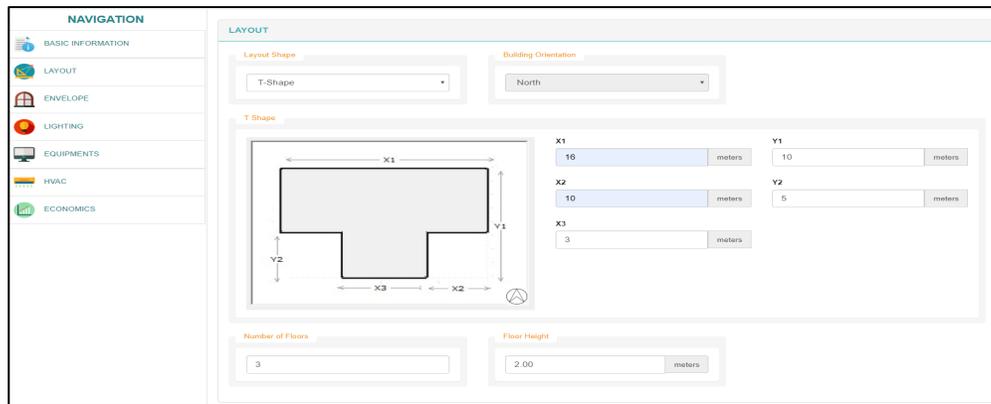# ECONIWAS 2.0
TOOL DEMONSTRATION

ECONIWAS 2.0 - INTRODUCTION

Basic Tool:

Quick evaluation platform for homeowners, contractors and builders alike to rapidly evaluate the project's preliminary design intent on the scale of energy efficiency, carbon footprint and monetary savings with the selected project location, user specified area and orientation, building envelope (wall, roof & window), Air-conditioning and Ventilation techniques.


Advanced Tool:

Simulation based tool for the professionals (Architects, Engineers, MEP consultants, project developers, Industry professionals) who wish to perform detailed analysis of the project design features in terms of energy efficiency, economic feasibility and environmental impact.

Envelope Optimization Tool:

A quick envelope evaluation module to compute the most optimized set of U-values & SHGC for best wall, best roof and best window for the selected location based on life cycle cost of the envelope options.
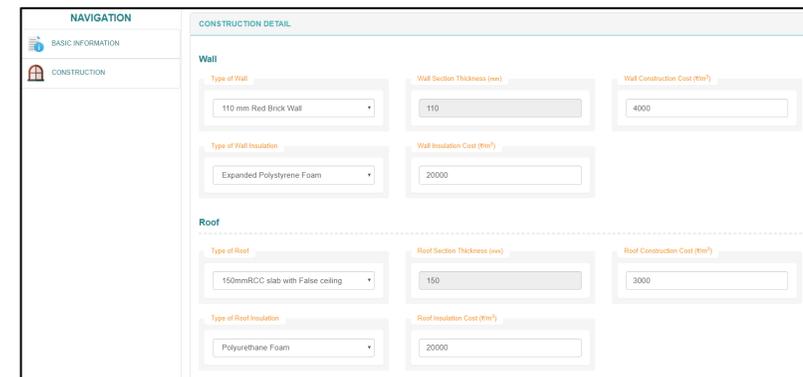
Basic Tool:

Quick evaluation platform for homeowners, contractors and builders alike to rapidly evaluate the project's preliminary design intent on the scale of energy efficiency, carbon footprint and monetary savings with the selected project location, user specified area and orientation, building envelope (wall, roof & window), Air-conditioning and Ventilation techniques.

