GGGI

ASIA LOW CARBON BUILDINGS TRANSITION
Life Cycle Assessment for Transitioning to a Low-Carbon Economy | PROJECT

Deep-Dive & Carbon Performance Analysis of Buildings in Kerala

Asia Low Carbon Buildings Transition (ALCBT) Project

January 2026

ASEAN CENTRE FOR ENERGY ACE

EESL

HEAT

Supported by:

Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety

IKI INTERNATIONAL CLIMATE INITIATIVE

based on a decision of the German Bundestag

ASIA LOW CARBON BUILDINGS TRANSITION
Life Cycle Assessment for Transitioning to a Low-Carbon Economy | PROJECT

This report is part of the **Asia Low Carbon Buildings Transition (ALCBT) Project**, funded by the Government of Germany through its Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN) via the International Climate Initiative (IKI).

CONTENTS

List of Figures

List of Tables

Acronyms and Abbreviations

ALCBT	Asia Low Carbon Buildings Transition
ASEAN	Association of Southeast Asian Nations
ACE	ASEAN Centre for Energy
BEAT	Building Emission Assessment Tool
BoQ	Bill of Quantities
CaaS	Cooling-as-a-Service
CO_2	Carbon Dioxide
EESL	Energy Efficiency Services Limited
EOI	Expression of Interest
EPD	Environmental Product Declaration
EPI	Energy Performance Index
ESCO	Energy Service Company
GGGI	Global Green Growth Institute
GHG	Greenhouse Gas
HVAC	Heating, Ventilation and Air Conditioning
IKI	International Climate Initiative
kW	Kilowatt
kWh	Kilowatt-hour
kgCO_2e/sq.m.	Kilograms of CO_2 equivalent per square meter
LCA	Life Cycle Assessment
MWh	Megawatt-hour
NDCs	Nationally Determined Contributions
RCC	Reinforced Cement Concrete
RMC	Ready-Mix Concrete
SDGs	Sustainable Development Goals
TR	Tonnage of Refrigeration

Energy Management Centre

State Designated Agency to Enforce Energy Conservation Act 2001
Department of Power, Government of Kerala

Foreword

The building sector in Kerala is at a critical juncture, shaped by rapid urbanisation, increasing demand for cooling, and the urgent need to align development pathways with climate and energy goals. As a state that has consistently demonstrated leadership in energy efficiency, decentralised renewable energy, and climate-responsive planning, Kerala recognises the importance of evidence-based decision-making to guide its transition towards a low-carbon built environment.

The Energy Management Centre (EMC), as the State Designated Agency under the Energy Conservation Act, 2001 plays a central role in supporting the Government of Kerala in improving building energy performance, strengthening implementation of building energy codes, and enabling scalable efficiency interventions across public and private infrastructures. In this context, the *Deep-Dive and Carbon Performance Analysis of Buildings in Kerala* represents a significant and timely contribution to the state's energy and climate action agenda.

This report, developed under the Asia Low Carbon Buildings Transition (ALCBT) Project implemented by the Global Green Growth Institute (GGGI) and supported by the International Climate Initiative (IKI), builds upon the state-wide building registry and presents a detailed assessment of operational and embodied carbon across representative building typologies in Kerala. By applying the Building Emission Assessment Tool (BEAT) to a selected dataset of 80 buildings in the state, the analysis provides valuable insights into energy performance trends, carbon hotspots, and sector-specific intervention opportunities.

From EMC's perspective, the strength of this assessment lies in its ability to translate data into action. The findings clearly highlight the dominance of operational energy use, particularly cooling-related demand, in driving emissions in Healthcare, Hospitality, and Business buildings, while also drawing attention to the growing importance of embodied carbon in newer construction. These insights directly support Kerala's efforts to enhance compliance with the Energy Conservation and Sustainable Building Code (ECSBC), promote efficient cooling solutions in line with the India Cooling Action Plan, and encourage the adoption of innovative implementation models such as Energy Service Companies (ESCOs) and Cooling-as-a-Service (CaaS).

The shortlisting of buildings for pilot demonstrations, informed by this analysis, marks an important step towards on-ground implementation. These pilots will not only showcase technical solutions but also help test financing mechanisms, institutional coordination, and replicable pathways that can be scaled across the state.

EMC acknowledges the collaborative efforts of GGGI and other consortium partners, such as HEAT GmbH, Energy Efficiency Services Limited (EESL), and state and local stakeholders, in developing this report. We believe that the insights generated through this deep-dive assessment will serve as a robust knowledge base for policymakers, urban local bodies, building owners, and practitioners, and will support Kerala's continued leadership in advancing energy-efficient, climate-resilient, and low-carbon buildings.

Dr. R. Harikumar
Director
Energy Management Centre - Kerala

Sreekrishna Nagar, Sreekariyam P.O.
Thiruvananthapuram 695 017
Tel : 0471-2594922, 2594924 Fax : 0471-2594923
E-mail: emck@keralaenergy.gov.in | Website : www.keralaenergy.gov.in

Executive Summary

The Global Green Growth Institute (GGGI), under the Asia Low Carbon Buildings Transition (ALCBT) Project supported by the International Climate Initiative (IKI), is working with the Government of India and three state governments, Kerala, Haryana and Uttar Pradesh, to accelerate the transition to low-carbon buildings through evidence-based planning, capacity-building, and demonstration of scalable solutions.

Following the development of the Buildings Registry for 1687 buildings, this report presents the findings of a deep-dive assessment of 80 buildings in Kerala, selected from an initial dataset of 400 buildings. The analysis uses the Building Emission Assessment Tool (BEAT)[1], a web-based lifecycle assessment (LCA) platform that quantifies both operational and embodied carbon across a building's lifecycle. The tool was developed by HEAT GmbH as part of the ALCBT Project.

The building dataset chosen for the assessment is dominated by Educational (32.5%) and Healthcare (32.5%) facilities. Across typologies, Hospitality, Healthcare, and Assembly buildings exhibit the highest energy intensity, driven by long operational hours, intensive cooling requirements, and equipment-heavy operations. These categories also have the highest per-capita energy use, indicating significant potential for efficiency improvements.

In contrast, Educational and Business buildings show comparatively lower Energy Performance Index (EPI) values but highlight an emerging challenge: the growing share of embodied carbon in newer construction. The shift from traditional masonry structures to reinforced and ready-mixed concrete systems in recent years has increased the material-related carbon footprint of Kerala's building dataset. Finishing materials, particularly in Hospitality buildings, contribute additional embodied emissions due to frequent renovations.

Insights from the combined operational and embodied carbon analysis informed the shortlisting of 16 buildings for pilot retrofits in Kerala. These pilots will focus primarily on cooling efficiency measures and are expected to deliver substantial impact, with an estimated average energy savings of 32% and annual CO_2 emissions reductions of 2,295 tonnes. The demonstrations will test and operationalize scalable business models such as Energy Service Company (ESCO) and Cooling-as-a-Service (CaaS), intended for replication across the state.

Overall, the deep-dive assessment underscores the importance of targeted interventions in high-intensity typologies, improved construction practices, and streamlined data collection systems to enable Kerala's transition to climate-aligned buildings. The findings provide a strong analytical foundation for state-level planning and directly support India's Nationally Determined Contributions (NDCs) by advancing efficient, low-carbon building pathways.

[1] Asia Low Carbon Buildings Transition (ALCBT) Project, *Building Emission Assessment Tool (BEAT)*, https://beat-alcbt.gggi.org/

1. | Introduction

1.1 About the ALCBT Project

The Asia Low Carbon Buildings Transition (ALCBT) Project is a five-year program implemented in Cambodia, India, Indonesia, Thailand, and Vietnam. In India, the project is being implemented in Kerala, Haryana, and Uttar Pradesh under the Ministry of Housing and Urban Affairs, with support from the respective state governments. The project is spearheaded by the Global Green Growth Institute (GGGI) in collaboration with HEAT GmbH, Energy Efficiency Services Limited (EESL), and the ASEAN Centre for Energy (ACE), and is funded by the German Government through its Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN) via the International Climate Initiative (IKI). The project aims to catalyse a nationwide transition towards low-carbon buildings by addressing regulatory, capacity, and financing gaps, while targeting both operational and embodied greenhouse gas (GHG) emissions.

As part of this project, a building registry dataset comprising 1,687 buildings (approximately 1,600+) across Kerala, Haryana, and Uttar Pradesh has been developed. The dataset includes 1,150 existing buildings (constructed up to 2024) and 537 new buildings (under construction or planned from 2025 onwards), spanning residential, commercial, and institutional typologies.

Data was compiled from secondary sources, including energy audit reports, electricity bills, planning records, and inputs from government departments and state agencies. For each building, the registry captures detailed attributes including building identification and location, year of construction, ownership (public or private), building typology and sub-typology, total and air-conditioned floor area, number of floors, connected electrical load, annual electricity consumption, cooling system type and capacity, occupancy levels, and operational hours. Based on this information, key performance indicators, such as the Energy Performance Index (EPI), were calculated, with observed values ranging widely across building types, reflecting differences in use patterns and energy intensity.

The building registry aims to serve as a foundational resource for policymakers and stakeholders by identifying opportunities to strengthen the implementation of the **Energy Conservation and Sustainable Building Code (ECSBC)**[2] and **Eco-Niwas Samhita (ENS)**[3] and by recommending the integration of energy and carbon assessment tools into municipal regulations.

1.2 Purpose and Scope of the Deep-Dive Assessment

From the registry database of 400 new and existing buildings, selected buildings were subjected to a deep-dive assessment using BEAT. By applying BEAT to a representative dataset of 80 buildings from the registry, the project aims to quantify building performance, establish carbon baselines, identify investment-ready projects, and generate evidence for targeted policy interventions and demonstration pilots for Kerala. The deep-dive assessment will support in facilitating the transition from compiling building registries to establishing actionable carbon reduction strategies.

