pathfinder© user guide

app.climatepositivedesign.com

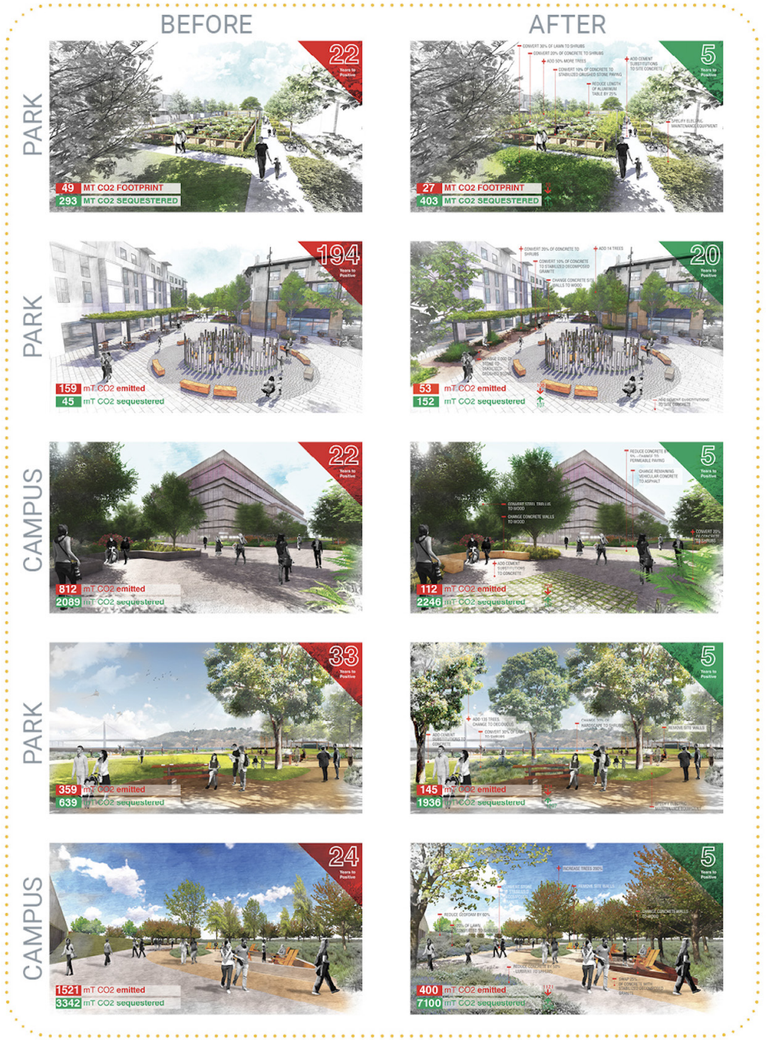
Welcome to Pathfinder 3.0!

This is your guide to:

1. Understand how to meet the Climate Positive Design Challenge
2. Learn about related tools and suggested use
3. Explore each step and feature in Pathfinder 3.0

Let’s get started

climatepositive design challenge



Targets are based on a 2019 industry study by CPD which assessed project improvement potential.

set your goals

Use Pathfinder to meet the **Climate Positive Design Challenge** targets.

Go **BEYOND NEUTRAL. BE CLIMATE POSITIVE!**

The **Climate Positive Design Challenge** is a voluntary industry program managed by Climate Positive Design that reports progress on meeting the UNFCCC Paris Agreement and IPCC 1.5°C Special Report goals.

The Challenge tracks emissions reductions and sequestration increases on projects in the exterior built and natural environment logged in the **Pathfinder** application. Established in 2019, the program set the following targets for how many years each project type would strive to offset its own emissions:

years to
climate positive design

5	20	25
parks, gardens, campus, etc.	plazas and streetscapes	infrastructure

For a complete list of project types see: https://climatepositivedesign.com/advocacy/

Carbon Conscience > Climate Positive Design Roadmap

If your project is in an early master planning stage, consider starting your analysis in Carbon Conscience before transitioning into Pathfinder.

Carbon Conscience is an application for evaluating potential carbon impacts of urban design when quantity takeoffs are not yet available.

If your project concept already has general quantities, you can begin in Pathfinder.

Pathfinder 3.0 aligns with the Carbon Conscience dataset, and is meant to be used from Concept (25% Design) through Construction Documentation (100% Design).

Use Pathfinder during each phase of design to set project goals, test design ideas, iterate, refine and measure the final project impacts.

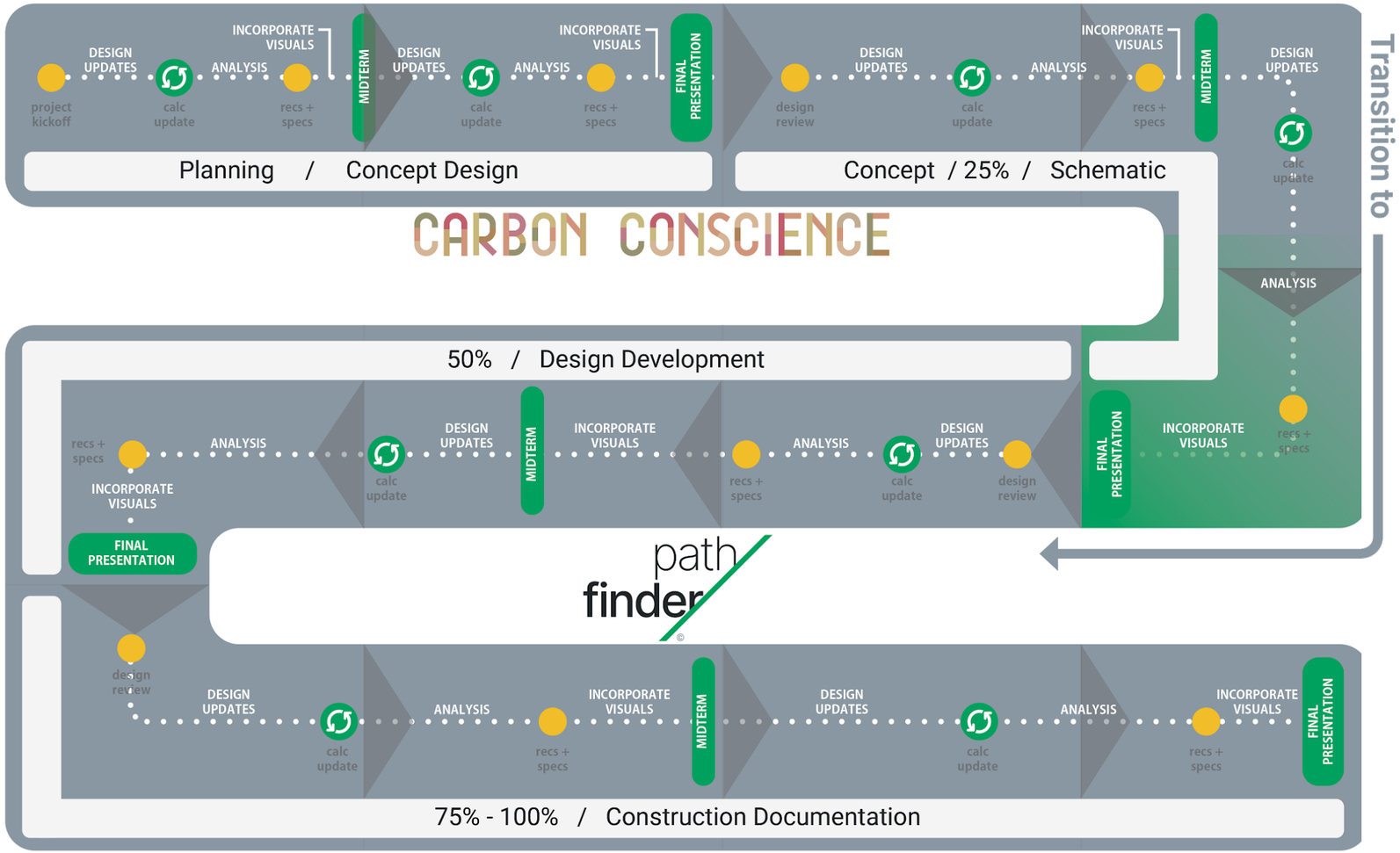
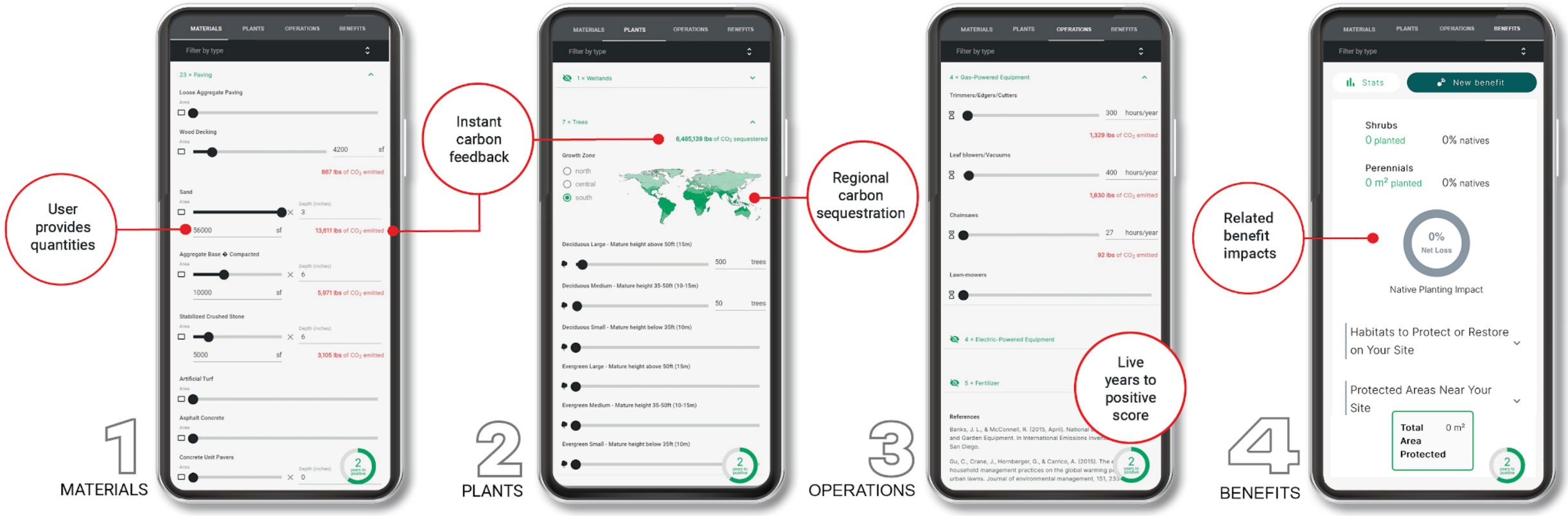
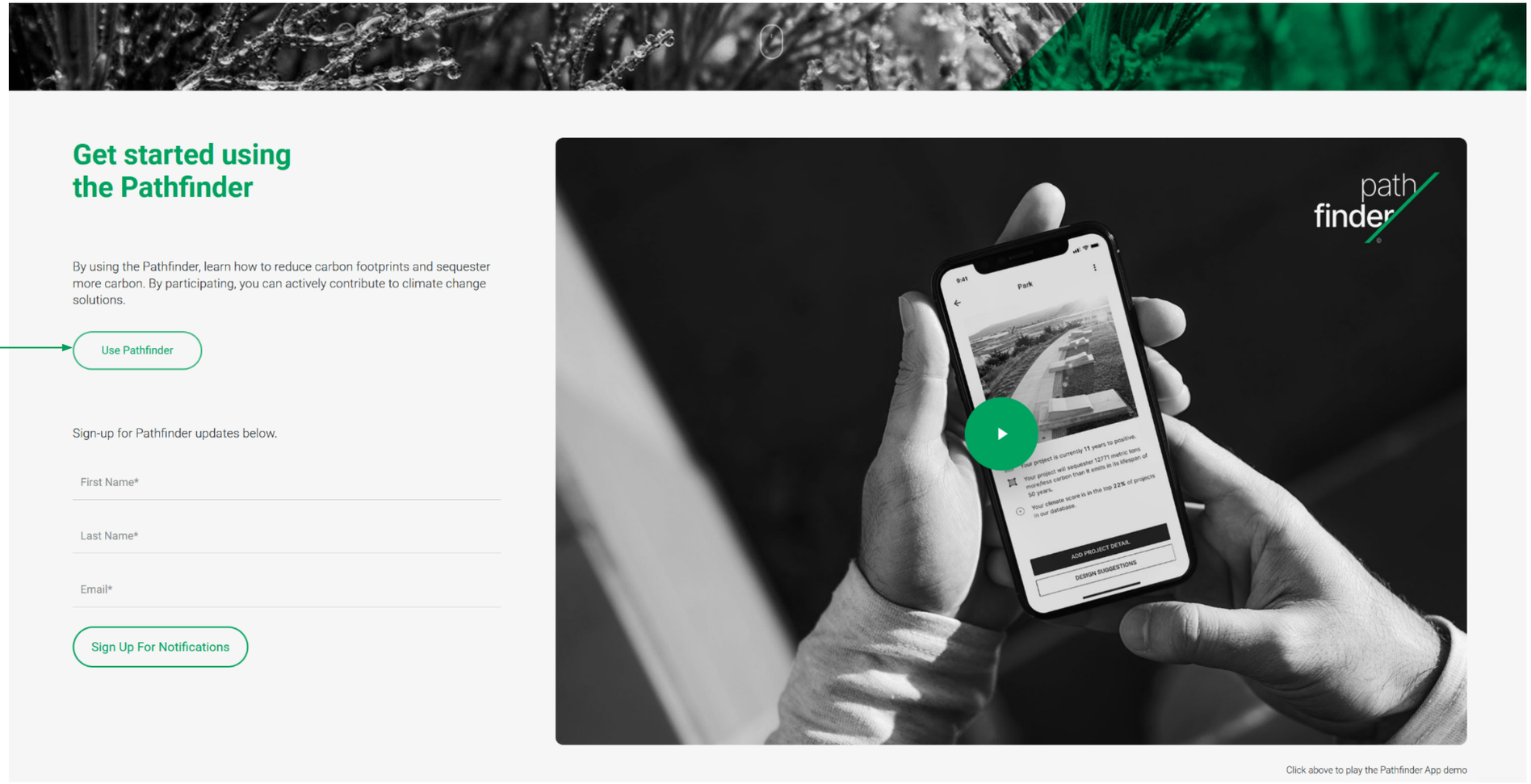