ECONIWAS 2.0 – BASIC TOOL

Quick and Easy Inputs for defining primary information of Building including location, shading, area and orientation.
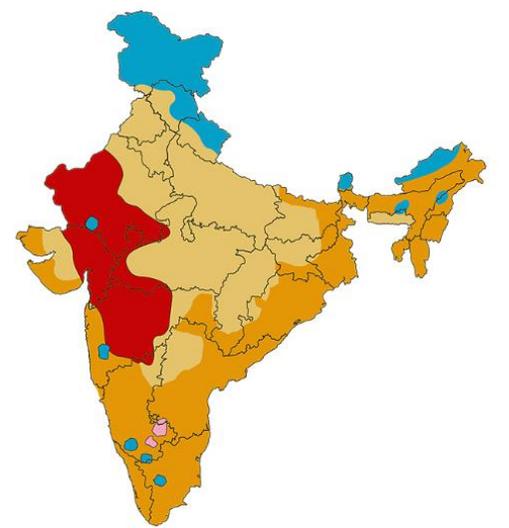

Welcome to ECO-NIWAS Tool

Please select your State and closest City

State
National Capital Territory of Delhi

City
New Delhi

Climate Zone
- Hot and Dry
- Warm and Humid
- Composite
- Temperate
- Cold

Continue   Back

Please select your Building Type

- **Stand-Alone**
  A Stand-Alone building does not have any neighbouring buildings.
- **3-Sides-Open**
  A 3-Sides-Open building has one building attached on one side.
- **2-Sides-Open**
  A 2-Sides-Open building has two buildings attached, one on each side.
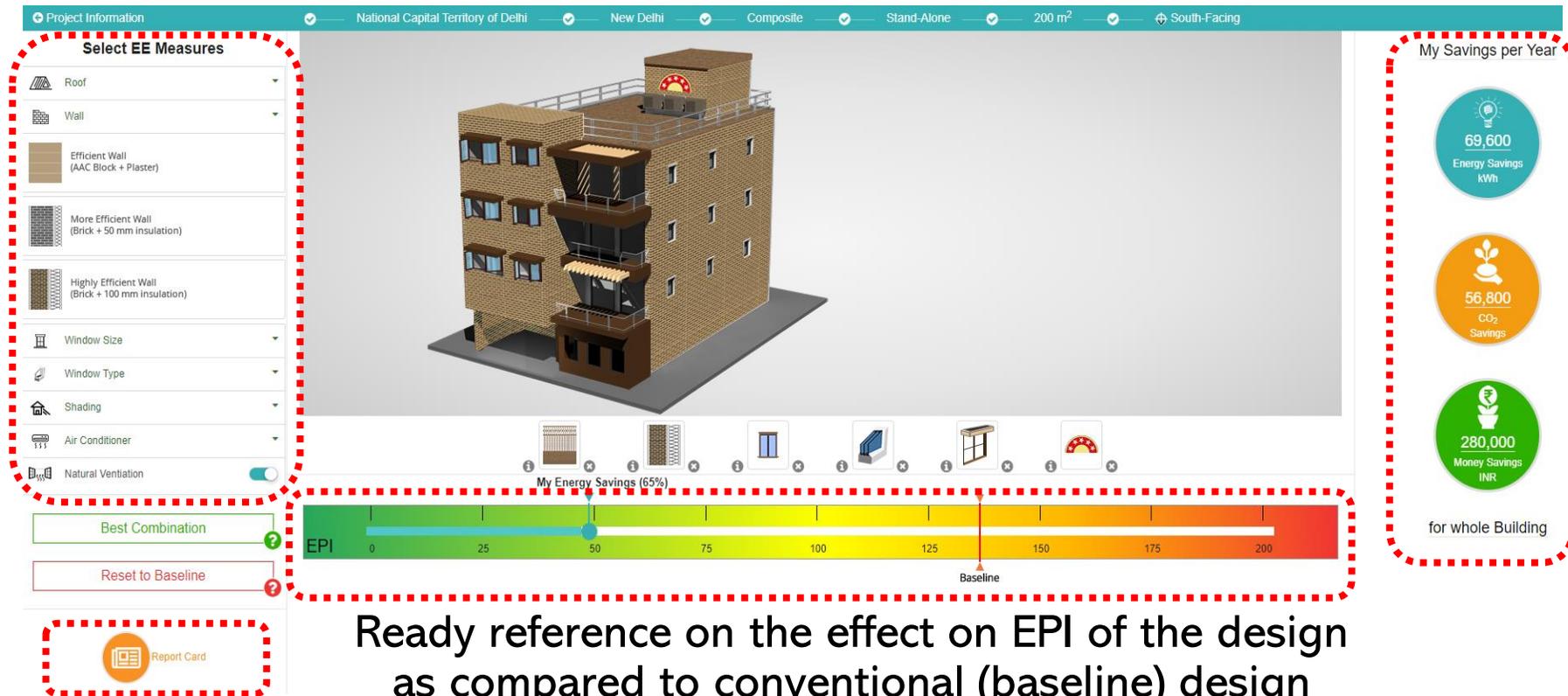
Area per Floor
200   m²

