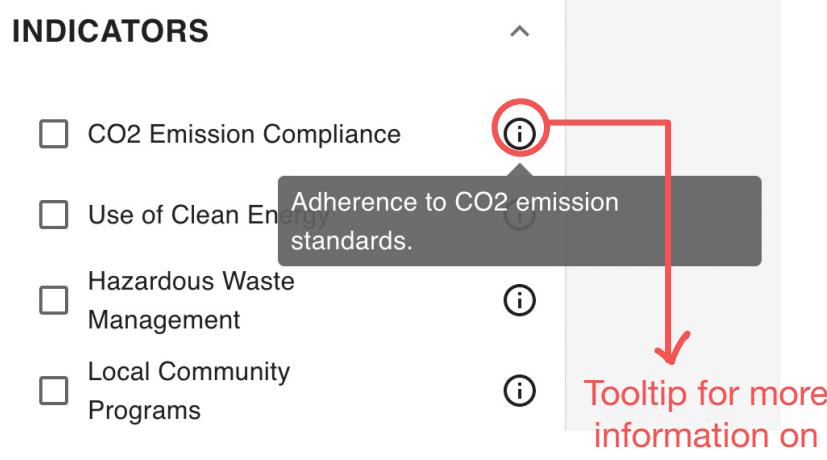


For Table View: Years (Single select)

For Table View: Indicators (Multi select)



For Graph View: Years (Slider)



Tooltip for more information on the indicator

For Graph View: Indicators (Single select)



INDICATORS

- CO2 Emission Compliance
- Use of Clean Energy
- Hazardous Waste



C. Data Display

This section changes dynamically upon any new user selection in section B. Sidebar. There is also an option to download the current data display.

This is an example of Table View

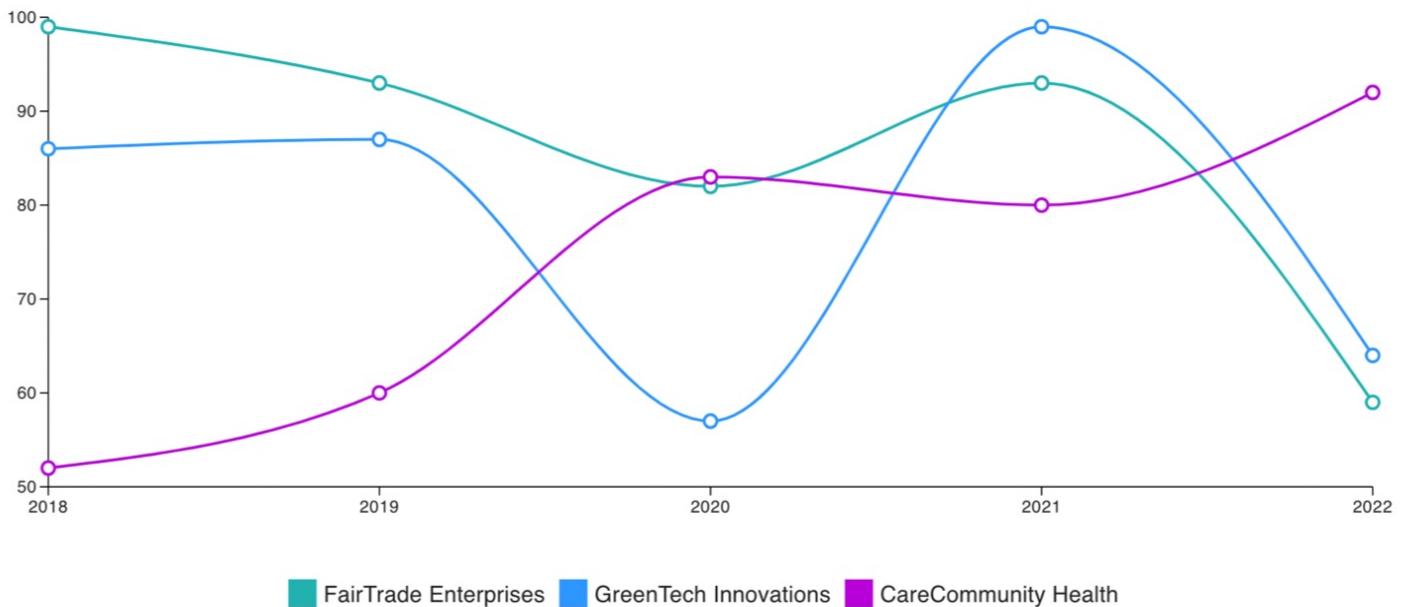
Indicator		GreenTech Innovations	CareCommunity Health	FairTrade Enterprises
CO2 Emission Compliance	(i)	86	52	99
Use of Clean Energy	(i)	76	53	65
Hazardous Waste Management	(i)	71	58	57
Local Community Programs	(i)	53	78	95
Ethical Sourcing	(i)	80	83	97
Employee Satisfaction	(i)	64	94	96
Health & Safety Initiatives	(i)	58	57	51