chart your path



Pathfinder is a free, accessible, life-cycle assessment (LCA) tool for landscape architects, designers, planners, and engineers to calculate the greenhouse gas emissions, carbon sequestration and related benefits associated with exterior built environment projects.

how pathfinder works



Navigate to https://climatepositivedesign.com/education/ to watch the demo video, and **click Use Pathfinder** to get started.

begin using pathfinder

app.climatepositivedesign.com

Enter the project location **1**

2 Click the polygon button to define your site boundary

3 Click each boundary point of your site and close the polygon

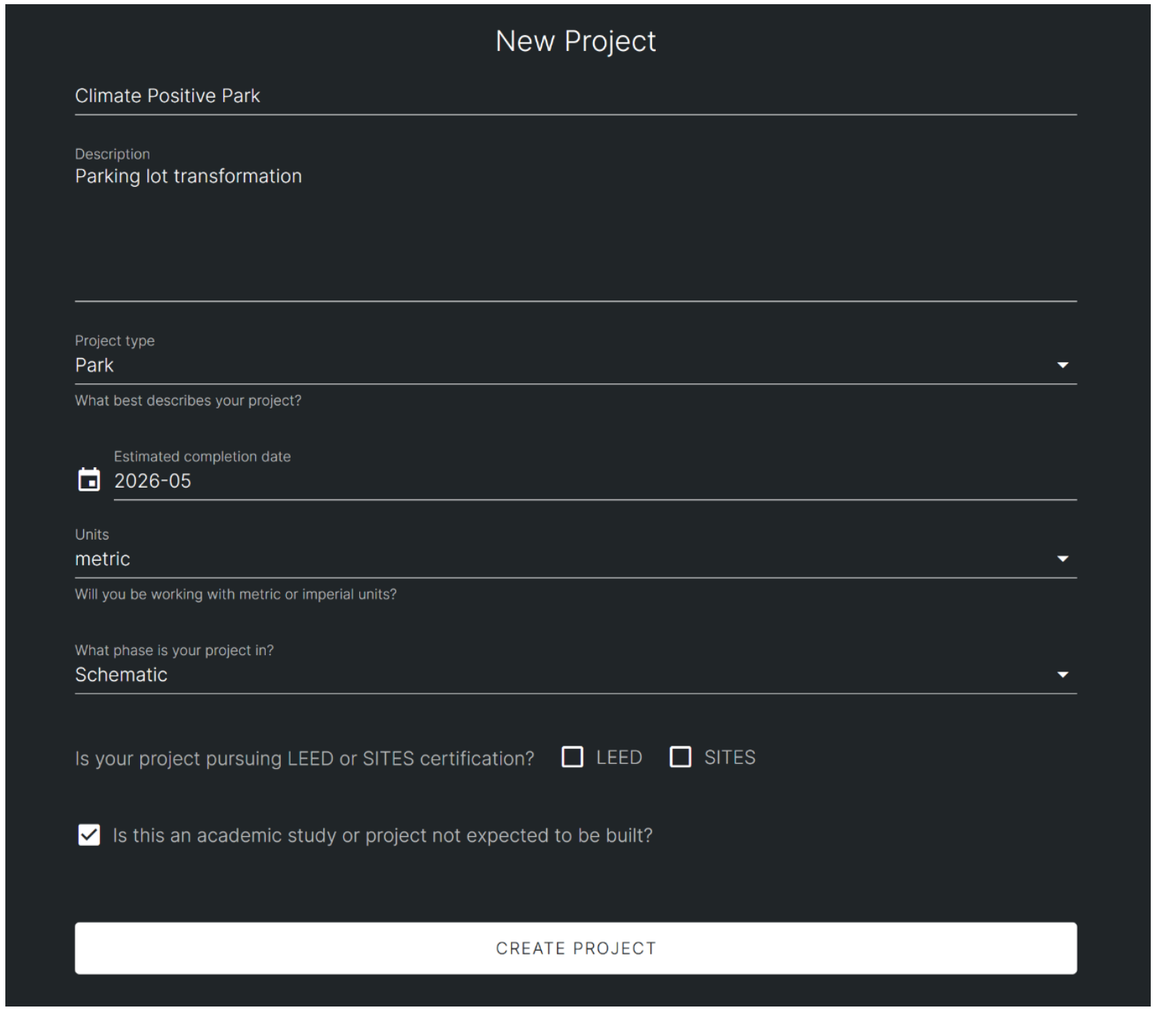
4 Check the circle to advance

5 Approve area or type in refined one, excluding building footprints

Enter an address or location to find your site. Click the polygon button to draw the boundary of your site. When done, click the checkmark and adjust the area and units as needed. When set, click Continue with existing value.

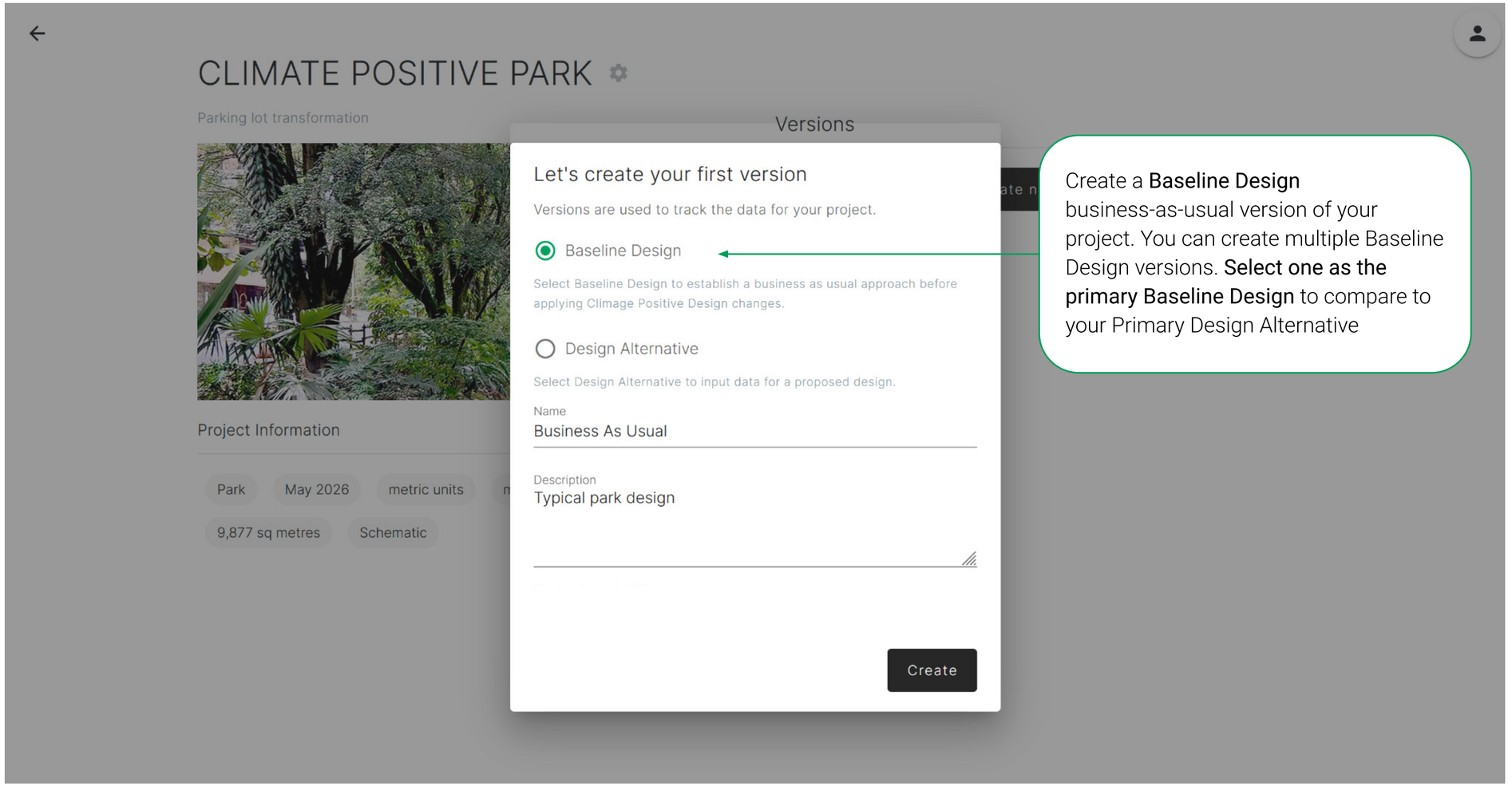
define your site boundary

Sign in or create an account.