Building Area
Building Area is equivalent to 800 m²

Which direction should your building face?
South-Facing

Continue   Back

ECONIWAS 2.0 – BASIC TOOL

Most interactive drag and drop features to select and install energy efficient parameters in building design

Quick inference on the impact of selected design features on the energy, environment and monetary level.

One click export of results to PDF file

Ready reference on the effect on EPI of the design as compared to conventional (baseline) design

Advanced Tool:

Simulation based tool for the professionals (Architects, Engineers, MEP consultants, project developers, Industry professionals) who wish to perform detailed analysis of the project design features in terms of energy efficiency, economic feasibility and environmental impact..

ECONIWAS 2.0 – ADVANCED TOOL- Basic Information

Effective and responsible user form that takes essential inputs from the user to generate desired results

Easy to Navigate, tree view layout for quick navigations between various building parameters.

Self explanatory help panel for easy understanding of inputs for the users

ECONIWAS 2.0 – ADVANCED TOOL- Layout Information

User can select desired orientation of building

Various layout options for the user to choose from, to match exact shape of the building design.

LAYOUT

Layout Shape

T-Shape

Rectangular Shape
L-Shape
T-Shape
U-Shape
Rectangle Minus Corner
Custom Geometry

Building Orientation

North

X1	Y1
16 meters	10 meters

X2	Y2
10 meters	5 meters

X3	
3 meters	

Ability to adjust dimensions as per the exact design

Number of Floors

3

Floor Height

2.00 meters

Accessibility to design multiple floors with user specified floor height

ECONIWAS 2.0 – ADVANCED TOOL- Envelope Construction Information

For Wall & Roof Construction Assembly Definition

Define Wall/Roof constructions through property (U-value) or layer definition method. The construction once created can be used multiple times.

ENVELOPE

Construction Details

WALL DETAILS

Definition Type	Wall Name	Layer Name (outside to inside)
Layer ▼	BrickWall	Cement plaster (1762 kg/m3) ▼

Thickness (mm)

15

Large number of construction Materials as per ENS are available in the list

See layer by layer construction of your desired assembly in this construction table along with thermal performance values.

Add Layer

S.No.	Wall Name	Layer Name	Thickness (mm)	R Value (K.m²/W)	Action
1	BrickWall	Solid burnt clay brick (1760 kg/m3)	230	0.295	✎ ▬
2		Cement plaster (1762 kg/m3)	15	0.021	✎ ▬

Add Wall

S.No.	Wall Name	Definition Type	U-value (W/m²K)	Action
1	Brick wall	1- Solid burnt clay brick (1920 kg/m3) [230 mm] 2- Cement plaster (1762 kg/m3) [15 mm] 3- Cement plaster (1762 kg/m3) [12 mm]	2.151	✎ ▬
2	Rat Trap Bond Wall	1- Cement plaster (1762 kg/m3) [12 mm] 2- Solid burnt clay brick (1760 kg/m3) [75 mm] 3- Air Cavity (50mm Thickness) [80 mm] 4- Solid burnt clay brick (1760 kg/m3) [75 mm] 5- Cement plaster (1762 kg/m3) [12 mm] 6- Brick tile (1892 kg/m3) [8 mm]	1.441	✎ ▬

All the assembled constructions are listed in this table for later use.

For Fenestration Definition

Define fenestration constructions through property U-value, SHGC & VLT, glazing area and opaque frame selection. The construction once created can be used multiple times.