The next phase will identify a final cohort of 20 buildings across Kerala for pilot implementation of energy-efficient cooling interventions in new and existing structures. These pilot sites will showcase low-carbon cooling solutions using natural refrigerants,

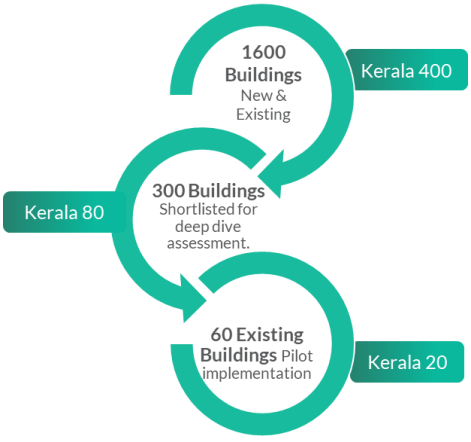


Figure 1. Scope of work in the Building Registry

[2] Government of India, Energy Conservation and Sustainable Building Code (ECSBC) (New Delhi: Bureau of Energy Efficiency, Ministry of Power), https://beeindia.gov.in/sites/default/files/ECSBC_2024.pdf
[3] Government of India, Eco-Niwas Samhita (ENS) 2024 (New Delhi: Bureau of Energy Efficiency, Ministry of Power), https://beeindia.gov.in/sites/default/files/publications/files/BEE%20ENS%202024.pdf

jointly implemented by GGGI and EESL through innovative business models such as CaaS and ESCO models.

The key steps in the building registry activity are illustrated in **Figure 2**.

Figure 2. Schematic Diagram for Building Registry Activity

1.3 Relevance of the Deep-Dive Assessment

The deep-dive assessment is closely aligned with India's national climate and development commitments. It complements the State Climate Action Plans, India Cooling Action Plan (ICAP), and national climate targets under the Nationally Determined Contribution (NDC). It also supports the achievement of the Sustainable Development Goals (SDGs), particularly:

- **SDG 7:** Affordable and Clean Energy
- **SDG 11:** Sustainable Cities and Communities
- **SDG 13:** Climate Action

By embedding measurable energy efficiency and carbon reduction practices within the building sector, the project makes a direct and meaningful contribution to these global goals.

1.4 Limitations of the Deep–Dive Assessment

While the deep-dive assessment generated valuable insights into the energy and carbon performance of buildings in Kerala, certain limitations were encountered that should be acknowledged:

- **Data Availability and Quality:** In many cases, critical datasets, such as electricity bills, Bills of Quantities (BOQs), and detailed design drawings, were unavailable or incomplete. Data gaps and inconsistencies necessitated reliance on secondary sources, estimates, or assumptions, which affected the accuracy of certain performance indicators.
- **Investment Readiness and Stakeholder Willingness:** The willingness of building owners to share data, provide access, and invest in upgrades varied significantly. This influenced both the quality of information collected and the selection of candidate buildings for pilot interventions.

2. | Methodology

2.1 Building Registry Development

The foundation of the deep-dive assessment was established through the Building Registry activity. Data for 400 buildings in Kerala were systematically compiled, cleaned, and categorized by typology, gross floor area, occupancy, connected load, and EPI. The registry provided a comprehensive baseline, capturing both public and private buildings across residential, business, educational, assembly, and healthcare typologies. This structured dataset enabled sampling, cross-comparison, and performance benchmarking in subsequent analytical stages.

2.2 Selection Criteria for the Deep-Dive Dataset

A total of 80 buildings in Kerala were selected from the registry using the selection criteria for detailed assessment. ASHRAE Level 2 and walk-through audits were conducted for data collection. These buildings represent a diverse mix of typologies (residential, business, educational, assembly and healthcare). Selection was based on a set of technical, performance, operational, and practical considerations:

- **Technical Parameters:** Buildings with a connected load of ≥100 kW, gross floor area exceeding 1,000 sq.m., and high occupancy (>500 persons for large public buildings).
- **Performance Thresholds:** EPI ≥180 kWh/sq.m./year for commercial/government buildings, and ≥50 kWh/sq.m./year for residential buildings.
- **Operational Characteristics:** Buildings with cooling systems contributing more than 50% of electricity consumption and operating hours greater than 3,000 per year.
- **Practical Aspects:** Availability of reliable datasets such as BOQs, architectural/design drawings, and the willingness of building owners to participate. The investment readiness of the building owners was also taken into consideration.

2.3 Data Sources

A multi-source data collection approach was adopted to ensure completeness and accuracy. The main data sources included:

- **Audit Reports and Surveys:** Site visits and walk-through surveys were undertaken to capture building performance.
- **Design Documentation:** BOQs, architectural drawings, and construction documents were collected where available. In cases where documentation was missing, site sketches and AutoCAD models were developed.
- **Operational Data:** Electricity and fuel consumption bills, connected load data, existing energy audit reports and occupancy information were obtained for operational data collection.
- **Photographs and Field Notes:** On-site photographs and field sketches provided supplementary detail for both operational and embodied carbon analysis.

2.4 Building Energy and Embodied Carbon Assessment

BEAT captures comprehensive building information, including building ID, name, type, year of construction, climate zone, city, location, total floor area, conditioned floor area, number of floors, building typology, and all relevant inputs required to calculate the building's operational and embodied carbon. Based on the building's general parameters and field-visit data, material details for each architectural element are identified. This is an essential step in accurately defining material layers.

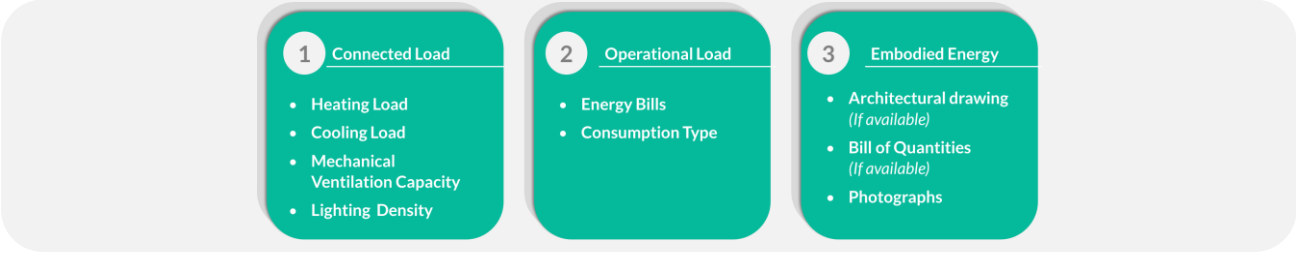


Figure 3. Components of the Building Energy and Embodied Carbon Assessment

- **Calculation of Total Connected Load and EPI:** The methodology integrates three components of building energy use, connected load and operational energy consumption to understand how the built environment interacts with overall energy demand.
- **Connected Load Calculation**: The connected load is calculated by identifying and summing the energy demand of all equipment, including:
    - *Appliances*
    - *Heating type and capacity*
    - *Cooling type and capacity*
    - *Ventilation type and capacity*
    - *Lighting type and capacity*

  This provides a baseline estimate of the building's maximum potential energy demand and supports identification of high-consumption areas, efficient load management, and opportunities for cost savings.

- **Collection of Operational Load Data:** Operational energy data are collected by reviewing monthly energy bills from the building owner, utility company, or fuel supplier. In some cases, the building's internal energy worksheet is used as a supplementary source.

- **Annual Energy Consumption:** Total energy consumption (kWh) is compiled over a defined period, typically one year, and includes all energy sources such as electricity, gas, and other fuels.

- **Energy Performance Index (EPI):** The EPI is calculated by dividing total annual energy consumption by the total built-up floor area (sq.m.) and is expressed in kWh/sq.m./year. EPI serves as a critical metric for evaluating a building's energy efficiency. It indicates how much energy is consumed per unit area annually, enabling comparison with industry standards and benchmarks.

- **Embodied Energy Assessment:** The embodied carbon is estimated by quantifying emissions locked within building materials. The methodology varies depending on data availability:
    - *Where architectural drawings are available:* Dimensions, material specifications, and construction details are directly extracted from drawings to calculate material quantities.
    - *Where only a BoQ is available:* Material quantities are derived directly from the BOQ prepared during construction.
    - *Where neither drawings nor BoQ are available:* Material quantification becomes more complex. Approximate drawings are prepared using on-site photographs to estimate material volumes.

- **Material Calculation:** Material volumes identified through the above methods are processed using Excel-based calculations. Standardized thumb rules from IS:10067-1982 are applied where necessary. These quantities are then used to estimate embodied carbon using the BEAT.

2.5 Implications of the analysis for Pilot Implementation

The outcomes of this analysis directly inform the next phase of pilot implementation under the ALCBT project. A total of 20 buildings has been shortlisted for low-carbon interventions and retrofits, with priority given to cooling efficiency measures. The pilots will serve as demonstration projects, showcasing the technical feasibility of low-carbon retrofits; scalable financing models such as ESCO and CaaS; and mechanisms for policy integration, enabling large-scale replication across states.

3. | Deep Dive Assessment in Kerala

3.1 Overview of the Building Sector in Kerala

Kerala, located in the southwestern region of India, spans approximately 38,863 square kilometres. The state's building sector has experienced rapid growth driven by urbanization, high population density, and increased development activities. The growth has led to a significant rise in energy consumption, making energy efficiency a critical priority.

In the financial year 2019-20, the construction sector significantly contributed to Kerala's economy, accounting for 12.42%[4] of the Gross State Domestic Product (GSDP). This robust performance highlights the sector's critical role in the state's economic framework. Kerala's economy has demonstrated growth trends, marked by an increase in per capita income and a reduction in the revenue deficit. These indicators reflect the state's improving economic health and the construction sector's pivotal role in driving this progress.