Name and describe your project, select the Project Type, estimated completion date, units, and current design phase. Select any certification pursued, and remember to check the academic / study box if the project is not currently expected to be built, so that the data is not included in aggregated global exterior built environment projections.

set up your account and project



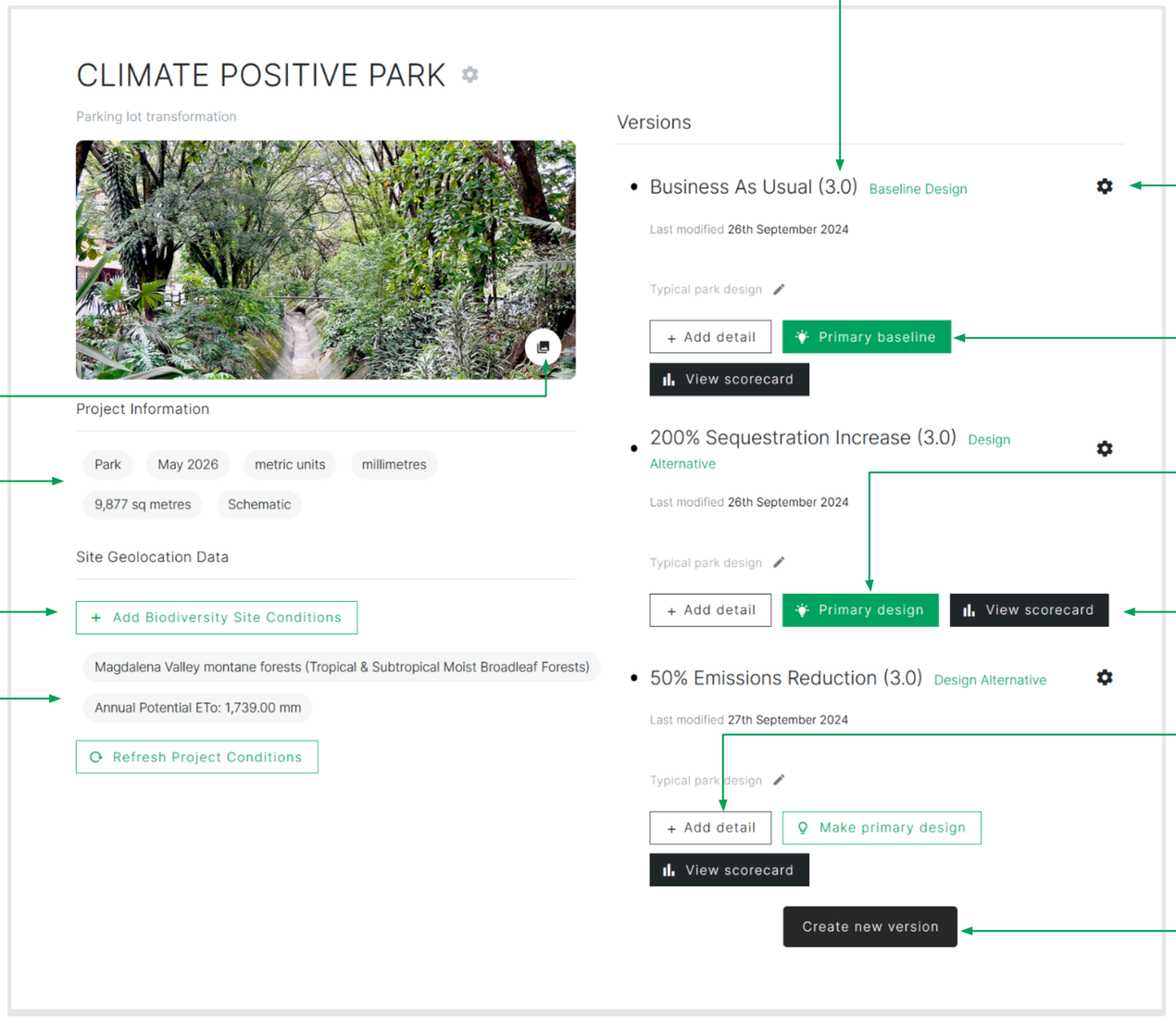
create a baseline

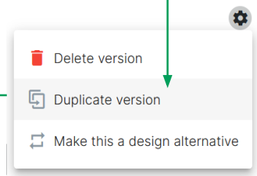
review your project page

New projects are automatically created in Pathfinder 3.0

Duplicate any Baseline or Design version to modify elements and compare.

Click to change to Design Alternative, Baseline, or to make primary version.





Click here to change your project image

Click to adjust project info and redraw site polygon.

Add existing biodiversity site conditions info.

Site data, see Benefits for more info.

Establish one Baseline Design alternative as Primary for comparison to the Primary Design Alternative on the scorecard

Establish one Design Alternative as Primary

View scorecard at any time

Add and update elements

Create new version of your project, whether Baseline or Design Alternative

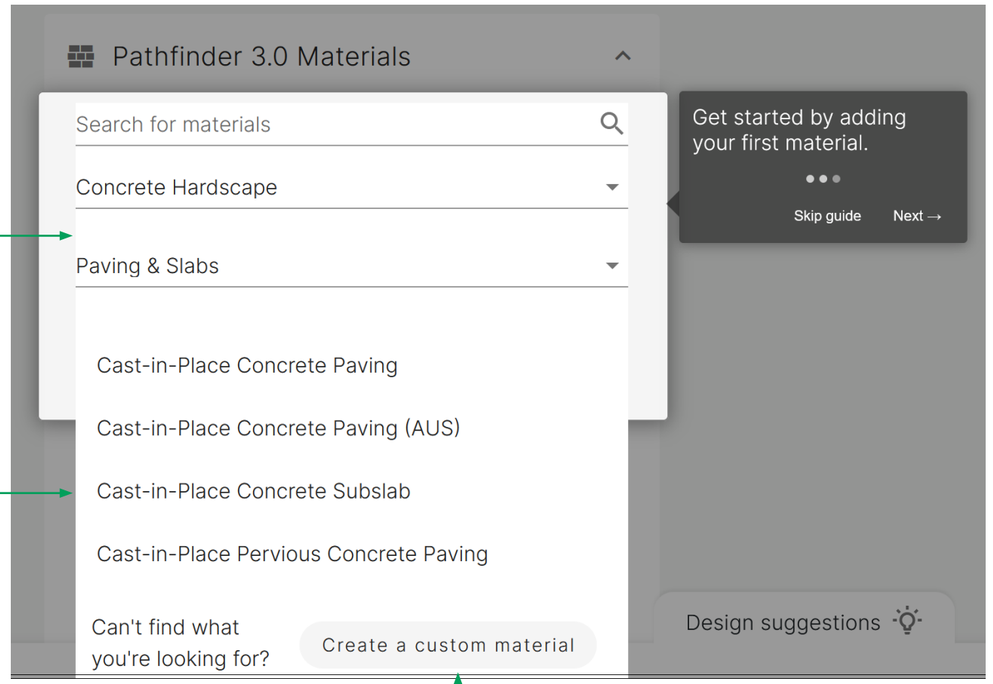
add materials

In the Materials tab, search for or select material categories and subcategories.

1

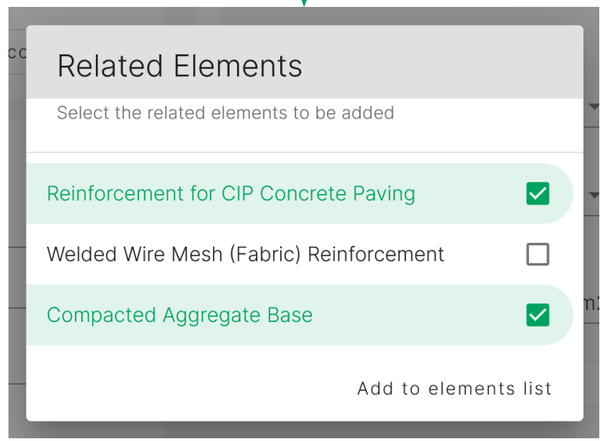
Select each material that is part of the design.

2



3

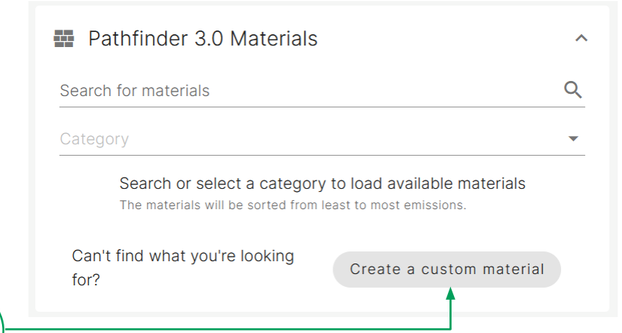
Pathfinder will suggest related elements. Select all that will be included in the design.



4

Create custom elements for your project as needed. See next page for more information.

If you'd like to add a specific material, or an assembly detailed in your project, Create a custom material.