FENESTRATION DETAILS

Fenestration Type	Name of Window	Fenestration Opening Type
Window	Window1	Casement

U-value (W/m²K)	SHGC	VLT
4.2	0 ——————●———— 1 **0.60**	0 ——————————●—— 1 **0.70**

Glazing (%)	Opaque Frame U-Value (W/m².K)
0 ————●————— 100 **50**	Metal Frame

Add Fenestration

S.No.	Fenestration Type	Name of the window	Fenestration Opening Type	U-value (W/m²K)	SHGC	VLT	Glazing (%)	Opaque Frame U-Value (W/m².K)	Action
1	Window	wind_1	Casement	1.4	0.4	0.47	50	1.90	
2	Window	wind_2	Casement	0.4	0.4	0.44	40	0.40	

All the window constructions are listed in this table for later use.

For Wall & Roof Construction Assembly Definition

Dimensional Details ⌄

Wall

Automatic naming of the walls and the façade orientation based on user input in layout section for easy reference

Wall-3

Wall-4
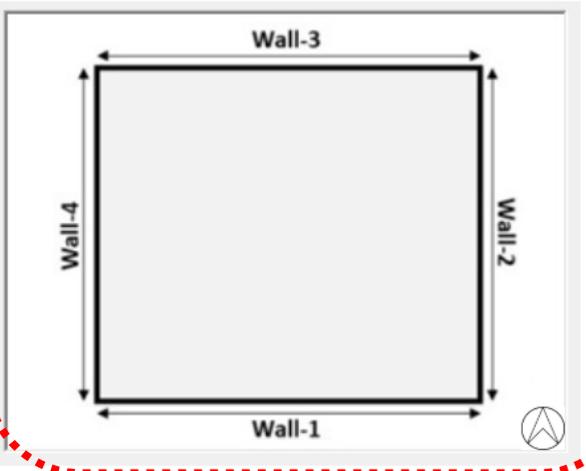
Wall-2

Wall-1

Wall 1 (South) ⌄

Wall Construction	Length	Height	Number of Floors
wall1	10 m	2.00 m	3

Area

60 m²

Add Construction

One click definition for wall/roof construction material on selected facade.

Wall 2 (East) ⌃

For Wall & Fenestration Dimension Definition

Select construction from predefined construction types to be installed on the selected wall of the building

Add Construction for wall 1 (South)

Construction

Type
Select
Select
Brick Wall
Fly Ash Brick Wall
AAC block Wall
60.00   m²

Length
10   m

No. of Floors
3

Boundary Condition
Exposed to the outside

Select the boundary condition as to whether the wall is exposed or non-exposed to outside environment. For exposed walls, option to add fenestration shall be available in the window.

Fenestration

Type
Select

Number

Length   m

Height   m

Area (including Frame)   m²

Shading Type ❶
No Shading

ECONIWAS 2.0 – ADVANCED TOOL- Envelope Dimension Information

For Fenestration & Shading Dimension Definition

Select window type from predefined window constructions types to be installed on the selected wall of the building. Define dimension of windows and numbers

Options to install shading elements on the selected window. Select one and input dimensions.

For Roof Dimension Definition

Similarly one can select the applicable roof construction to be installed in building design from construction library

User can define the lighting/equipment power density using Building Area Method or Space Function Method as per ECBC

LIGHTING

Definition Method

Space by Space Method ▼

Lighting Power

Area Type	Percent Area (%)	Design Load (Watts)
Guest Room ▼		
	Percent Area Sum (%) 75	

Add LPD

This table represents the design lighting/equipment load in different areas of the building.

S.No.	Area Type	Percent Area (%)	Design Load (Watts)	Action
1	Corridor	15	100	✎ ➖
2	Guest Room	60	500	✎ ➖

HVAC

HVAC Present

User has the option to choose whether the building is conditioned or naturally ventilated.

Yes

Conditioned Area %

5 ────●──────── 100
50

In case the HVAC is present, some essential information about the efficiency of equipment and conditioned area is asked from the user.