DOWNLOAD

Hover over tooltip for more information on the source of data

This is an example of Graph View

Display Indicator Benchmark Average



DOWNLOAD

2.2.1 Comparison Mode Example: Using Table View

1. Select a year

The screenshot shows a user interface for comparing company performance. At the top, there's a navigation bar with a lightbulb icon, a company dropdown set to "GreenTech Innovations +2", and mode buttons for "SINGLE MODE" and "COMPARISON MODE". The main area is titled "OVERVIEW" and has tabs for "TABLE VIEW" (selected) and "GRAPH VIEW". A sidebar on the left allows selecting years (2018-2023) and indicators (CO2 Emission Compliance, Use of Clean Energy, Hazardous Waste Management, Local Community Programs, Ethical Sourcing, Employee Satisfaction, Health & Safety Initiatives). A red arrow points from the "2018" radio button in the years section to the "2018" radio button in the table header. Another red arrow points from the "Healthcare Initiatives" checkbox in the indicators sidebar to the "Health & Safety Initiatives" indicator in the table. The table itself compares four companies: GreenTech Innovations, CareCommunity Health, and FairTrade Enterprises, across the selected indicators and years. A "DOWNLOAD" button is located at the bottom left of the table area.

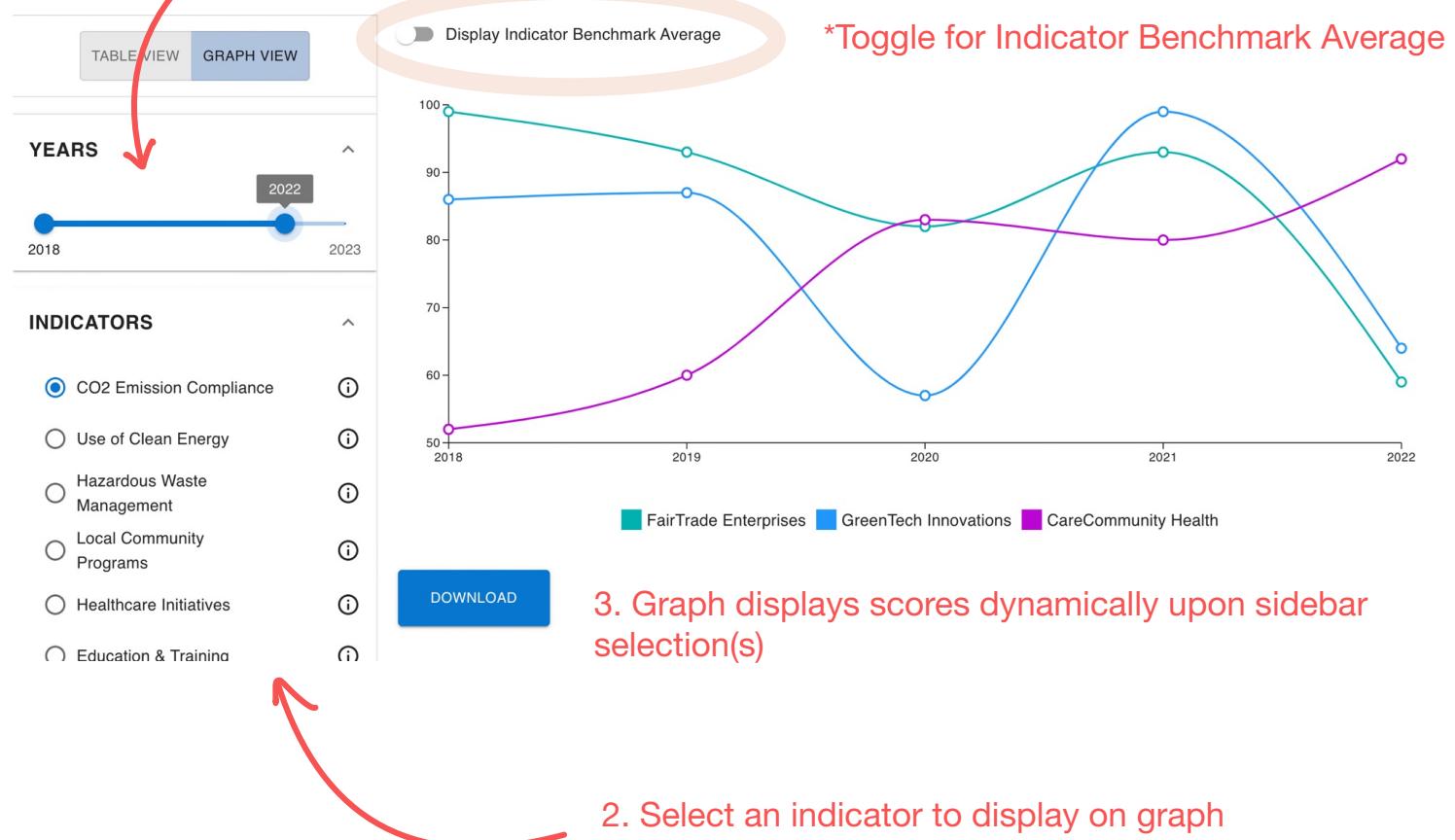
Indicator	GreenTech Innovations	CareCommunity Health	FairTrade Enterprises
CO2 Emission Compliance ⓘ	86	52	99
Use of Clean Energy ⓘ	76	53	65
Hazardous Waste Management ⓘ	71	58	57
Local Community Programs ⓘ	53	78	95
Ethical Sourcing ⓘ	80	83	97
Employee Satisfaction ⓘ	64	94	96
Health & Safety Initiatives ⓘ	58	57	51