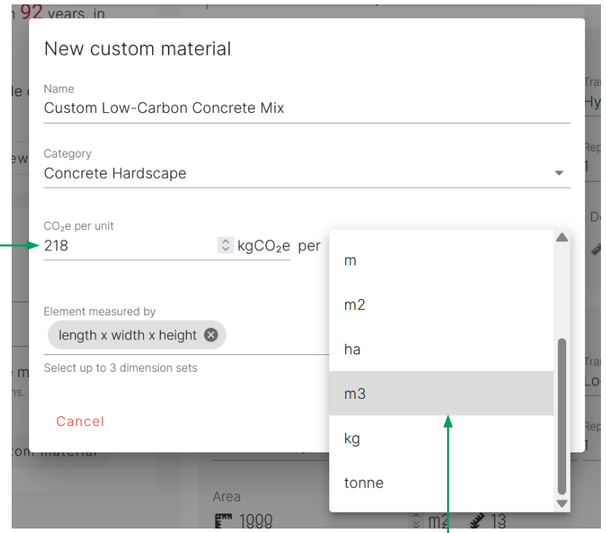


1

Enter the GWP CO_2E per unit. This can be found on the product EPD.

2

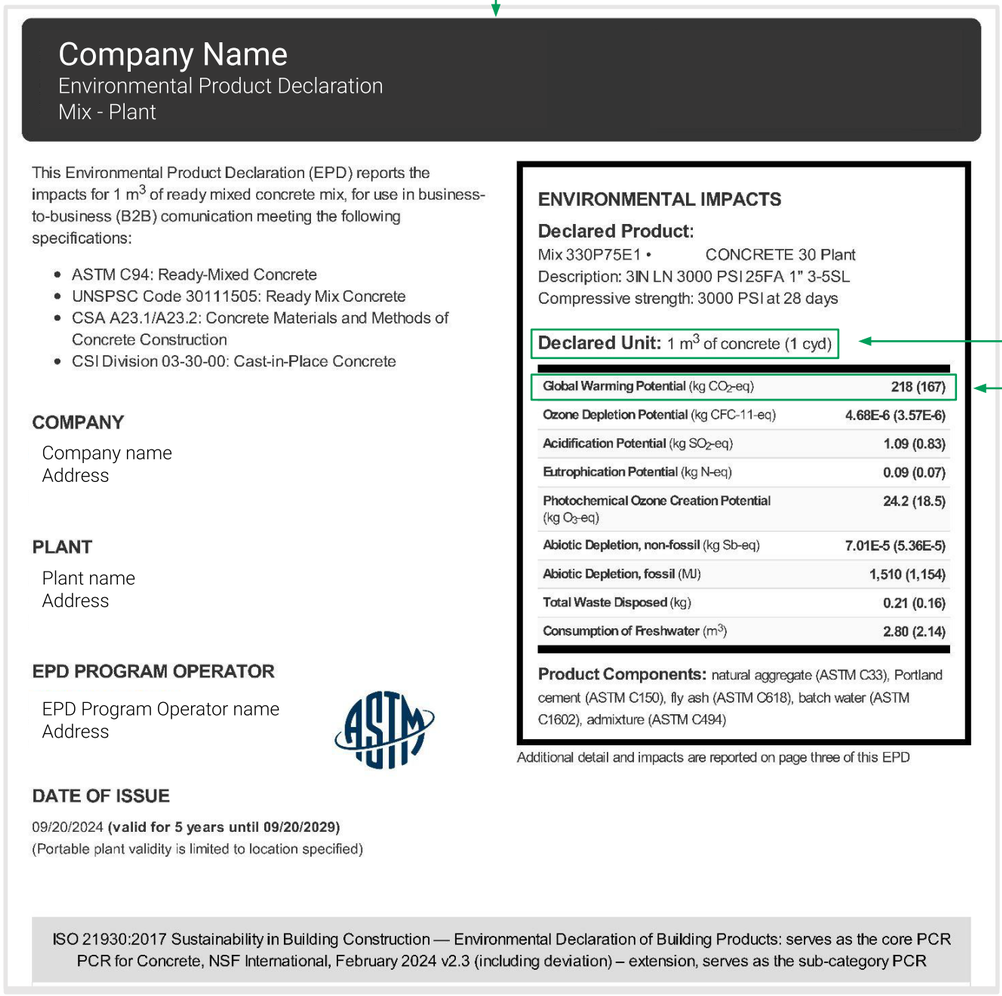
Note: If you're creating an assembly, sum the GWP of all constituent parts, per the unit measured.



Select the unit of measurement. See EPD at right.

3

An Environmental Product Declaration (EPD) contains information about the environmental performance or impact of any product or material over its lifetime. Search for EPDs on EC3 and other EPD databases.



Company Name
Environmental Product Declaration
Mix - Plant

This Environmental Product Declaration (EPD) reports the impacts for 1 m^3 of ready mixed concrete mix, for use in business-to-business (B2B) comunication meeting the following specifications:

- ASTM C94: Ready-Mixed Concrete
- UNSPSC Code 30111505: Ready Mix Concrete
- CSA A23.1/A23.2: Concrete Materials and Methods of Concrete Construction
- CSI Division 03-30-00: Cast-in-Place Concrete

COMPANY
Company name
Address

PLANT
Plant name
Address

EPD PROGRAM OPERATOR
EPD Program Operator name
Address

DATE OF ISSUE
09/20/2024 **(valid for 5 years until 09/20/2029)**
(Portable plant validity is limited to location specified)

ENVIRONMENTAL IMPACTS

Declared Product:
Mix 330P75E1 • CONCRETE 30 Plant
Description: 3IN LN 3000 PSI 25FA 1" 3-5SL
Compressive strength: 3000 PSI at 28 days

Declared Unit: 1 m^3 of concrete (1 cyd)

Global Warming Potential (kg CO_2-eq)	**218 (167)**
Ozone Depletion Potential (kg CFC-11-eq)	**4.68E-6 (3.57E-6)**
Acidification Potential (kg SO_2-eq)	**1.09 (0.83)**
Eutrophication Potential (kg N-eq)	**0.09 (0.07)**
Photochemical Ozone Creation Potential (kg O_3-eq)	**24.2 (18.5)**
Abiotic Depletion, non-fossil (kg Sb-eq)	**7.01E-5 (5.36E-5)**
Abiotic Depletion, fossil (MJ)	**1,510 (1,154)**
Total Waste Disposed (kg)	**0.21 (0.16)**
Consumption of Freshwater (m^3)	**2.80 (2.14)**

Product Components: natural aggregate (ASTM C33), Portland cement (ASTM C150), fly ash (ASTM C618), batch water (ASTM C1602), admixture (ASTM C494)

Additional detail and impacts are reported on page three of this EPD

ISO 21930:2017 Sustainability in Building Construction — Environmental Declaration of Building Products: serves as the core PCR
PCR for Concrete, NSF International, February 2024 v2.3 (including deviation) – extension, serves as the sub-category PCR

Unit

GWP

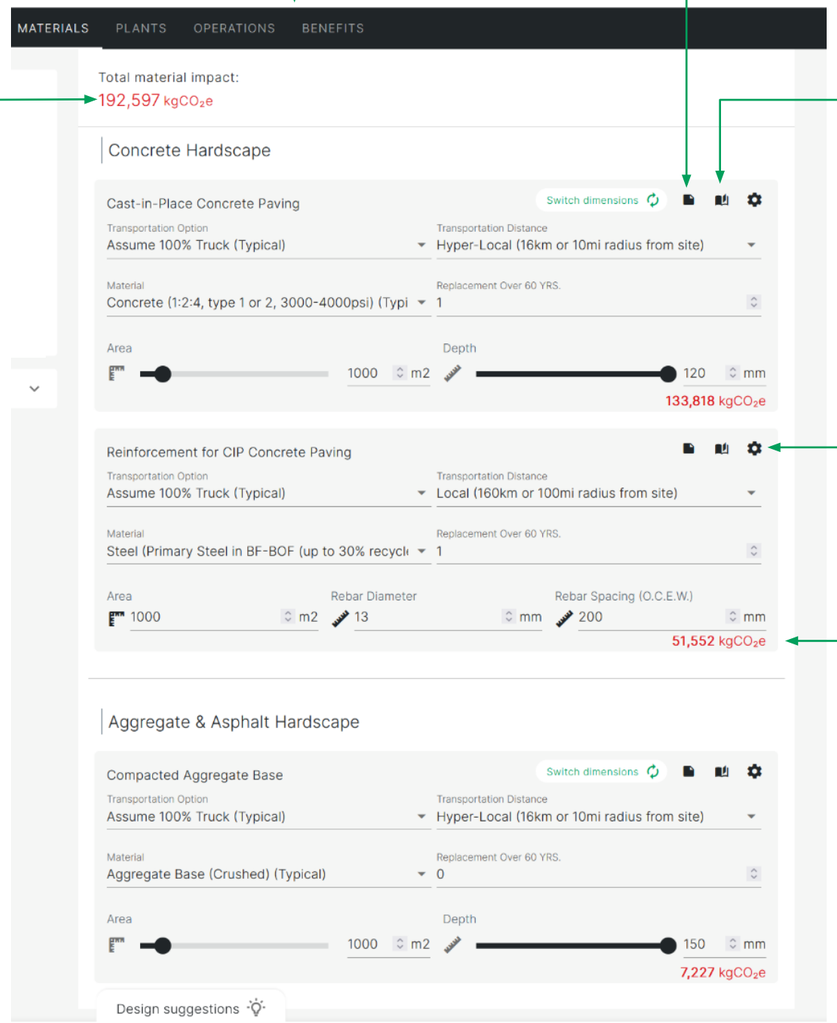
create custom elements

Switch between Materials, Plants, Operations and Benefits at any time.

View or add internal reference notes to your element as needed.