Cooling Present

Yes

Cooling Thermostat Setpoint °C

20 ────●──────── 32
25

Co-efficient of Performance
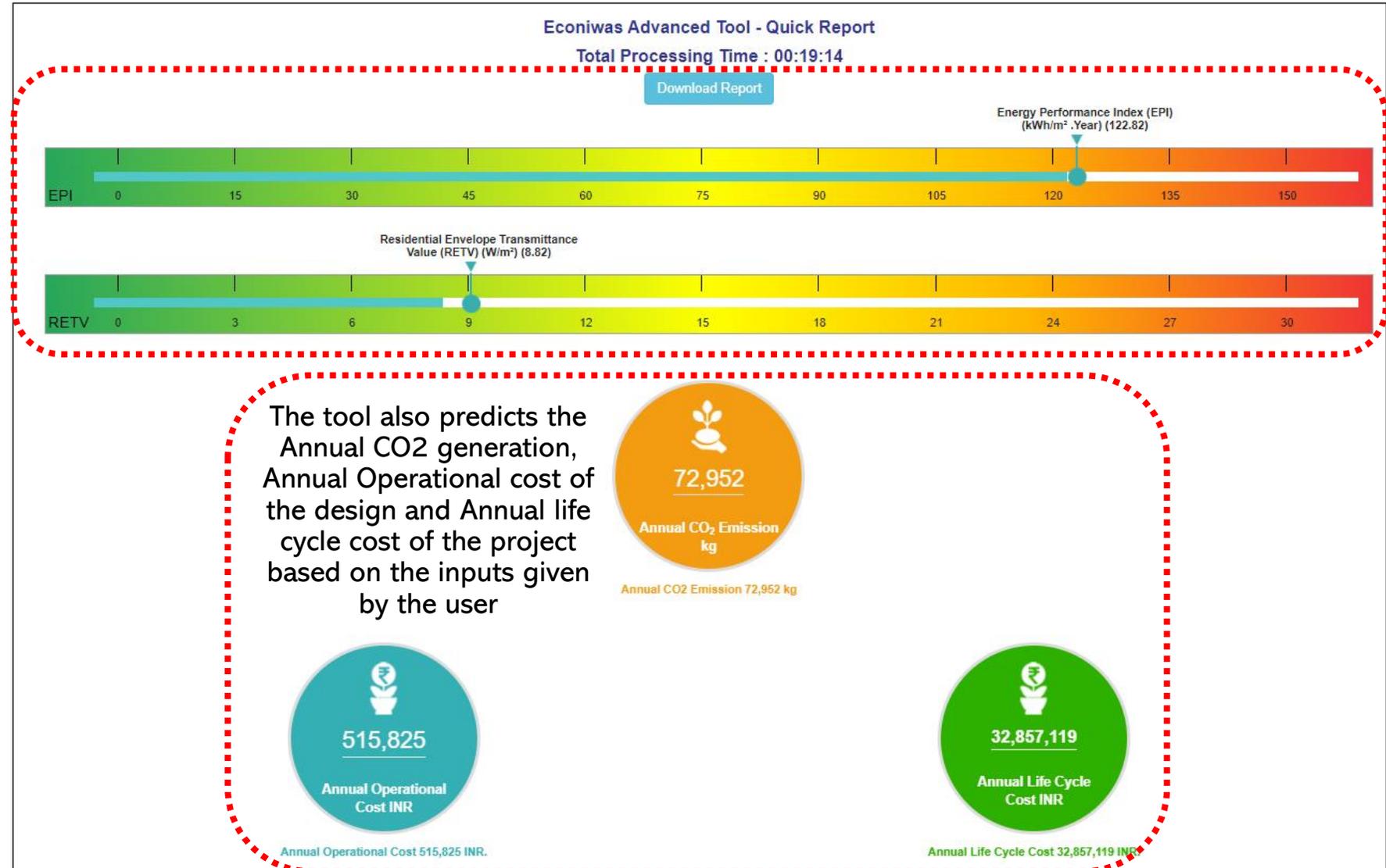
4

Heating Present

Yes

Heating Type

Electric

Heating Thermostat Setpoint °C

10 ────●──────── 22
15

ECONIWAS 2.0 – ADVANCED TOOL- Results

On the submission of the form, the tool performs the energy simulation using energy plus server-side simulation platform to predict the EPI and RETV values of the designed building.

The user has the option to export the results in PDF format for later use, using the "Download Report" button on the results page.