3.2 Climate of Kerala

Kerala experiences a tropical monsoon climate characterised by warm temperatures, high humidity, and abundant rainfall throughout the year. The state has four seasons: a warm and humid summer (March–May), the intense southwest monsoon (June–September), which brings nearly 70 per cent of the annual rainfall; the northeast monsoon (October–November), bringing additional showers, particularly in the south; and a mild winter (December–February).

The Western Ghats influence the climate by intercepting moisture-laden winds, causing heavy orographic rainfall that ranges from about 2,000 mm along the coast to over 5,000 mm in the highlands, supporting Kerala's dense vegetation and biodiversity[5].

3.3 Overview of the Selected 80 Buildings in Kerala

The dataset of 80 buildings in Kerala, illustrated in **Figure 4,** shows that the Educational and Healthcare buildings dominate the dataset, each contributing 32.5 per cent of the total. These are followed by Business buildings (18.75 per cent), Hospitality buildings (11.25 per cent), and Assembly buildings (5 per cent). This distribution indicates a building stock largely centred around public service infrastructure.

As shown in **Table 1**, the age distribution reveals that Educational buildings span all age groups, with many in the 10–30-year range, reflecting steady expansion over time. As per the selection criteria for the deep dive assessment, 64 buildings are old constructions up to 2017, whereas 16 are new constructions from 2018.

City-wise distribution, shown in **Figure 5,** indicates that Thiruvananthapuram has the largest share with 28 buildings, followed by Thrissur with 11 buildings, and Ernakulam and Alappuzha with seven buildings each. This reflects a strong concentration in major urban and administrative hubs, while smaller districts are less represented.

[4] Building Statistics, 2019-2020, Government of Kerala, https://ecostat.kerala.gov.in/storage/publications/17.pdf
[5] Monsoon 2024: A Report, Government of India, India Meteorological Department, https://mausam.imd.gov.in/imd_latest/monsoonreport2024.pdf

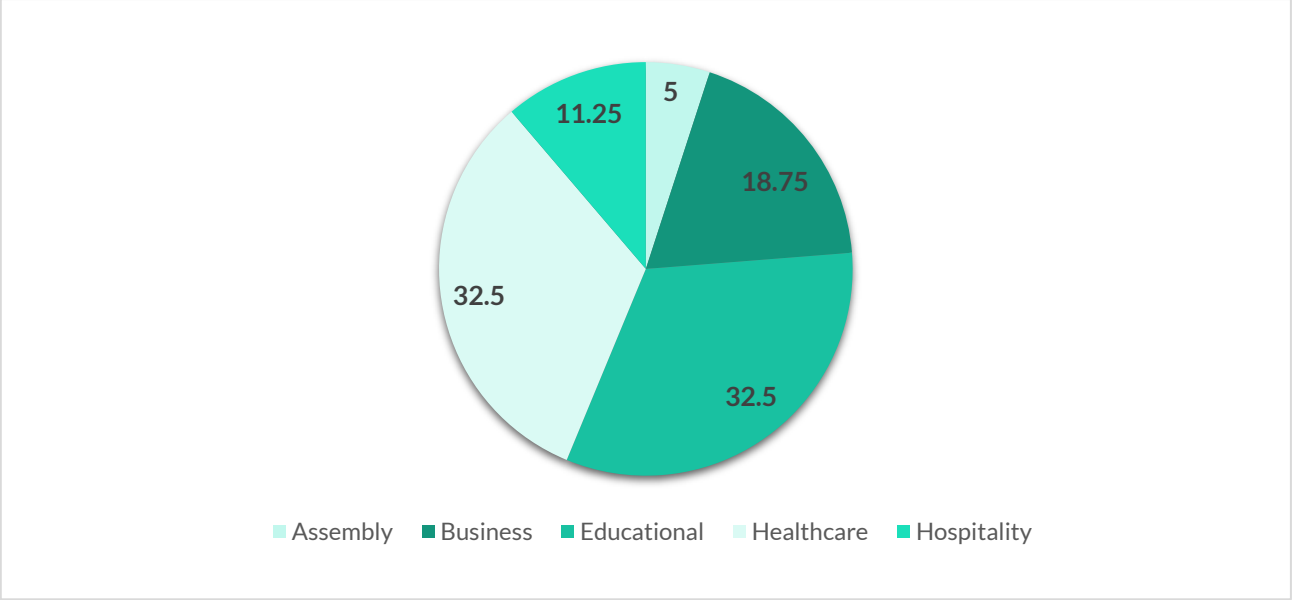


Figure 4. Percentage Building Type Distribution of 80 Buildings in Kerala

Table 1. Distribution of Buildings by Type and Age Distribution

Building Type	Age Distribution					
	<10 years	10-30 years	30-50 years	50-100 years	Above 100 Years	Grand Total
Assembly	3	1	0	0	0	4
Business	6	4	3	2	0	15
Educational	5	12	4	4	1	26
Healthcare	8	9	1	5	3	26
Hospitality	0	5	0	4	0	9
Grand Total	22	31	8	15	4	**80**

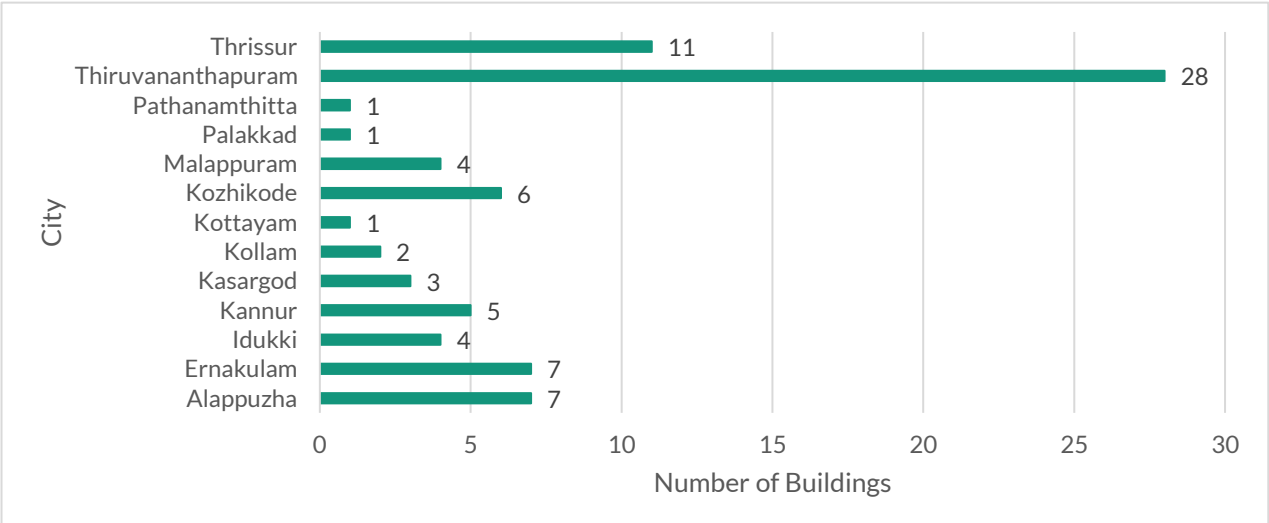


Figure 5. Number of Buildings in the Cities of Kerala

The analysis of Kerala's building data in **Figure 6** and **Figure 7** shows clear differences in energy performance and load intensity across building types. Assembly buildings emerge as the most energy-intensive category, recording the highest EPI (133 kWh/sq.m./year) along with the highest average cooling load (654 kW) and total connected

load (1,090 kW), reflecting large occupancy levels and heavy Heating, Ventilation and Air Conditioning (HVAC) dependence. Healthcare buildings also show high energy demand, with an EPI of 75 kWh/sq.m./year and substantial cooling (393 kW) and total loads (654.6 kW) due to 24/7 operations and medical equipment use. Hospitality buildings display moderate energy consumption, with a total load of 472.7 kW and an EPI of 100, while Business and Educational buildings show comparatively lower and more efficient energy profiles. Educational buildings demonstrate the lowest EPI (18 kWh/sq.m./year) and moderate load requirements, consistent with daytime occupancy and limited equipment usage.

Overall, the combined indicators highlight that Assembly, Healthcare, and Hospitality buildings carry the highest operational energy burden, presenting strong potential for targeted efficiency interventions, while Business and Educational buildings show inherently lower load and energy intensity.