Details and information

Total emissions from materials, including transportation, installation/ construction and replacements

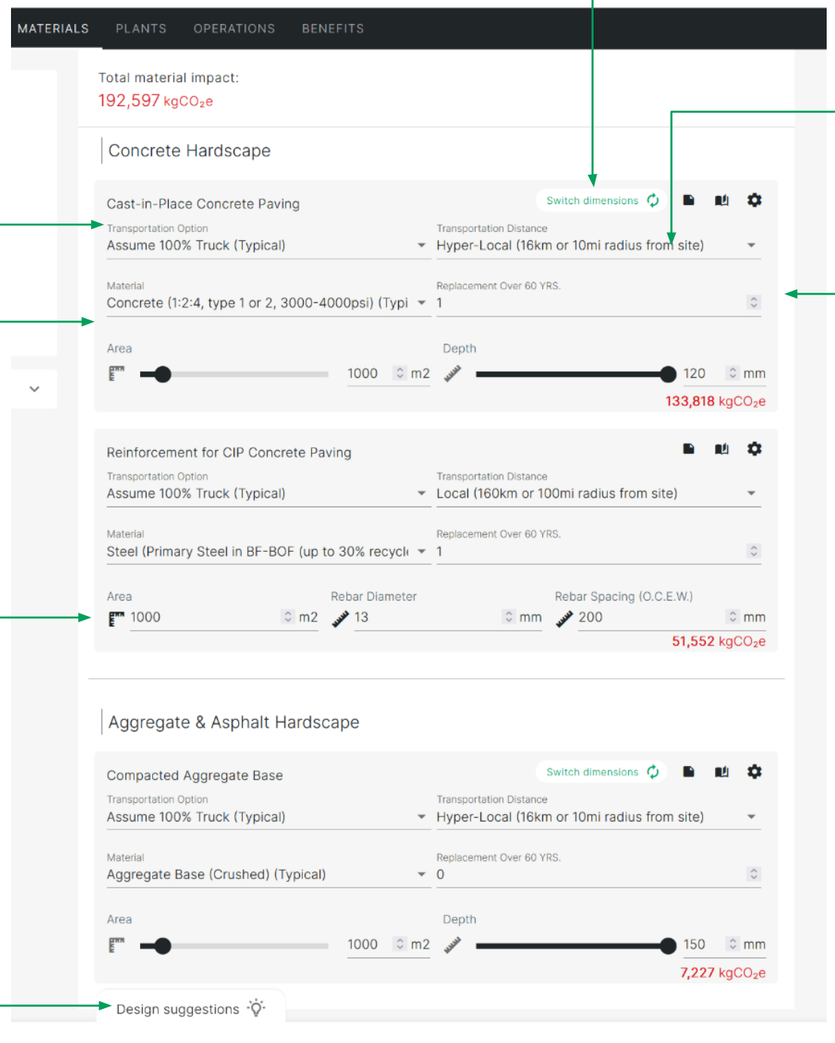


Options

Emissions of the element, including transportation, installation and replacements.

keep adding materials

keep adding materials



Select type of transportation of the element to the site — 4

Select material type — 1

Enter dimensions / quantity and units — 3

Click for climate positive design suggestions — 7

2 Switch dimension type as needed, i.e. length X width X height vs area X depth vs volume.

5 Choose the distance that the material will be transported to the site.

6 Enter the number of expected replacements of the element over the 60-year life of the project.

Materials can be added multiple times as different elements, with different dimensions and variables. For example, add a 4” slab of type 1 concrete and a 5” slab. Or add the total volume of type 1 concrete.

add plants

Total emissions and sequestration from plants, including nursery emissions, transportation, installation/construction and replacements.

Project statistics are updated here. Click to view scorecard.

8

Select each planting category and element, including Trees and Ecosystems to protect and restore, Perennials, Shrubs, and Lawn.

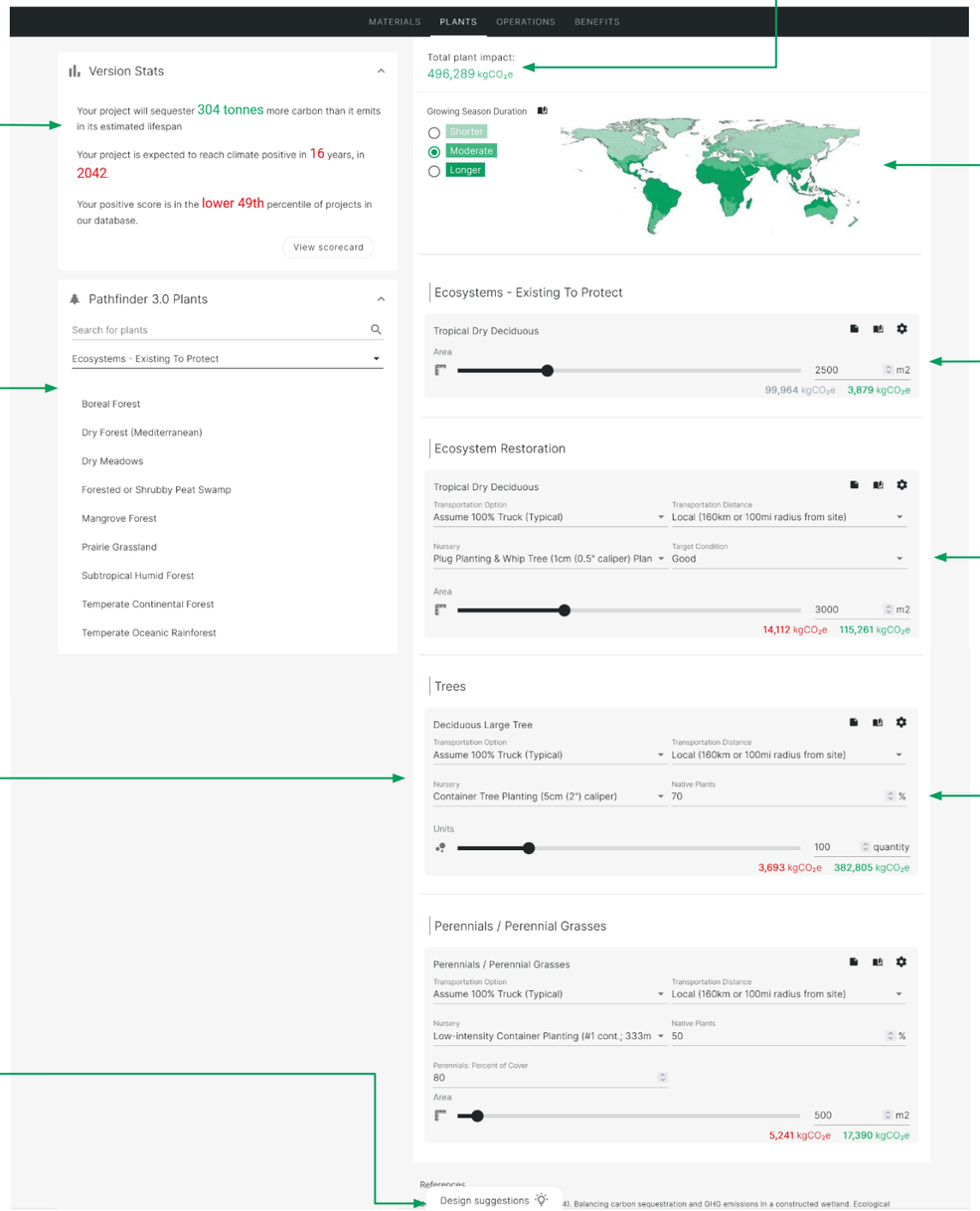
1

Select transportation type and distance. Select type of nursery stock specified. Enter area or quantity of plants.

4

Click for climate positive design suggestions.

7



2

Select the Growing Season Duration zone of your site. Click to enlarge the map.

3

Add the area of each existing habitat to be protected, or to be restored, from the UN FAO ecosystem types.

5

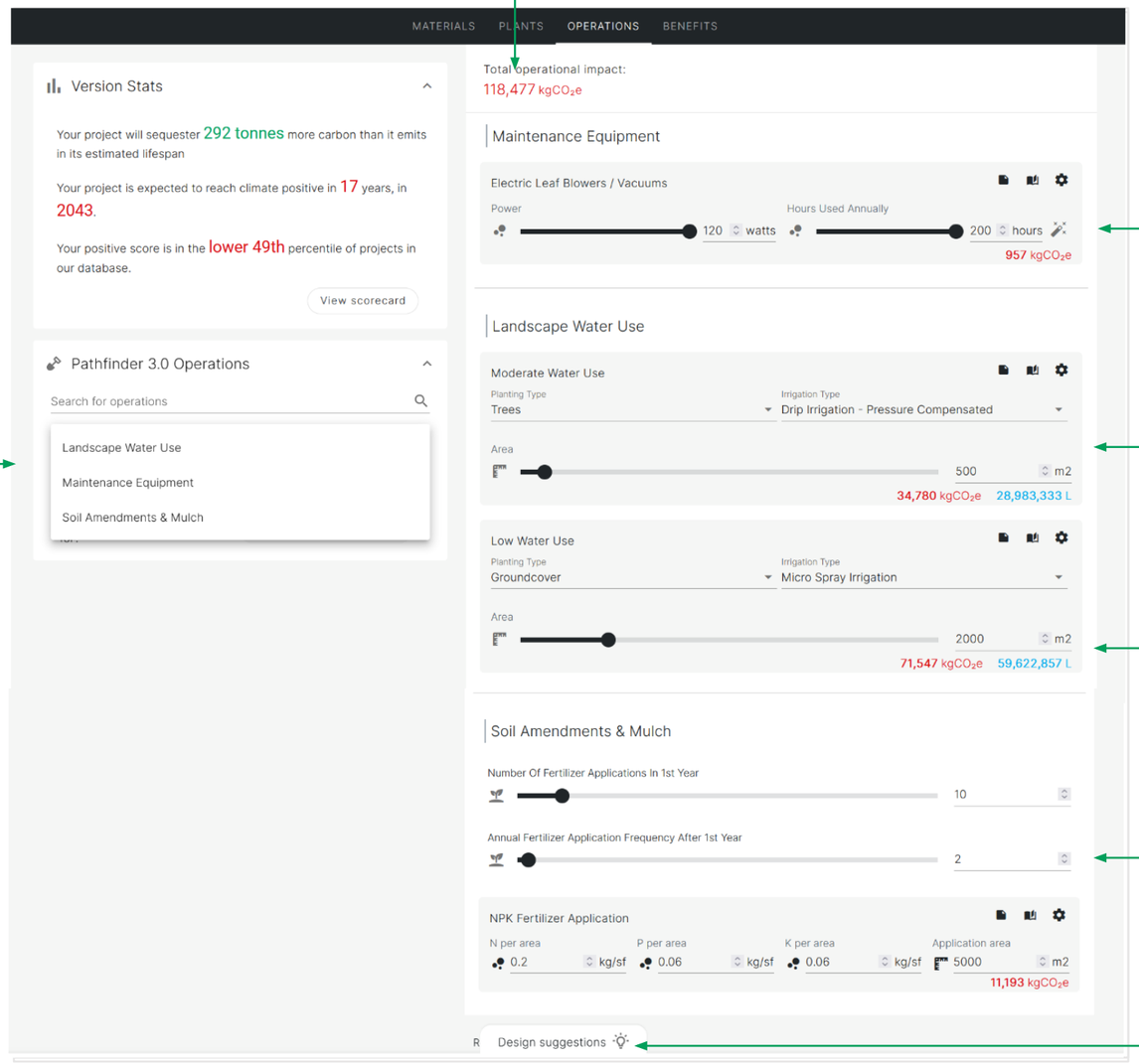
Ecosystem Restoration Target Condition:
- Good closely mimics a native ecosystem in structural and functional diversity, species mix and spacing.
- Moderate somewhat mimics the native ecosystem.

6

Select the percentage of all plants of this type that are native.

Pathfinder calculates the number of years until the plant sequestration offsets the emissions of the project. The target Years to Positive depends on the project type, see the Climate Positive Design Challenge.