Econiwas Advanced Tool - Quick Report
Total Processing Time : 00:19:14

Download Report

Energy Performance Index (EPI)
(kWh/m² .Year) (122.82)

EPI   0   15   30   45   60   75   90   105   120   135   150

Residential Envelope Transmittance
Value (RETV) (W/m²) (8.82)

RETV   0   3   6   9   12   15   18   21   24   27   30

The tool also predicts the Annual CO_2 generation, Annual Operational cost of the design and Annual life cycle cost of the project based on the inputs given by the user

72,952
Annual CO_2 Emission kg
Annual CO2 Emission 72,952 kg

515,825
Annual Operational Cost INR
Annual Operational Cost 515,825 INR.

32,857,119
Annual Life Cycle Cost INR
Annual Life Cycle Cost 32,857,119 INR

Envelope Optimization Tool:

A quick envelope evaluation module to compute the most optimized set of U-values & SHGC for best wall, best roof and best window including thickness of selected insulation required on the selected base assemblies of wall and roof for the selected location based on life cycle cost of the building envelope.

ECONIWAS 2.0 – Envelope Optimization Tool- Basic Information

Effective and responsible user form that takes essential inputs from the user to generate desired results. Project location, energy inflation rate, tariff rate and life cycle years are few basic inputs which are required by the user.
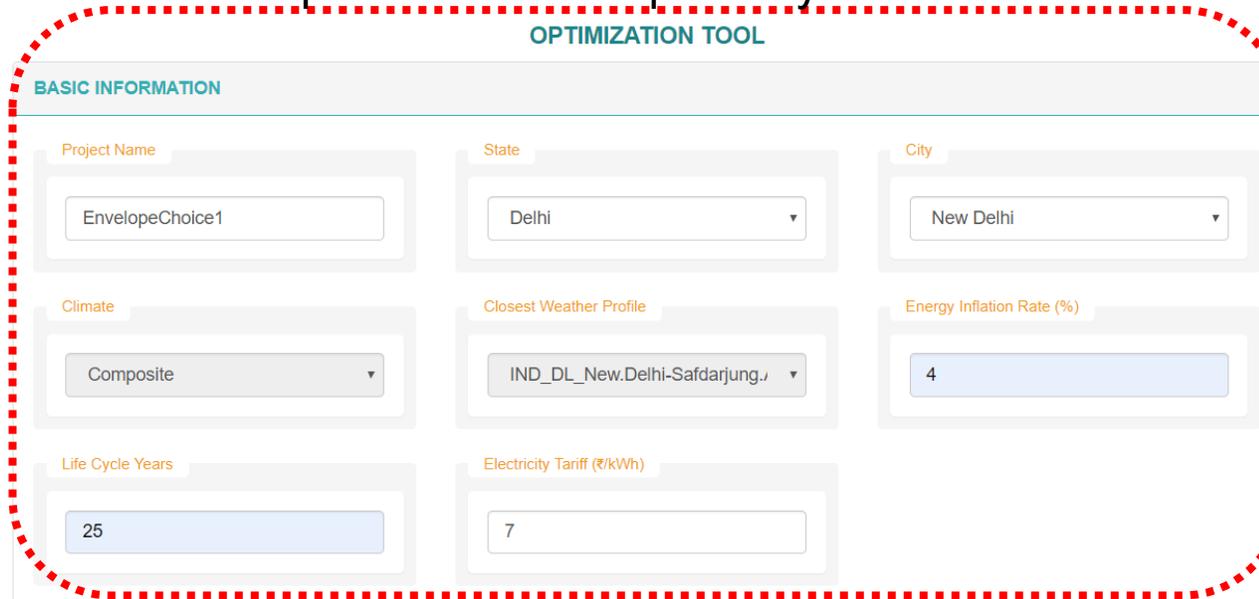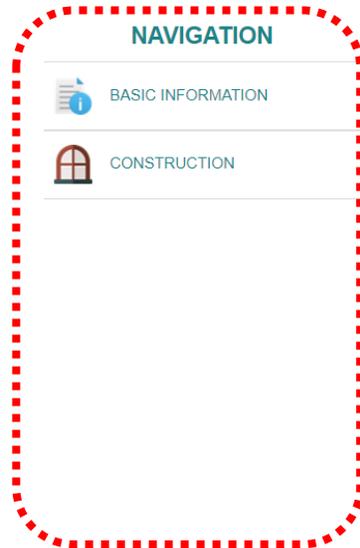
NAVIGATION

BASIC INFORMATION

CONSTRUCTION

OPTIMIZATION TOOL

BASIC INFORMATION

Project Name
EnvelopeChoice1

State
Delhi

City
New Delhi

Climate
Composite

Closest Weather Profile
IND_DL_New.Delhi-Safdarjung.