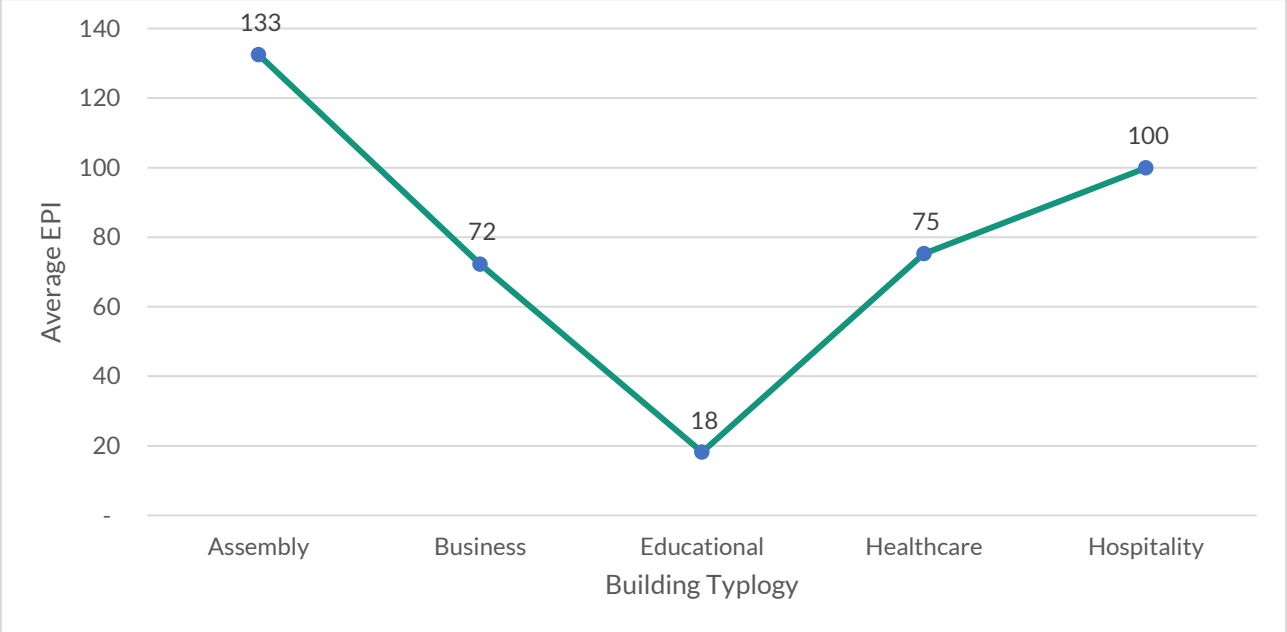


***Figure 6**. Average EPI as per Building Type*

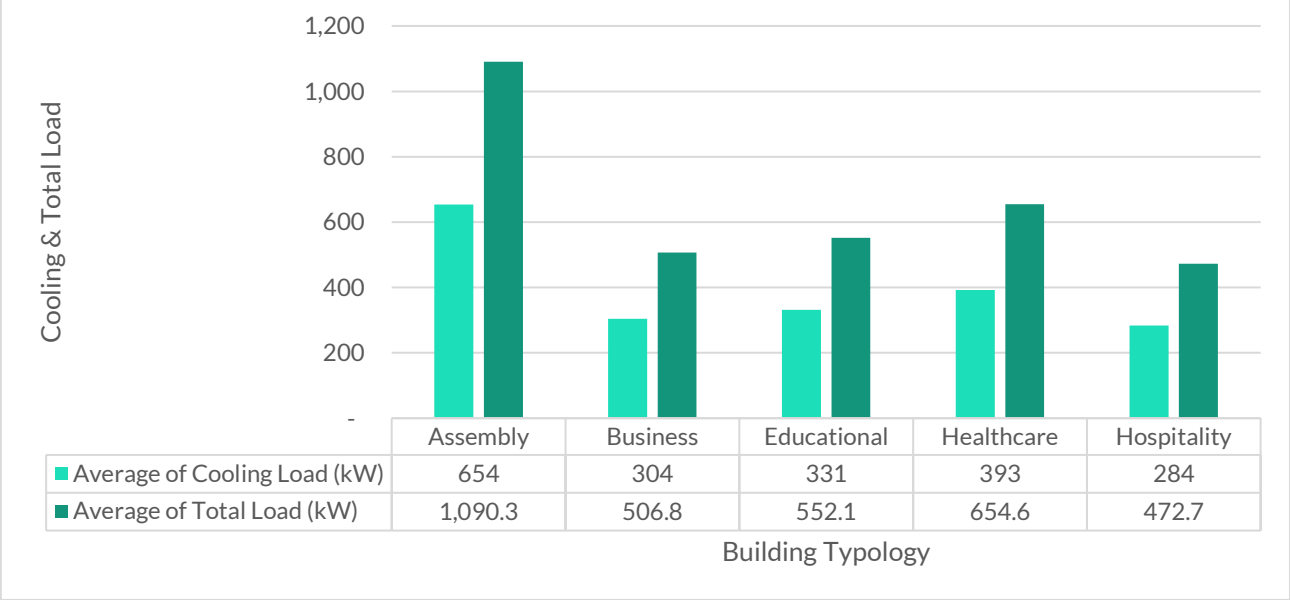


***Figure** 7. Average Total & Cooling Load as per Building Type*

3.4 BEAT Assessment of 80 Buildings in Kerala

BEAT quantifies both embodied and operational carbon emissions of buildings, providing a unified methodology for whole-life carbon assessment. The tool applies EN 15978-based LCA boundaries, covering product stage emissions (A1–A3) and operational energy use (B6). It allows users to model carbon performance through either BoQs or component-based inputs, linking material data with Environmental Product Declarations (EPDs). The tool integrates generic, official, and eventually user-specific EPDs to address data gaps and promote local low-carbon material markets[6].

Figure 8. Key features of BEAT

3.5 Output Generated by the BEAT

Figure 9 shows that Hospitality buildings have the highest carbon footprint, dominated by extremely high operational carbon emissions (7,155 $kgCO_2e/sq.m.$), reflecting intensive energy use and long operating hours. Healthcare and Business buildings also exhibit substantial carbon levels, with Business buildings showing a strong embodied carbon component due to material-heavy construction. Educational buildings fall in the mid-range, while Assembly buildings have the lowest overall carbon emissions. Across all categories, operational carbon is the primary contributor, highlighting significant potential for energy efficiency measures, especially in Hospitality, Healthcare, and Business buildings.

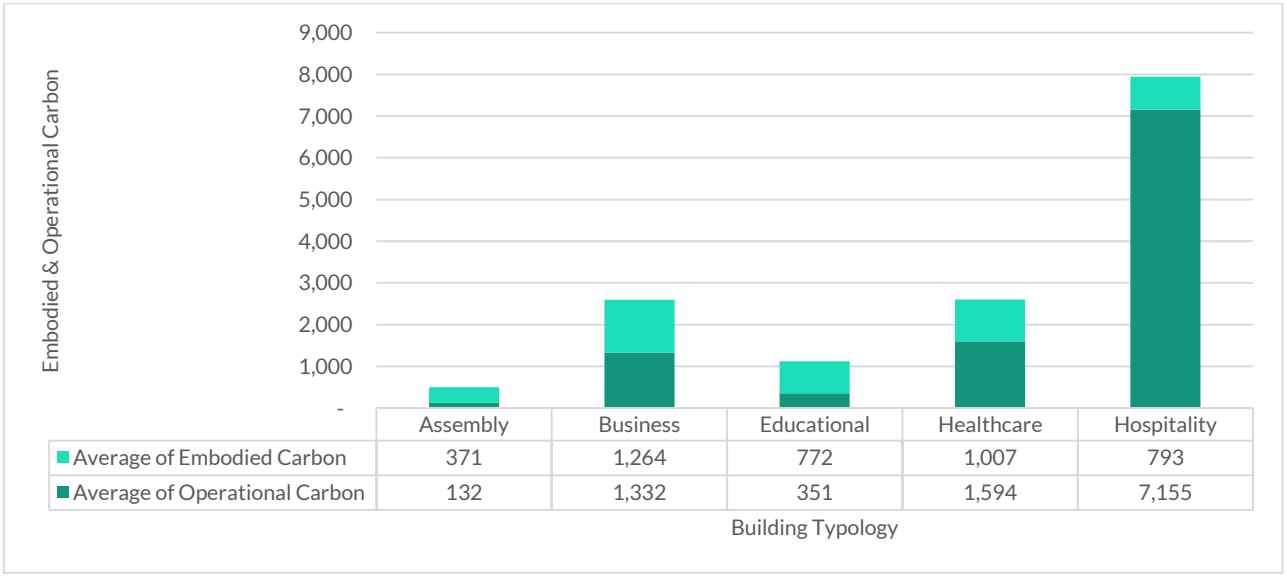


Figure 9. Average Percentage of Operational & Embodied Carbon by Percentage

[6] BEAT Handbook, Part 1- Core Concept Guide, https://alcbt.gggi.org/beat-handbook-part-1-core-concept-guide/

The material-wise carbon-concentrated chart in **Figure 10** reveals clear trends in how construction practices in Kerala have evolved across building types and age groups. Masonry shows a distinct age dependency, with higher usage in older Healthcare and Educational buildings, reaching 55.8 per cent in 50–100-year-old Healthcare structures, indicating the dominance of traditional construction in earlier decades. In contrast, newer buildings across all categories display a marked reduction in masonry, reflecting a shift towards reinforced concrete systems. This transition is further supported by the rise in rebar usage, which is consistently high in mid-aged Educational and Healthcare buildings and continues into newer construction, demonstrating the shift to reinforced cement concrete (RCC) as the primary structural system. Pre-cast concrete shows a strong presence in more recent Business and Hospitality buildings, suggesting the adoption of modular and faster construction methods, especially in commercial and tourism-driven sectors. Ready-mix concrete (RMC) emerges as the dominant material in the newest age group across all building types, underscoring the industry's move toward standardized, high-quality concrete production and modern construction practices.