Total emissions from operations over the 60-year life of the project.



Select Operations category and element. **1**

2 Enter power and annual usage of maintenance equipment.

3 Create an element for each hydrozone in the project. Select plant and irrigation type. Pathfinder calculates the projected water used over the 60-year life of the project, and the emissions of that water.

4 See Benefits - Water for further information about water use.

5 Add expected fertilizer frequency, quantity and contents.

6 Click for climate positive design suggestions.

add operations

add biodiversity site conditions: existing

Access the Biodiversity Site Conditions - Existing form from the Project or Benefits: Biodiversity page. May be edited at any time, but only one form is applied to all versions of the project.

1

Enter areas of existing ecosystems on site, from the UN FAO Global Ecological Zones classification.

5

Add existing general landscape planting including shrubs, groundcovers, perennials, annuals, etc., and indicate the percentage of all existing plants that are native to the site's ecoregion (see Benefits tab, Biodiversity).

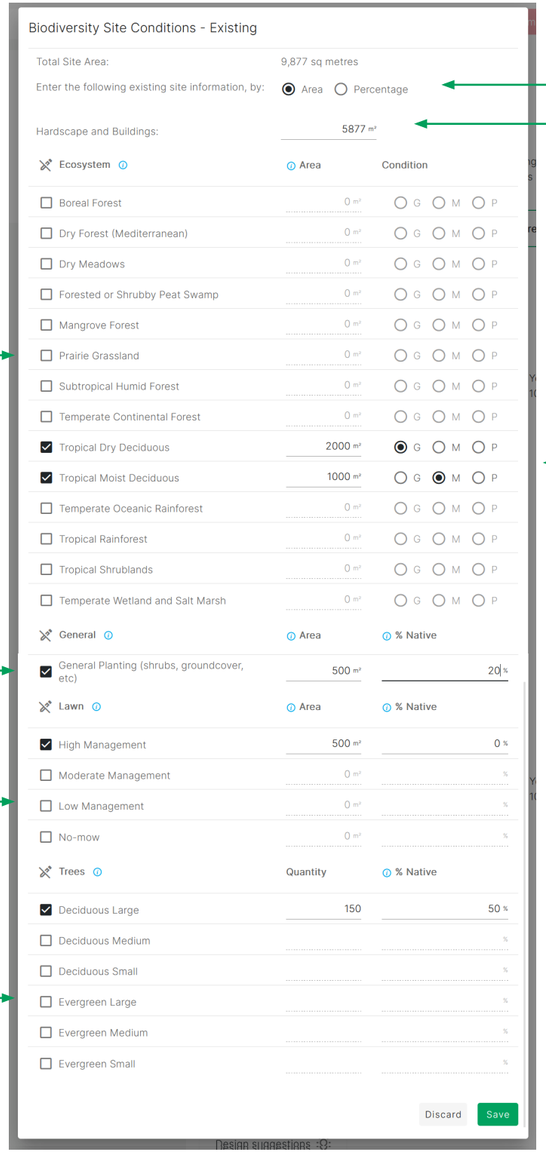
7

Add turf lawn areas, selecting which type of management the turf receives, and indicate the percentage of turf that is native.

8

Add existing trees of each size and type, and indicate the percentage of each that is native.

9



2

Enter pre-demolition and pre-construction existing site condition information, in order to calculate biodiversity impacts for your design.

3

Select whether to enter information in areas, or in percentage of the total site (including building areas).

4

Enter total area of existing hardscape and buildings. All remaining area is considered planting area.

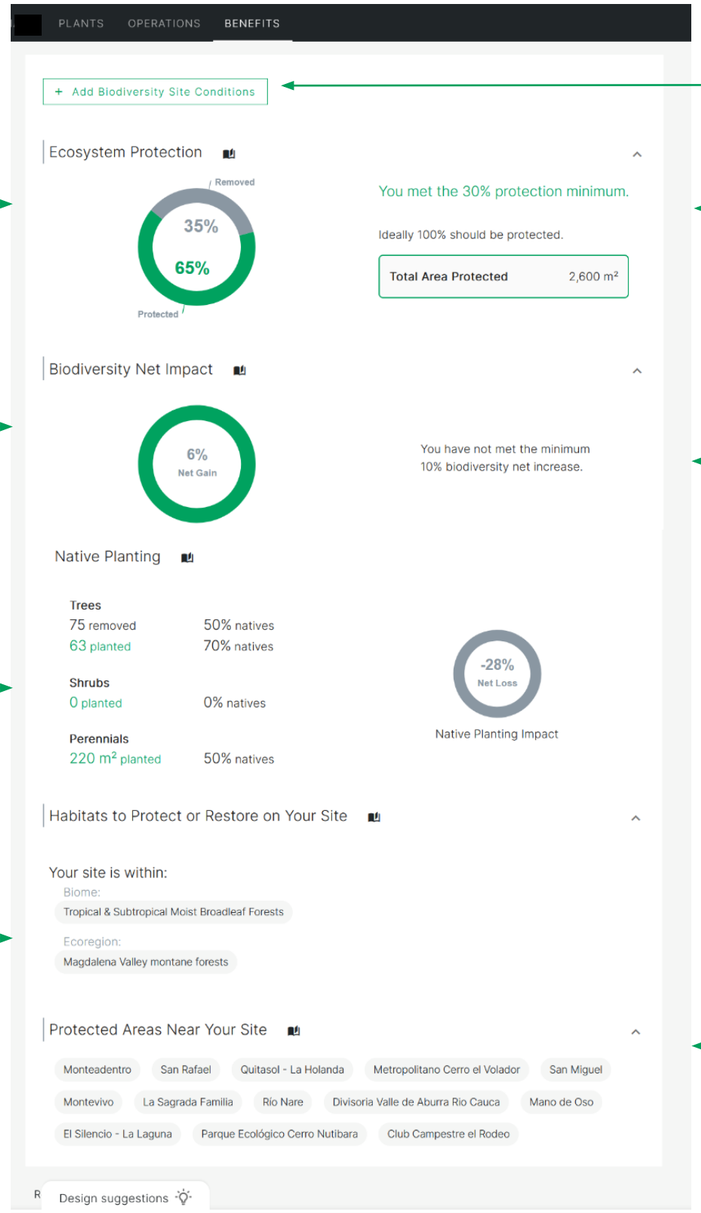
6

Select condition, compared to an optimal, healthy native ecosystem:
- Good (G) is close to optimal
- Moderate (M) shows some impacts
- Poor (P) ecosystem shows heavy impacts of human interference, invasive species, browsing and/or climate change

10

The sum of all areas or percentages entered must equal the Total Site Area

add benefits: biodiversity



1 Add existing biodiversity site conditions info to calculate biodiversity impacts.

2 Areas of removed and protected ecosystems are compared.

3 Per 30x30 goals, protect a minimum of 30% of existing ecosystems. Ideally 100% of good condition native ecosystems should be protected to avoid harming biodiversity.

4 The final quantity and condition of native ecosystems and planting is compared to the existing conditions. Existing ecosystems and trees are given greater weight than new planting. See Methodology Report for further information.

5 Per biodiversity net gain goals, increase biodiversity by at least 10% from the existing site condition.

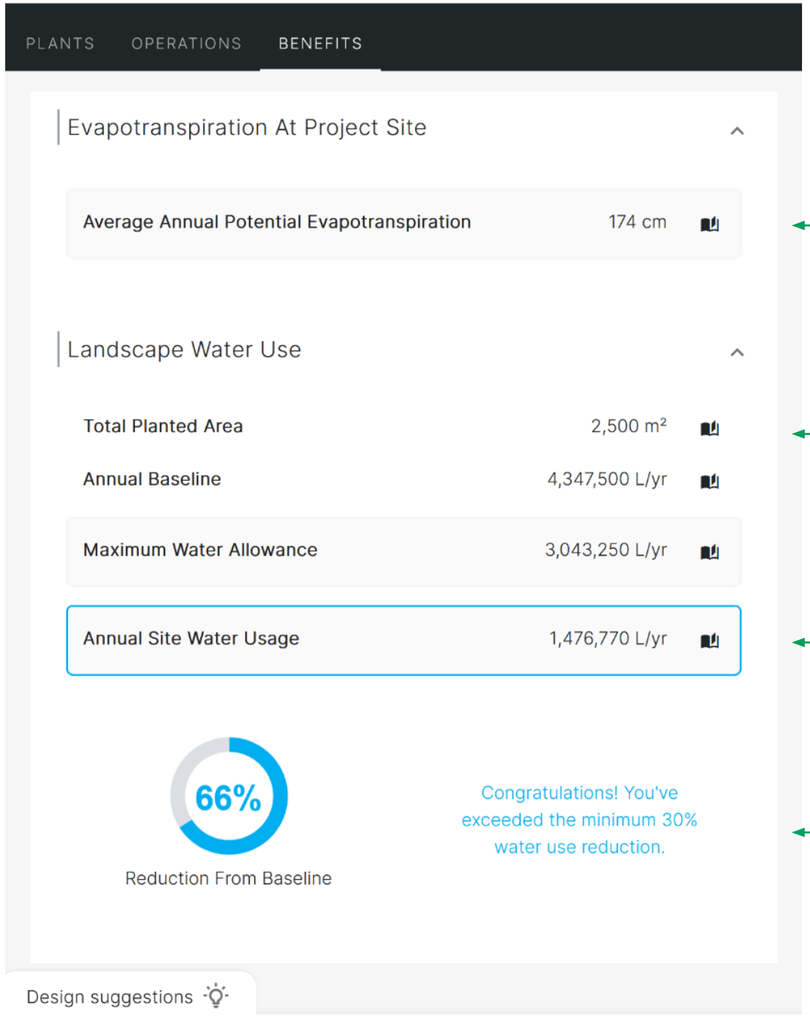
6 The final quantity and condition of native trees, shrubs and perennials are compared to the existing conditions. Existing native trees are given greater weight than new planting.

7 The project site falls within this biome and ecoregion, according to the RESOLVE Ecoregions and Biomes map. These can be used to determine native habitats and species.

8 See the World Database of Protected Areas for protected areas near your site, such as those below within 10 miles (16km), resources below. It may be possible to provide habitat for fauna to migrate to your site from nearby protected areas, via wildlife corridors or a patchwork of habitat sites.

add benefits: water

1. To calculate annual water usage, enter Landscape Water Use elements in Operations, including areas with no irrigation, and water features, pools and spas.