Energy Inflation Rate (%)
4

Life Cycle Years
25

Electricity Tariff (₹/kWh)
7

HELP

This input field represents the amount of years for which the life cycle cost is to be calculated. It plays a very important role in determining the capital cost to operational cost ratios for optimization. Enter the amount of years for which the life cycle cost is to be calculated.
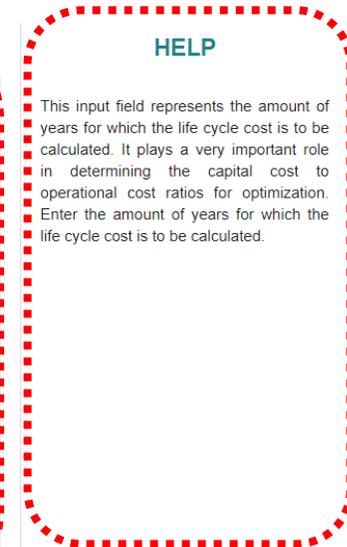
Easy to Navigate, tree view layout for quick navigations between various building parameters.

Self explanatory help panel for easy understanding of inputs for the users

User is required to select the choice of base wall/roof assembly on which insulation of optimized thickness shall be installed. Similarly, selection of insulation material is required as input.

User is required to define the cost per cubic meter for base wall roof assembly and the selected insulation.

Large number of insulation options for user to choose from.

CONSTRUCTION DETAIL

Wall

Type of Wall: 230mm Red Brick Wall

Wall Section Thickness (mm): 230

Wall Construction Cost (₹/m³): 5000

Type of Wall Insulation: Expanded Polystyrene Foam

Wall Insulation Cost (₹/m³): 3800

Roof

Type of Roof: 100mm RCC Slab

Roof Section Thickness (mm): 100

Roof Construction Cost (₹/m³): 6000

Type of Roof Insulation: -Select-One-
- -Select-One-
- Expanded Polystyrene Foam
- Polyurethane Foam
- Rockwool
- Glasswool
- Mud Phuska
- Straw
- Extruded polystyrene (XPS)
- Aerogel
- Wood fibre
- Cellulose / Wool / Hemp

Roof Insulation Cost (₹/m³):

Window Cost (₹/m²):

Building Height (m):

WWR-East (%): 0 — 50 — 100

Similarly, selection of Window type and corresponding cost is required as input. Based on the window type, the optimization tool shall limit the U-value output.
For example, if user selects SGU, the tool can predict U values close to 7 $W/m^2.K$, whereas if user selects DGU, the tool will limit the prediction of U-value upto 4 $W/m^2.K$

Window

Type of Window

Double Glazed ▼

Window Cost (₹/m²)