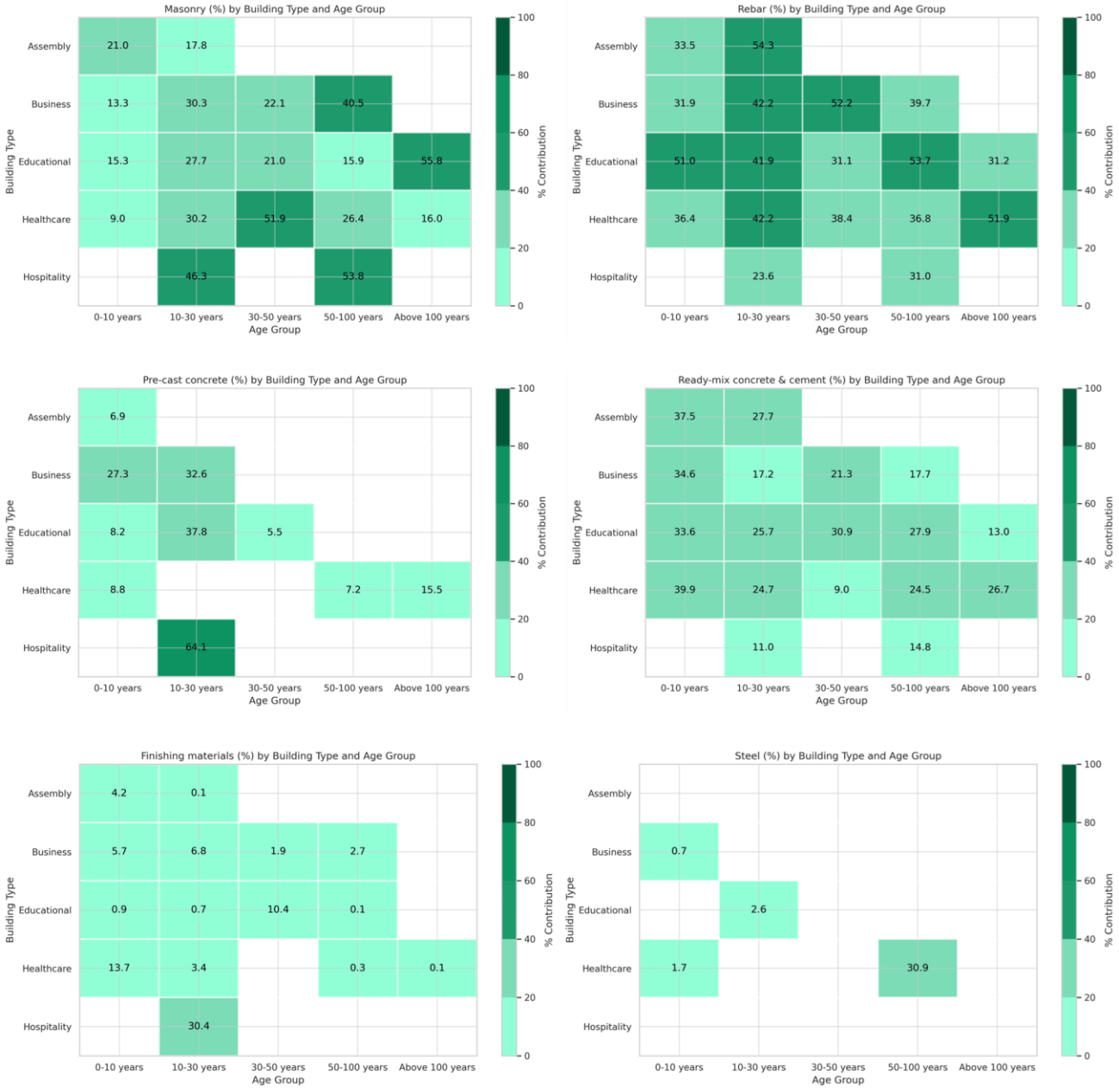


***Figure 10**. Carbon Concentration Chart with Trends in Material-Related Embodied Carbon across both Building Type and Age Group*

Finishing materials exhibit a unique pattern. While most building types show relatively low finishing material contributions across age groups, Hospitality buildings stand out with significantly higher finishing material

percentages accounting for 30.4 per cent in the 10–30-year age group. This reflects the sector's emphasis on interior quality, aesthetics, and frequent renovation cycles. Steel usage remains relatively low across the dataset, reaffirming Kerala's reliance on RCC over steel-framed structures, with isolated spikes in older Healthcare buildings likely linked to retrofits or specialized structural needs.

Overall, the material distribution reveals a clear evolution from masonry-heavy traditional buildings to RMC- and rebar-dominated modern structures, with distinct variations across sectors. Hospitality and Business buildings exhibit the most modern material profiles, while older Healthcare and Educational buildings retain heavier traditional construction elements. These insights highlight not only how Kerala's construction landscape has progressed, but also which sectors may require targeted retrofitting or modernization interventions.

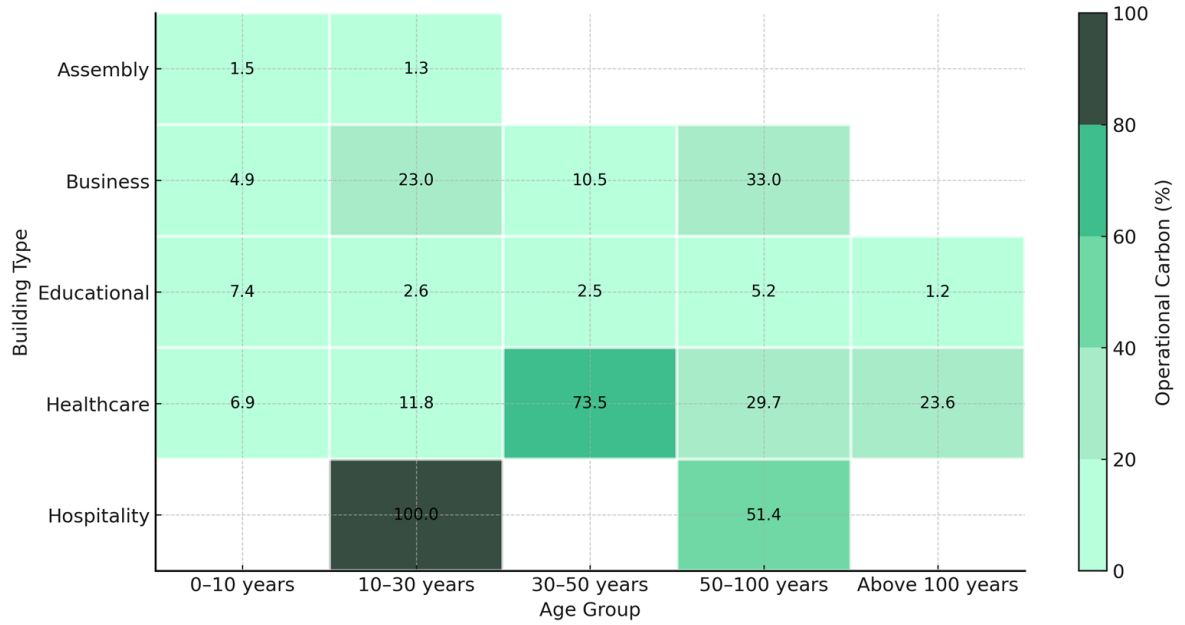


Figure 11. Carbon Concentration Chart showing trends in Operational Carbon Distribution (%)

The operational carbon concentration chart in **Figure 11** highlights significant variations across building types and age groups, demonstrating how usage patterns and operational intensity influence carbon emissions. Healthcare buildings show the highest operational carbon contribution in the 30–50-year age group at 73.5 per cent, indicating older medical facilities with energy-intensive operations and less efficient systems. This high operational footprint extends into the 50–100-year and above-100-year categories, reflecting continuous 24/7 operation and equipment-heavy environments.

Hospitality buildings also display a striking peak, with 100 per cent operational carbon in the 10–30-year range and 51.4 per cent in the 50–100-year range, underscoring the sector's reliance on HVAC, lighting, and constant service-driven energy consumption. Business buildings exhibit moderate but noteworthy operational carbon in the 10–30-year and 50–100-year groups, showing how workload intensity and building age shape energy performance. Educational and Assembly buildings, however, consistently register low operational carbon across all age groups, reflecting limited operational hours, lower equipment density, and efficient use patterns.

Overall, the chart clearly indicates that operational carbon is highest in sectors with extended operating hours and high functional demands, particularly Healthcare and Hospitality. At the same time, public-use buildings like Educational and Assembly remain significantly more efficient in operational performance.

Figure 12 presents the relationship between energy use per capita (kWh/person/year) and demand per capita (kW/person/year) across different building types. Healthcare, Hospitality, and Business buildings occupy the upper end of both axes, indicating significantly higher per-capita energy consumption as operational demand increases. Hospitality buildings also show several high-energy outliers, reflecting intensive service requirements. In contrast, Educational and Assembly buildings cluster in the lower-demand, lower-energy region, demonstrating much lower per-capita energy use due to shorter operating hours and limited equipment loads. Overall, the figure highlights that Healthcare, Hospitality, and Business are the most energy-intensive on per-capita basis, while Educational and Assembly buildings remain the most efficient.