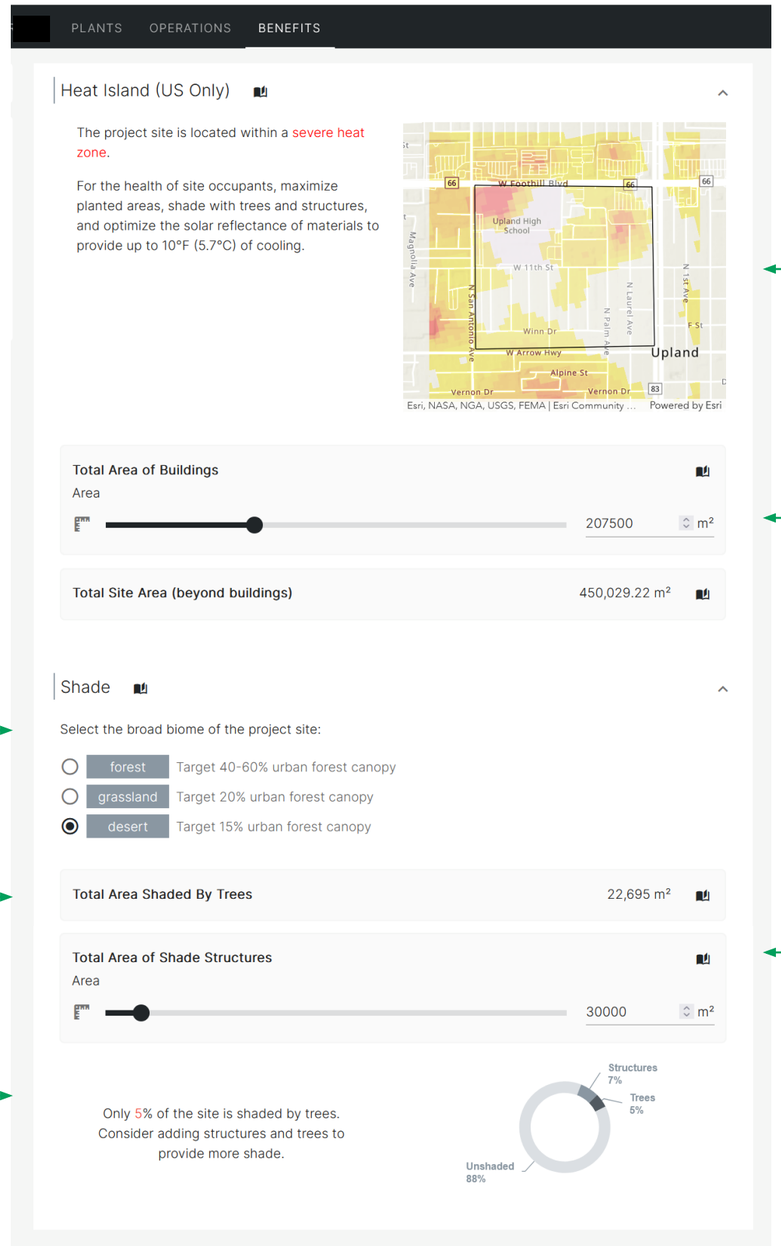
2. Potential Evapotranspiration (PET) is the amount of evaporation from land and surfaces, and transpiration from plants that would occur if soil moisture were unlimited. This is used to determine the maximum amount of irrigation water that may be required at a site.

3. Sum of all Landscape Water Use areas added in Operations.

4. Calculated from the site's potential evapotranspiration and the Landscape Water Use elements added in Operations.

5. Reduce water use from the annual baseline by at least 30%, per US EPA WaterSense.

add benefits: cooling



1 Within the US, sites with a heat measure of 4 or 5 out of 5 per map [Heat Severity - USA 2022] are indicated as severe heat areas.

2 Enter the total area of all buildings on the site in the proposed design.

3 Choose the broad biome that most closely matches your site area. Tree canopy targets are based upon these broad biomes.

4 Calculated from all trees entered in Plants tab.

5 Enter total area of shade structures in the designed landscape, including awnings, arcades, and free-standing structures, soft or rigid.

6 Add more trees to your design in the Plants tab to reach the canopy target.

Within the US, the US Government's Climate and Economic Justice Screening Tool provides environmental, infrastructural, and demographic information about the site area. Overburdened and underserved communities are marginalized by underinvestment and overburdened by pollution.

1

2

Select if your site falls within an overburdened and underserved community outside the USA, as designated by NGOs, local, national, or international authorities.

3

Adapted from the Spectrum of Public Participation, developed by the International Association for Public Participation.

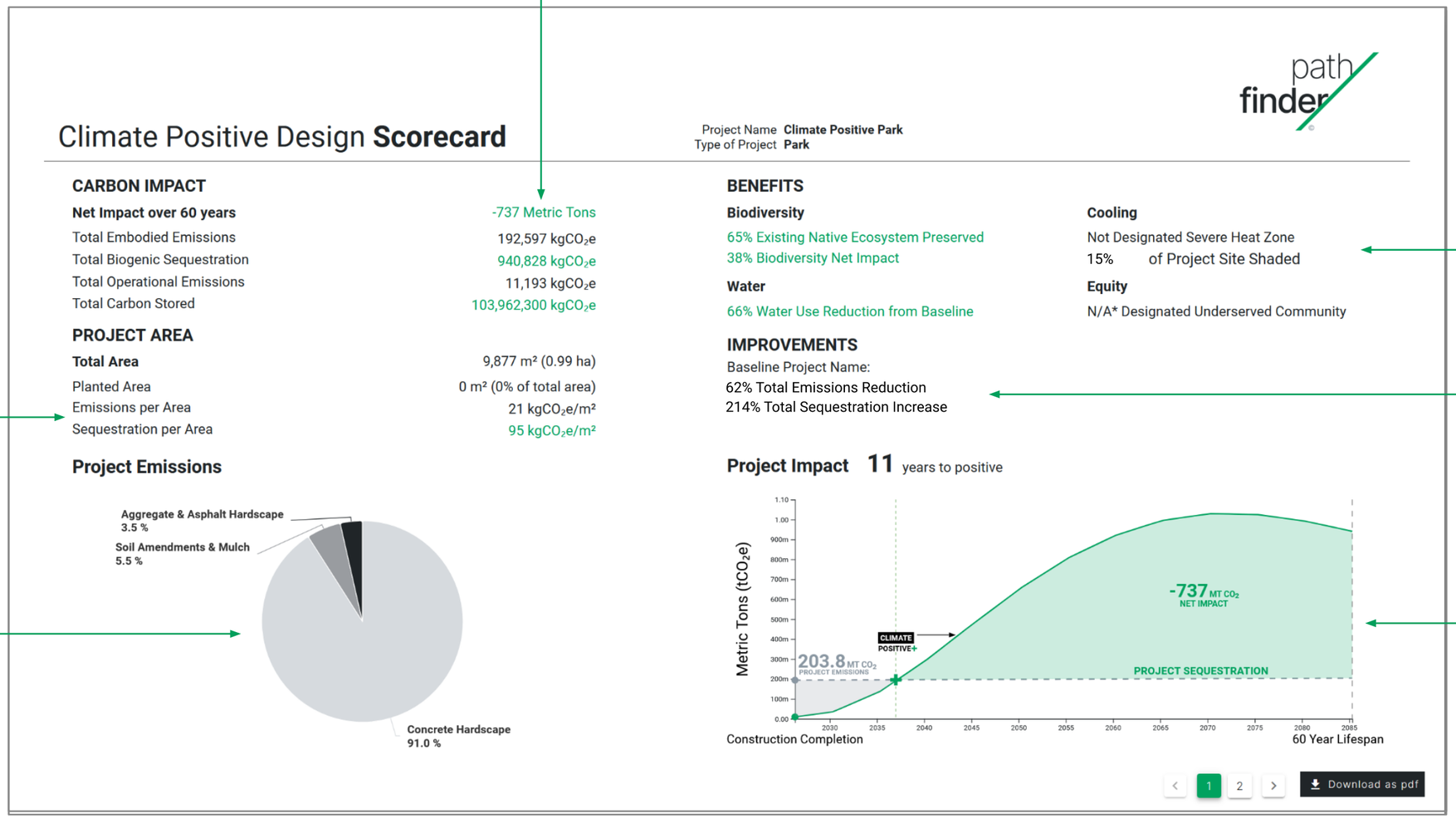
4

Select the highest level of public engagement intended or achieved during the planning, design and construction process. Ideally projects are designed with greater community engagement (right side of the spectrum), especially when located in overburdened and underserved communities.

add benefits: equity

Click View scorecard at any time for updated project results

Net Impact: green text and negative number means the project will sequester more carbon than emitted over 60 years. Black text and positive number means the project will emit more carbon than sequestered.



Climate Positive Design **Scorecard**

Project Name **Climate Positive Park**
Type of Project **Park**

CARBON IMPACT

Net Impact over 60 years	-737 Metric Tons
Total Embodied Emissions	192,597 $kgCO_2e$
Total Biogenic Sequestration	940,828 $kgCO_2e$
Total Operational Emissions	11,193 $kgCO_2e$
Total Carbon Stored	103,962,300 $kgCO_2e$

PROJECT AREA

Total Area	9,877 m² (0.99 ha)
Planted Area	0 m² (0% of total area)
Emissions per Area	21 $kgCO_2e/m^2$
Sequestration per Area	95 $kgCO_2e/m^2$

Project Emissions

Aggregate & Asphalt Hardscape 3.5 %
Soil Amendments & Mulch 5.5 %
Concrete Hardscape 91.0 %

BENEFITS

Biodiversity
65% Existing Native Ecosystem Preserved
38% Biodiversity Net Impact

Water
66% Water Use Reduction from Baseline

Cooling
Not Designated Severe Heat Zone
15% of Project Site Shaded

Equity
N/A* Designated Underserved Community

IMPROVEMENTS

Baseline Project Name:
62% Total Emissions Reduction
214% Total Sequestration Increase

Project Impact **11** years to positive

Metric Tons (tCO_2e)
-737 MT CO_2 NET IMPACT
CLIMATE POSITIVE+
203.8 MT CO_2 PROJECT EMISSIONS
PROJECT SEQUESTRATION
Construction Completion
60 Year Lifespan