5500

Other Design Specifications

Conditioned Area (%)
10 ———○——— 100
55

Building Height (m)
20

WWR-East (%)
0 ———○——— 100
50

WWR-West (%)
0 ———○——— 100
50

WWR-North (%)
0 ———○——— 100
50

WWR-South (%)
0 ———○——— 100
50

Submit

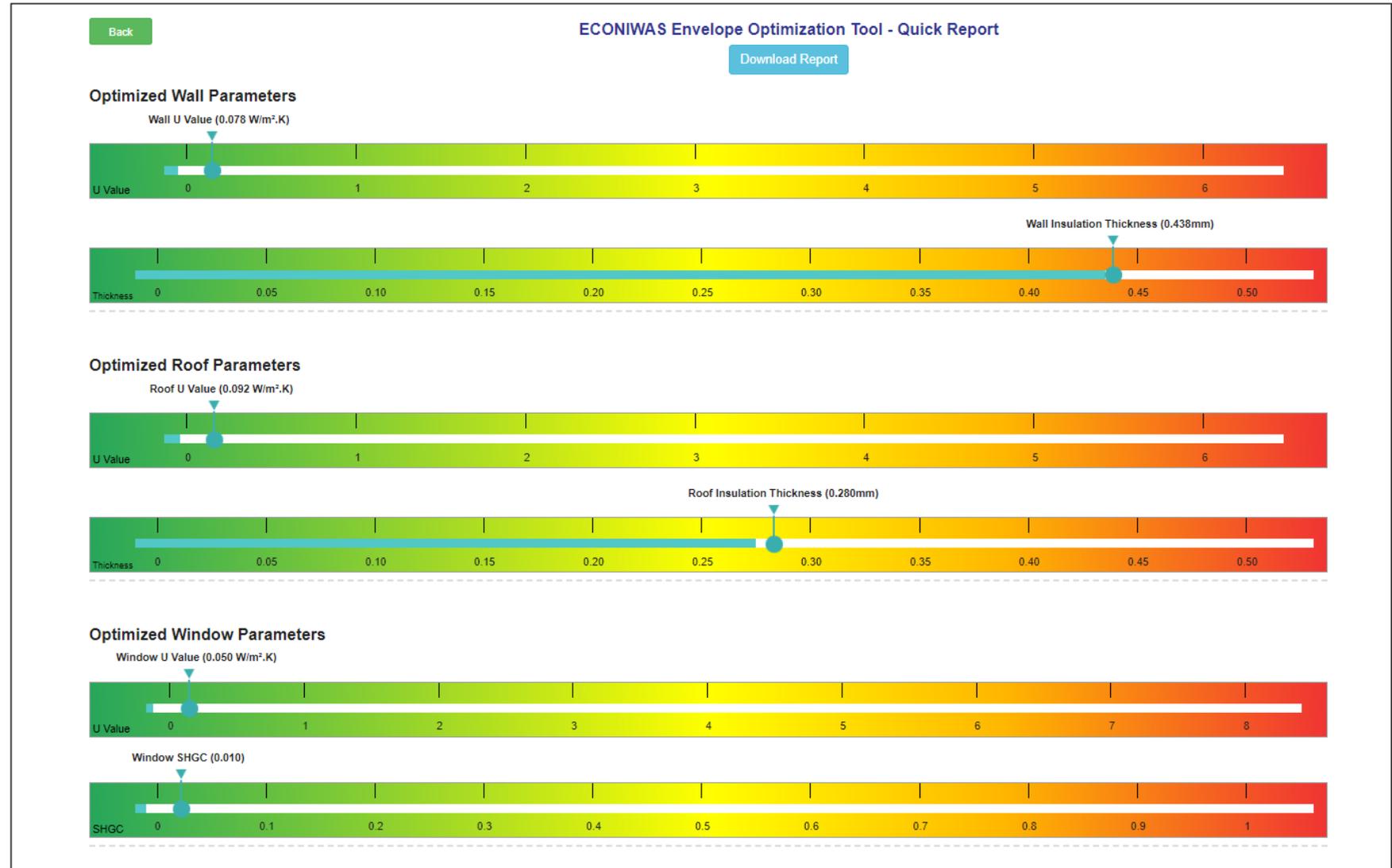**NAVIGATION**

📋 BASIC INFORMATION

🪟 CONSTRUCTION

Optimization in progress. This procedure generally takes 4-5 minutes. The results will be shown on the screen once the optimization is finished. Thanks!"

Please Wait ...

Apart from this, a few other relevant information on the envelope such as Building Height, Conditioned Area and WWR of each façade is required as input from the user

Generally, the optimization process takes 4-5 minutes to complete. The following message is shown in the tool during execution of optimization.

After filling all the required information, the user is required to click on the Submit button to start the optimization engine.

ECONIWAS 2.0 –Envelope Optimization Tool- Results

On the submission of the form, the tool performs the optimization using energy plus server-side simulation platform to predict the optimized U-value, SHGC for envelope components (wall, roof windows) as well as thickness of insulation for wall and roof assemblies. The user also has the option to export the results in PDF format for later use, using the "Download Report" button on the results page.

Thanks!