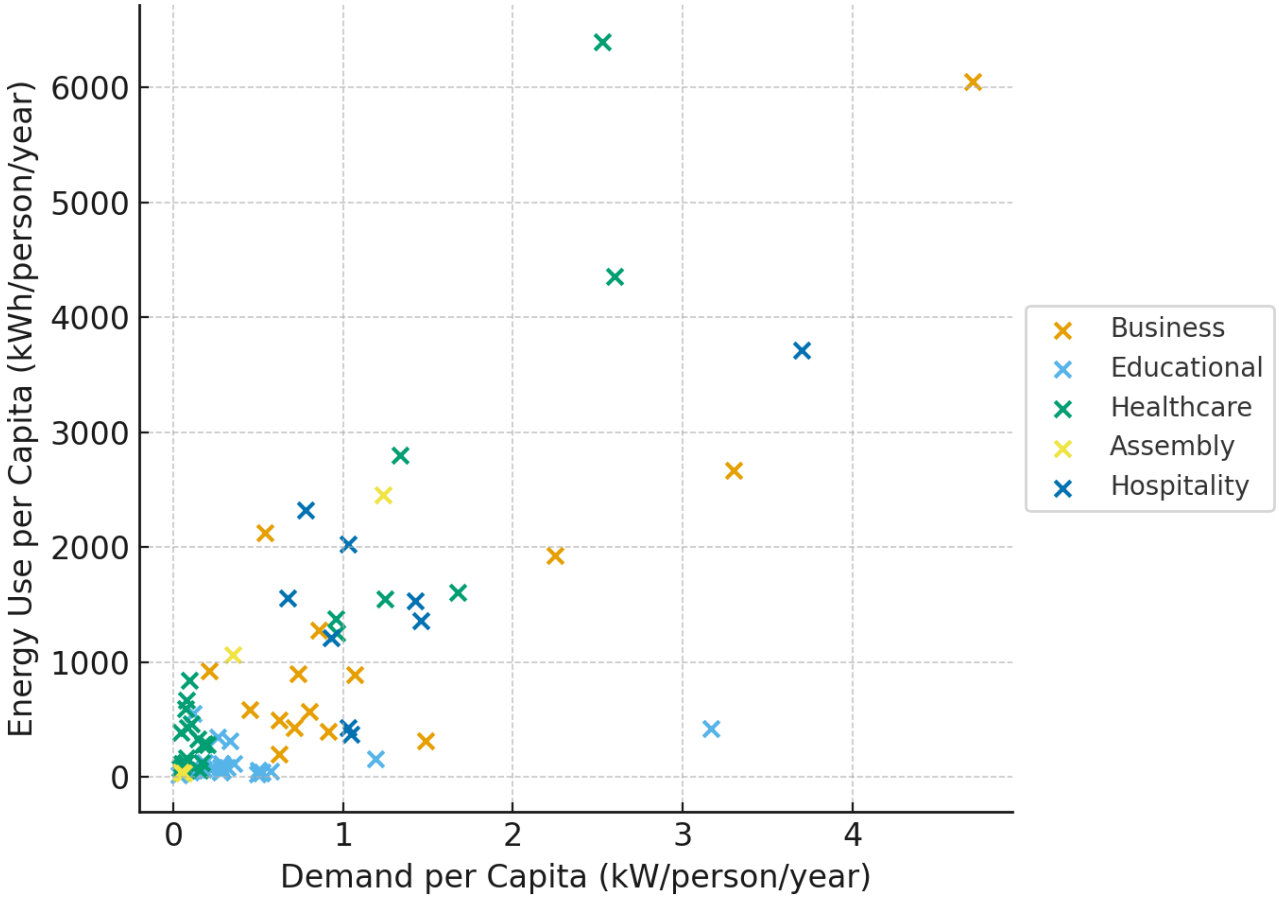


Figure 12. Energy Use vs Demand per Capita by Building Type

3.5.1 Building Deep-Dive Assessment Data from BEAT & Energy Audits

Table 2 below provides a consolidated overview of building-level energy and carbon performance data. It includes key parameters such as building type, location, total built-up area, total load, cooling load, annual energy consumption, EPI, operational carbon emissions, and embodied carbon emissions. The table also captures material-related embodied carbon metrics. Below is a detailed summary of the 80 buildings assessed using BEAT:

Table 2. Building Deep-Dive Assessment Summary Table

S.No.	Building ID	City	Building Type	Construction Year	Total Floor Area (m^2)	Number of Occupants	Total Occupancy Hours (Hr) in a workday	Total Load (kW)	Cooling Load (kW)	Annual Energy Consumption (kWh/yr)	Energy Performance Index (EPI) (kWh/m^2·year)	Embodied Carbon (kg CO_2eq/m^2)	Major Contribution of Embodied Carbon Material (%)	Operational Carbon (kg CO_2eq/m^2)	Whole Life Cycle Carbon (kg CO_2eq/m^2)
1	1_Comm._TVM_Kerala_16135	Thiruvananthapuram	Business	2016	16,136	800	7	585	351	7,18,551	45	218	Ready-mix concrete & cement - 36.4	284	502
2	3_Comm._TVM_Kerala_18985	Thiruvananthapuram	Educational	1995	18,985	2,166	7	629	378	1,28,127	7	621	Ready-mix concrete & cement - 35.4	240	860
3	4_Comm._TVM_Kerala_18241	Thiruvananthapuram	Educational	1999	18,241	1,544	7	284	170	1,91,370	10	558	Rebar - 43.1	371	928
4	5_Comm._TVM_Kerala_1655	Thiruvananthapuram	Business	1999	1,655	166	7	151	91	66,188	40	693	Rebar - 44.1	733	1,427
5	6_Comm._TVM_Kerala_3402	Thiruvananthapuram	Business	1991	3,403	340	7	212	127	67,503	20	471	Masonry - 34.1	476	947
6	7_Comm._TVM_Kerala_1858	Thiruvananthapuram	Educational	1978	1,858	63	9	200	120	26,640	14	387	Ready-mix concrete & cement - 47.5	344	731

7	8_Comm._TVM_Kerala_5000	Thiruvananthapuram	Healthcare	1964	5,000	418	24	402	241	5,22,382	104	473	Rebar - 44.8	4537	5,010
8	9_Comm._TVM_Kerala_11407	Thiruvananthapuram	Business	1982	11,408	500	9	226	136	2,91,357	26	2,297	Rebar - 80.9	901	3,198
9	10_Comm._TVM_Kerala_22040	Thiruvananthapuram	Healthcare	2015	22,040	5,510	24	931	559	15,72,948	71	145	Masonry - 38.8	2516	2,661
10	11_Comm._KKD_Kerala_10293	Kozhikode	Educational	1999	10,293	2,573	7	306	184	1,53,072	15	364	Rebar - 58.4	713	1,077
11	12_Comm._KKD_Kerala_8400	Kozhikode	Educational	1957	8,400	2,100	8	1,085	651	78,642	9	438	Rebar - 44.0	330	768
12	16_Comm._EKM_Kerala_13073	Ernakulam	Healthcare	1888	13,073	3,268	24	153	92	3,84,299	29	256	Rebar - 46.5	2932	3,187
13	17_Comm._EKM_Kerala_3250	Ernakulam	Business	2013	3,250	83	8	186	112	1,59,894	49	692	Rebar - 64.0	419	1,111
14	18_Comm._ALP_Kerala_10500	Alappuzha	Healthcare	2014	10,500	2,625	24	438	263	3,28,437	31	284	Rebar - 51.4	243	527
15	19_Comm._TSR_Kerala_47447	Thrissur	Educational	1957	47,447	4,017	8	861	517	2,83,509	6	246	Rebar - 46.8	287	533
16	21_Comm._TSR_Kerala_5461	Thrissur	Healthcare	2010	5,461	1,365	24	212	127	86,760	16	482	Rebar - 46.4	181	663
17	26_Comm._KSD_Kerala_5109	Kasargod	Educational	1996	5,109	1,277	8	128	77	58,512	11	291	Rebar - 42.5	234	526
18	27_Comm._KNR_Kerala_17519	Kannur	Educational	2000	17,519	4,380	7	429	257	2,48,256	14	334	Rebar - 38.8	250	584

19	28_Comm._KNR_Kerala_12068	Kannur	Educational	1991	12,068	678	8	188	113	55,668	5	389	Masonry - 36.8	111	500
20	30_Comm._MPM_Kerala_7073	Malappuram	Healthcare	2018	7,074	202	24	338	203	3,25,398	46	280	Rebar - 42.3	236	516
21	31_Comm._KSD_Kerala_3818	Kasargod	Healthcare	2004	3,818	298	24	372	223	4,61,724	121	559	Rebar - 43.9	4498	5,057
22	33_Comm._EKM_Kerala_10850	Ernakulam	Assembly	2017	10,850	2,713	8	165	99	94,674	9	416	Rebar - 51.2	49	465
23	34_Comm._MPM_Kerala_17041	Malappuram	Healthcare	2013	17,041	4,260	24	227	136	2,58,257	15	459	Rebar - 57.3	128	588
24	35_Comm._KSD_Kerala_5741	Kasargod	Healthcare	1950	5,741	1,435	24	286	172	4,00,266	70	407	Masonry - 40.2	3743	4,150
25	36_Comm._KKD_Kerala_7626	Kozhikode	Healthcare	2013	7,626	1,907	24	344	207	5,54,399	73	371	Rebar - 60.4	626	997
26	37_Comm._TVM_Kerala_1955	Thiruvananthapuram	Business	1976	1,955	196	7	140	84	84,290	43	616	Rebar - 48.2	1502	2,118
27	38_Comm._KKD_Kerala_36594	Kozhikode	Healthcare	1888	36,594	9,149	24	671	403	11,63,396	32	235	Rebar - 51.3	3072	3,307
28	39_Comm._IDK_Kerala_9581	Idukki	Educational	2000	9,581	1,409	8	322	193	1,21,980	13	313	Rebar - 37.8	225	537
29	41_Comm._ALP_Kerala_5480	Alappuzha	Educational	1961	5,480	1,370	8	376	226	67,136	12	120	Rebar - 72.7	553	673
30	42_Comm._ALP_Kerala_12500	Alappuzha	Educational	2000	12,500	1,913	8	529	317	87,812	7	489	Rebar - 54.1	126	615