1 2 Download as pdf

Emissions and Sequestration per unit area

Graph of emissions sources by category

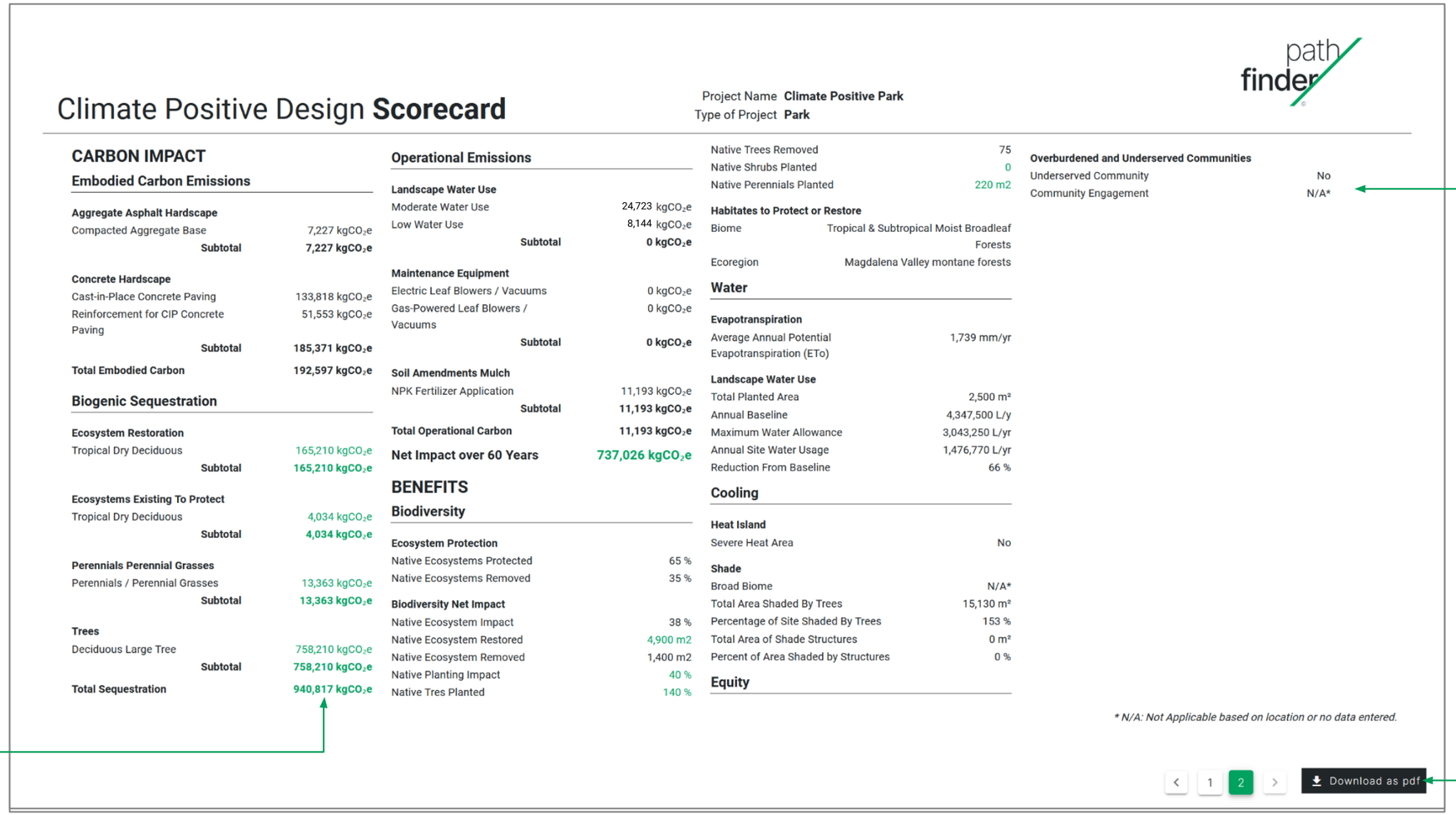
Benefits impacts. Green scores have met the targets.

Improvement comparison to the Primary Baseline version

Impact over the life of the project. Gray represents emissions, green sequestration.

view scorecard: page 1

Details of materials, operations, plants and benefits are included on page 2



Climate Positive Design **Scorecard**

Project Name **Climate Positive Park**
Type of Project **Park**

CARBON IMPACT

Embodied Carbon Emissions

Aggregate Asphalt Hardscape	
Compacted Aggregate Base	7,227 $kgCO_2e$
Subtotal	**7,227 $kgCO_2e$**
Concrete Hardscape	
Cast-in-Place Concrete Paving	133,818 $kgCO_2e$
Reinforcement for CIP Concrete Paving	51,553 $kgCO_2e$
Subtotal	**185,371 $kgCO_2e$**
Total Embodied Carbon	**192,597 $kgCO_2e$**

Biogenic Sequestration

Ecosystem Restoration	
Tropical Dry Deciduous	165,210 $kgCO_2e$
Subtotal	**165,210 $kgCO_2e$**
Ecosystems Existing To Protect	
Tropical Dry Deciduous	4,034 $kgCO_2e$
Subtotal	**4,034 $kgCO_2e$**
Perennials Perennial Grasses	
Perennials / Perennial Grasses	13,363 $kgCO_2e$
Subtotal	**13,363 $kgCO_2e$**
Trees	
Deciduous Large Tree	758,210 $kgCO_2e$
Subtotal	**758,210 $kgCO_2e$**
Total Sequestration	**940,817 $kgCO_2e$**

Operational Emissions

Landscape Water Use	
Moderate Water Use	24,723 $kgCO_2e$
Low Water Use	8,144 $kgCO_2e$
Subtotal	**0 $kgCO_2e$**
Maintenance Equipment	
Electric Leaf Blowers / Vacuums	0 $kgCO_2e$
Gas-Powered Leaf Blowers / Vacuums	0 $kgCO_2e$
Subtotal	**0 $kgCO_2e$**
Soil Amendments Mulch	
NPK Fertilizer Application	11,193 $kgCO_2e$
Subtotal	**11,193 $kgCO_2e$**
Total Operational Carbon	**11,193 $kgCO_2e$**
Net Impact over 60 Years	**737,026 $kgCO_2e$**

BENEFITS

Biodiversity

Ecosystem Protection	
Native Ecosystems Protected	65 %
Native Ecosystems Removed	35 %
Biodiversity Net Impact	
Native Ecosystem Impact	38 %
Native Ecosystem Restored	4,900 m2
Native Ecosystem Removed	1,400 m2
Native Planting Impact	40 %
Native Tres Planted	140 %
Native Trees Removed	75
Native Shrubs Planted	0
Native Perennials Planted	220 m2
Habitates to Protect or Restore	
Biome	Tropical & Subtropical Moist Broadleaf Forests
Ecoregion	Magdalena Valley montane forests

Water

Evapotranspiration	
Average Annual Potential Evapotranspiration (ETo)	1,739 mm/yr
Landscape Water Use	
Total Planted Area	2,500 m²
Annual Baseline	4,347,500 L/y
Maximum Water Allowance	3,043,250 L/yr
Annual Site Water Usage	1,476,770 L/yr
Reduction From Baseline	66 %

Cooling

Heat Island	
Severe Heat Area	No
Shade	
Broad Biome	N/A*
Total Area Shaded By Trees	15,130 m²
Percentage of Site Shaded By Trees	153 %
Total Area of Shade Structures	0 m²
Percent of Area Shaded by Structures	0 %

Equity

Overburdened and Underserved Communities	
Underserved Community	No
Community Engagement	N/A*

** N/A: Not Applicable based on location or no data entered.*

1 2 Download as pdf

N/A : Not applicable based on location or no data entered.

Green text represents sequestration and targets met.

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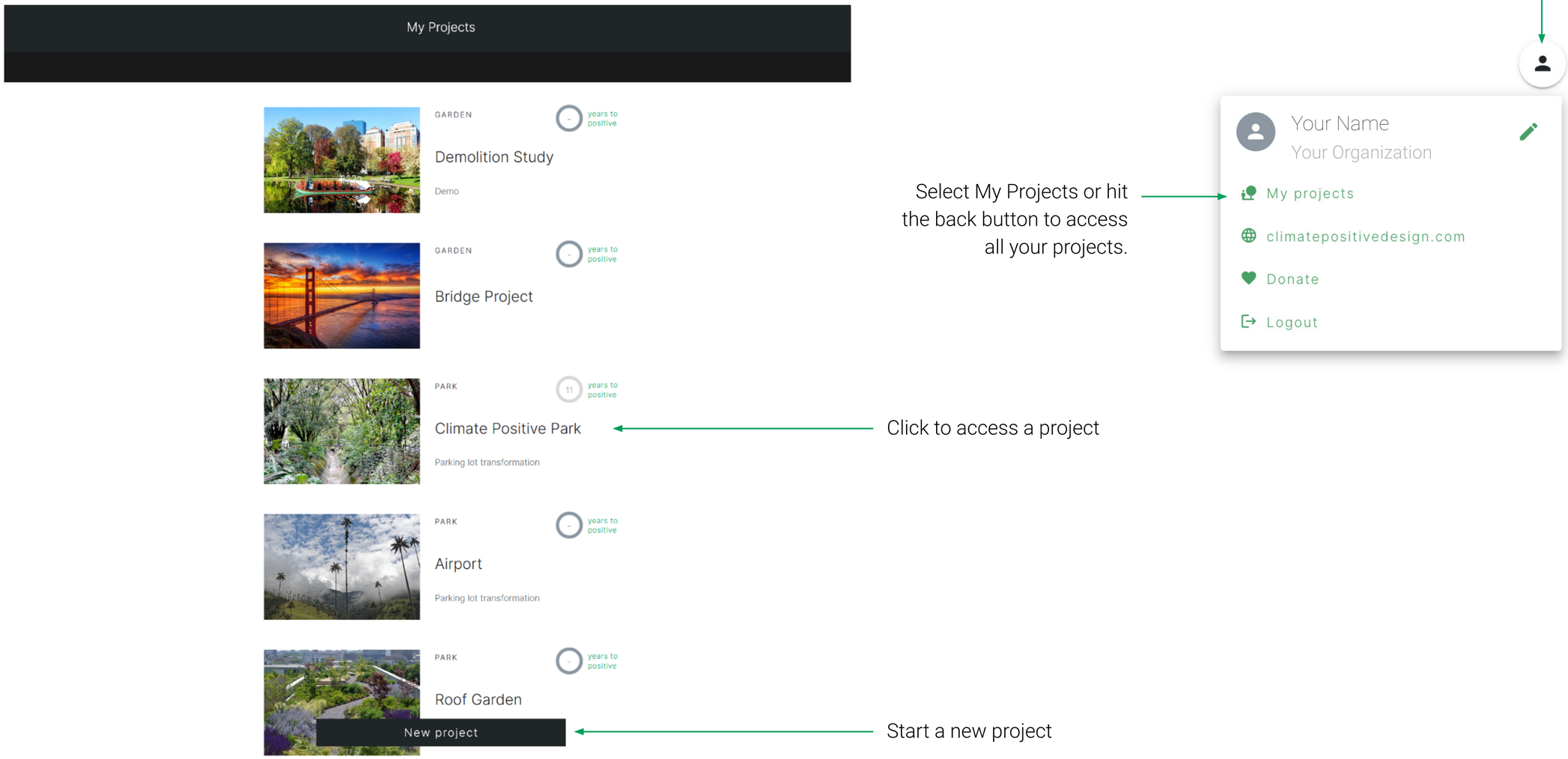

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... and keep going!

Many thanks to our sponsors and collaborators who make this work possible.