3. Table displays scores dynamically upon sidebar selection(s)

2. Select one or more indicators to compare the companies on

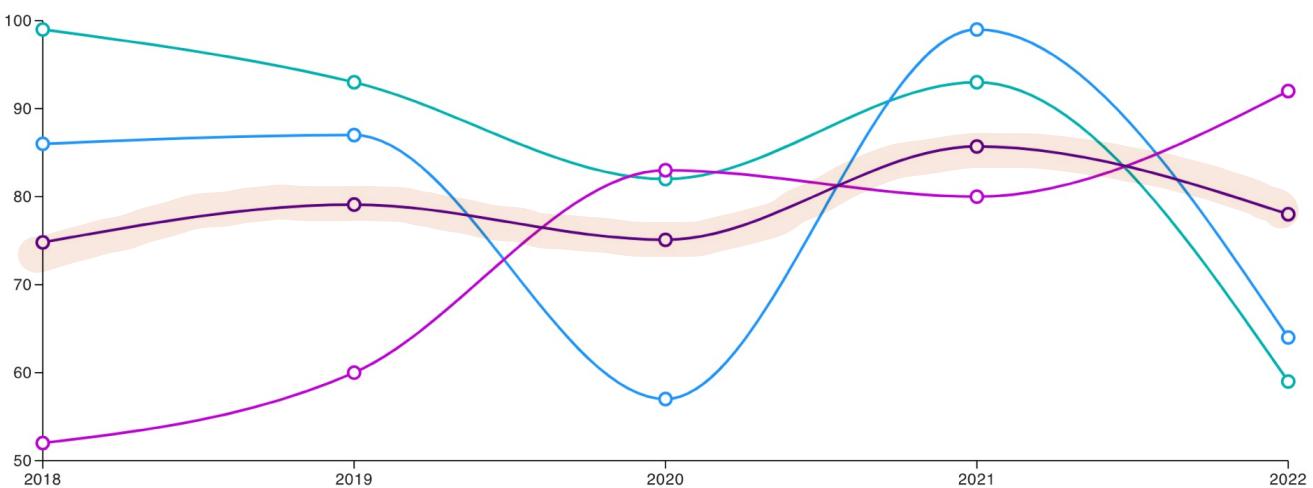
2.2.2 Comparison Mode Example: Using Graph View

1. Set Years slider (maximum range by default)



This is an example display with Indicator Benchmark Average toggled.

Display Indicator Benchmark Average



DOWNLOAD

A new line is added to the graph, displaying the average score of the indicator