31	43_Comm._TSR_Kerala_73500	Thrissur	Healthcare	1957	73,500	1,478	24	3,839	2,303	64,39,030	88	370	Rebar - 59.3	3838	4,208
32	44_Comm._TSR_Kerala_1675	Thrissur	Educational	2010	1,675	375	8	186	111	9,310	6	412	Masonry - 40.0	269	680
33	45_Comm._TSR_Kerala_26500	Thrissur	Healthcare	1963	26,500	172	24	434	261	11,00,586	42	1,833	Masonry - 29.3	519	2,352
34	46_Comm._TSR_Kerala_6725	Thrissur	Healthcare	2000	6,725	1,681	24	124	75	2,76,806	41	726	Rebar - 30.3	697	1,423
35	47_Comm._KKD_Kerala_11000	Kozhikode	Educational	1995	11,000	1,330	8	135	81	63,380	6	707	Finishing materials - 36.5	203	910
36	53_Comm._IDK_Kerala_3385	Idukki	Educational	1996	3,385	248	8	125	75	14,252	4	371	Rebar - 55.1	86	457
37	69_Comm._TVM_Kerala_10956	Thiruvananthapuram	Healthcare	2008	10,956	2,739	24	140	84	1,27,750	12	405	Rebar - 38.7	140	544
38	74_Comm._ALP_Kerala_31338	Alappuzha	Healthcare	1888	31,338	411	24	392	235	5,64,115	18	481	Rebar - 57.8	461	941
39	79_Comm._TSR_Kerala_21450	Thrissur	Educational	2017	21,450	2,145	8	374	225	1,43,784	7	477	Rebar - 58.9	142	619
40	80_Comm._TSR_Kerala_13478	Thrissur	Assembly	2009	13,478	3,370	8	155	93	1,39,405	10	421	Rebar - 54.3	118	539
41	81_Comm._KKD_Kerala_13592	Kozhikode	Healthcare	1967	13,592	3,398	24	194	116	3,05,805	22	286	Rebar - 42.7	923	1,209
42	82_Comm._TVM_Kerala_54428	Thiruvananthapuram	Educational	1939	54,428	5,590	8	1,977	1,186	6,52,932	12	233	Rebar - 51.2	728	961

43	99_Comm._TVM_Kerala_8718	Thiruvananthapuram	Educational	2008	8,719	1,600	8	912	547	86,756	10	241	Rebar - 45.7	119	360
44	100_Comm._TVM_Kerala_6300	Thiruvananthapuram	Educational	2018	6,300	1,575	8	823	494	67,735	11	327	Rebar - 39.1	53	380
45	101_Comm._TVM_Kerala_4354	Thiruvananthapuram	Business	2019	4,354	200	8	297	178	63,314	15	541	Rebar - 52.0	62	602
46	104_Comm._TVM_Kerala_1504	Thiruvananthapuram	Business	1965	1,505	50	8	165	99	1,33,328	89	373	Rebar - 38.1	3853	4,227
47	116_Comm._ALP_Kerala_6000	Alappuzha	Educational	2000	6,000	777	8	247	148	64,463	11	314	Rebar - 40.3	190	503
48	119_Comm._TVM_Kerala_5500	Thiruvananthapuram	Business	2017	5,500	550	8	441	265	3,15,000	57	269	Pre-cast concrete - 45.7	2019	2,288
49	120_Comm._TVM_Kerala_13531	Thiruvananthapuram	Healthcare	2012	13,531	3,383	24	133	80	2,63,599	19	203	Masonry - 68.5	687	890
50	145_Comm._EKM_Kerala_3771	Ernakulam	Hospitality	1963	3,772	560	24	378	227	8,72,739	231	1,756	Rebar - 54.9	9628	11,384
51	363_Comm._EKM_Kerala_61379	Ernakulam	Educational	2002	61,380	1,234	8	412	247	3,85,517	6	148	Pre-cast concrete - 37.8	222	370
52	365_Comm._IDK_Kerala_5759	Idukki	Hospitality	2015	5,760	238	24	245	147	4,81,500	84	390	Masonry - 53.3	2947	3,337
53	367_Comm._IDK_Kerala_1654	Idukki	Hospitality	2001	1,654	165	24	153	92	1,99,887	121	359	Pre-cast concrete - 64.1	4218	4,577
54	366_Comm._ALP_Kerala_4602	Alappuzha	Hospitality	2008	4,602	310	24	442	265	4,74,264	103	311	Masonry - 81.0	34935	35,246

55	369_Comm._KLM_Kerala_859	Kollam	Business	1997	859	150	8	160	96	1,33,741	156	2,938	Masonry - 37.5	5489	8,427
56	409_Comm._TSR_Kerala_16567	Thrissur	Educational	1925	16,567	3,420	8	109	66	53,054	3	219	Masonry - 55.8	113	332
57	103_Comm._TVM_Kerala_22180	Thiruvananthapuram	Hospitality	1970	22,180	420	24	1,555	933	15,61,478	70	412	Masonry - 68.6	2482	2,894
58	105_Comm._TVM_Kerala_6317	Thiruvananthapuram	Hospitality	1974	6,317	346	24	269	161	8,04,724	127	168	Masonry - 73.9	4492	4,660
59	106_Comm._TVM_Kerala_3810	Thiruvananthapuram	Hospitality	1975	3,810	536	24	550	330	2,32,574	61	468	Masonry - 54.7	2152	2,620
60	112_Comm._TVM_Kerala_13156	Thiruvananthapuram	Healthcare	1987	13,160	828	24	1,106	664	23,18,208	176	4,444	Masonry - 51.9	6708	11,152
61	113_Comm._TVM_Kerala_39403	Thiruvananthapuram	Business	1973	39,404	410	8	1,931	1,158	24,81,790	63	331	Masonry - 47.1	2176	2,506
62	114_Comm._TVM_Kerala_2334	Thiruvananthapuram	Business	2002	2,334	233	7	145	87	1,16,479	50	8,434	Masonry - 48.8	1760	10,193
63	115_Comm._TVM_Kerala_34673	Thiruvananthapuram	Educational	2002	34,673	2,350	7	663	398	2,75,432	8	352	Masonry - 69.9	32	384
64	102_Comm._ALP_Kerala_5100	Alappuzha	Hospitality	2005	5,100	275	24	401	241	3,73,576	73	2,583	Masonry - 32.9	552	3,135
65	411_Comm._TVM_Kerala_3288	Thiruvananthapuram	Hospitality	2011	3,288	250	24	262	157	92,356	28	692	Masonry - 63.1	2990	3,682
66	373_Comm._TSR_Kerala_38247	Thrissur	Educational	2025	38,247	9,562	24	1,100	660	53,15,272	139	4,900	Ready-mix concrete &	1759	6,659

													cement - 67.4		
67	376_Comm._KNR_Kerala_5806	Kannur	Educational	2025	5,806	1,452	7	1,732	1,039	2,25,715	39	6,559	Rebar - 89.2	1370	7,929
68	395_Comm._TSR_Kerala_47457	Thrissur	Healthcare	2025	47,457	11,864	24	1,139	684	99,52,241	210	7,394	Finishing materials - 40.5	952	8,346
69	398_Comm._EKM_Kerala_58715	Ernakulam	Healthcare	2025	58,715	14,679	24	647	388	56,53,513	96	413	Ready-mix concrete & cement - 63.0	3395	3,808
70	400_Comm._TVM_Kerala_20602	Thiruvananthapuram	Business	2025	20,603	2,060	24	1,766	1,060	26,28,611	128	450	Pre-cast concrete - 37.7	26	476
71	388_Comm._PKD_Kerala_17280	Palakkad	Healthcare	2025	17,280	4,320	24	296	178	25,85,100	150	807	Ready-mix concrete & cement - 61.4	0	807
72	370_Comm._KTM_Kerala_26649	Kottayam	Healthcare	2025	26,649	6,662	24	550	330	28,49,100	107	1,059	Finishing materials - 34.6	75	1,135
73	371_Comm._KLM_Kerala_18307	Kollam	Healthcare	2025	18,307	4,577	24	351	211	30,70,030	168	662	Rebar - 51.2	118	780
74	372_Comm._PTA_Kerala_53232	Pathanamthitta	Healthcare	2025	53,232	13,308	7	1,937	1,162	44,62,295	84	2,956	Ready-mix concrete & cement - 61.1	68	3,024
75	377_Comm._KNR_Kerala_3483	Kannur	Educational	2025	3,483	871	7	225	135	3,04,548	87	270	Rebar - 49.3	62	332
76	179_Comm._MPM_Kerala_24274	Malappuram	Assembly	2024	24,274	2,427	12	2,991	1,795	59,49,900	245	337	Rebar - 31.4	173	510

77	193_Comm._TVM_Kerala_24800	Thiruvananthapuram	Business	2025	24,800	2,480	12	525	315	22,94,452	93	383	Ready-mix concrete & cement - 47.3	133	516
78	203_Comm._KNR_Kerala_51294	Kannur	Healthcare	2023	51,295	12,824	24	1,360	816	59,39,901	116	199	Rebar - 40	163	362
79	204_Comm._MPM_Kerala_12413	Malappuram	Business	2025	12,413	1,241	12	671	403	26,34,500	212	258	Ready-mix concrete & cement - 51.6	150	408
80	212_Comm._EKM_Kerala_11973	Ernakulam	Assembly	2025	11,974	2,993	12	1,050	630	31,83,960	266	312	Ready-mix concrete & cement - 65.2	188	499

3.5.2. Shortlisted List of Buildings for Pilot Demonstration

Once the energy audit and BEAT analysis for 80 buildings was completed, 16 buildings were shortlisted from Kerala based on the following selection criteria:

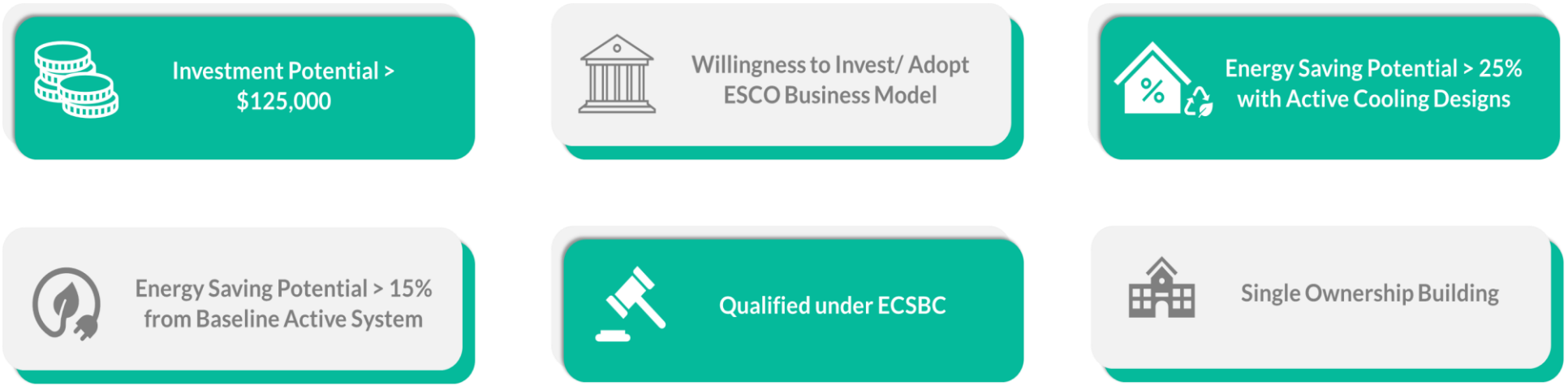


Figure 13. Selection Criteria for Pilot Buildings

From the shortlisted buildings, 16 building owners gave an expression of interest (EOI), and the list is attached in the **Table 3** below. These buildings will be considered for pilot retrofitting in Kerala. The list is as follows:

Table 3. EOI for 16 Buildings in Kerala

S.No	Building ID	Construction Year	Total Floor Area (sq.m.)	Conditioned Floor Area (sq.m.)	Energy Saving Potential (%)	Estimated Avg HVAC Consumption (kWh/yr)	Annual Energy Savings in cooling (kWh/yr)	Total HVAC Capacity (TR)	Savings (kWh/yr/TR)	CO2eq Emission Reduction (tonnes/ year)
1	112_Comm._TVM_Kerala_13156	1987	13,156.0	7,895.8	40	18,26,668.80	7,30,667.52	461.3	1,584.00	526.08
2	104_Comm._TVM_Kerala_1504	1965	1,504.0	1,504.0	25	1,08,000	27,000.00	90.0	300.00	19.44
3	103_Comm._TVM_Kerala_22180	1970	22,180.0	22,180.0	35	10,21,500	3,57,525.00	454.0	787.50	257.42
4	105_Comm._TVM_Kerala_6317	1974	6,317.0	6,317.0	35	7,04,250	2,46,487.50	313.0	787.50	177.47
5	106_Comm._TVM_Kerala_3810	1975	3,810.0	3,810.0	35	5,85,270	2,04,844.50	260.1	787.50	147.49
6	102_Comm._ALP_Kerala_5100	2005	5,100.0	5,100.0	35	2,22,750	77,962.50	99.0	787.50	56.13
7	5_Comm._TVM_Kerala_1655	1999	1,655.0	1,655.0	25	1,68,912	42,228.00	91.8	460.00	30.40
8	369_Comm._KLM_Kerala_859	1997	859.0	859.0	25	80,960	20,240.00	44.0	460.00	14.57
9	113_Comm._TVM_Kerala_39403	1973	39,403.0	39,403.0	25	6,07,200	1,51,800.00	330.0	460.00	109.30
10	114_Comm._TVM_Kerala_34673	2002	34,673.0	34,673.0	22	1,70,431	37,494.82	72.5	517.44	27.00
11	10_Comm._TVM_Kerala_22040	2015	22,040.0	22,040.0	40	17,57,368.80	7,02,947.52	443.8	1,584.00	506.12
12	9_Comm._TVM_Kerala_11407	1982	11,407.0	11,407.0	25	1,34,784	33,696.00	64.8	520.00	24.26
13	6_Comm._TVM_Kerala_3402	1991	3,402.0	3,402.0	25	60,858	15,214.50	33.1	460.00	10.95
14	370_Comm._KTM_Kerala_26649	2025	26,649.0	26,649.0	40	4,75,200	1,90,080.00	120.0	1,584.00	136.86
15	371_Comm._KLM_Kerala_18307	2025	18,307.0	18,307.0	40	4,37,382	1,74,952.80	110.5	1,584.00	125.97
16	8_Comm._TVM_Kerala_5000	1964	5,000.0	750.0	40	4,38,641.28	1,75,456.51	110.8	1,584.00	126.33

As per the Central Energy Authority (CEA) report, the weighted average emission factor is 0.727 tCO_2/MWh[7] . Hence, the estimated carbon dioxide emission reduction after pilot retrofitting is 2,295.79 tonnes of CO_2 per year, and the average energy saving potential for the 16 buildings is 32%.

[7] Central Energy Authority (CEA), CDM – CO2 Baseline Database, https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fcea.nic.in%2Fwp-content%2Fuploads%2F2021%2F03%2FCO2_Database_Version_20.0_2023_24.xlsx&wdOrigin=BROWSELINK

4 | Conclusion

The deep-dive assessment conducted in Kerala under the ALCBT Project, in support of the Energy Management Centre (EMC), provides a robust analytical foundation for understanding operational and embodied carbon patterns across key public building typologies in the state. The BEAT-based analysis of 80 buildings clearly shows that operational carbon dominates whole-life emissions in Kerala's Hospitality, Healthcare, and Business buildings, driven by high cooling loads, equipment-intensive operations, and long occupancy hours. These categories also record the highest EPI values and per-capita energy demand, making them the most carbon-intensive segments of the state's building portfolio.

Educational and Assembly buildings, while performing more efficiently in terms of operational energy use, exhibit a broader spread of material-related embodied carbon, highlighting the role of construction practices in shaping whole-life emissions. The assessment also captures Kerala's ongoing structural transition from traditional masonry to RMC- and rebar-based systems, reaffirming the need for low-carbon material choices, design longevity, and enhanced material documentation to support embodied carbon reduction.

Spatially, the concentration of large, high-load buildings in urban hubs such as Thiruvananthapuram further highlights the importance of city-focused retrofit strategies. Among potential interventions, cooling-related measures emerge as the most impactful near-term opportunity, both in terms of feasibility and carbon-reduction.

These findings guided the shortlisting of 16 buildings for pilot retrofits in Kerala. The projected impact of these demonstrations is substantial, with an estimated annual CO_2 emission reduction of 2,295.79 tonnes CO_2eq and an average energy-saving potential of 32%. By showcasing scalable models such as ESCO and CaaS, the pilots aim to translate analytical findings into on-ground implementation and establish replicable pathways for wider adoption across the state.

Overall, the Kerala deep-dive assessment highlights that targeted interventions in high-intensity building typologies, improved construction practices, and enhanced data systems can significantly accelerate the state's low-carbon transition. The results form a critical evidence base for the next implementation phase of the ALCBT Project and position Kerala to make a meaningful contribution to India's national climate commitments through data-driven, outcome-oriented building sector transformations.

5. | Annexure 1 – Building Deep-Dive Assessment Summary for 80 Buildings

01	**Building ID**	**1_Comm._TVM_Kerala_16135**				
Building Information						
Year of Completion	2016					
Basic details	**City**	Palayam				
	Building type	Commercial		**Sub-type**	Office	
	Built-up Area	16135.66 sq.m.		**Conditioned Floor Area**		
	Floors above ground	6		**Floors below ground**	0	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	4642.048 cu.m.		Quantity	1299.505 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	1005.145 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	800		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity					
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				7,18,551 kWh/Yr	
	Annual Energy Consumption (Diesel)				1057.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				44 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				296 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**284.3** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**217.6** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**502** kg CO_2e/sq.m.		

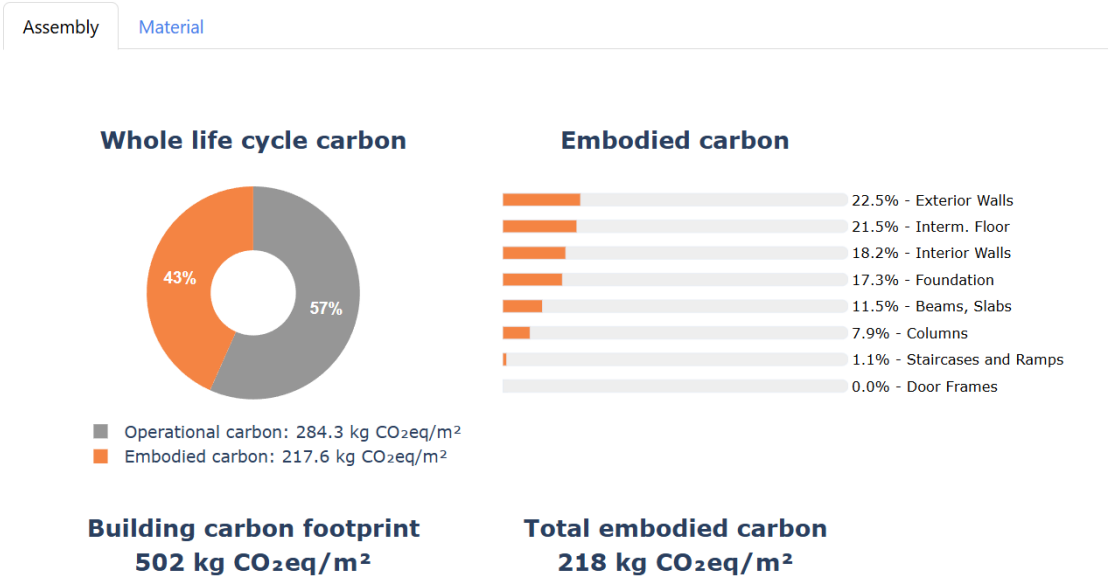


Figure 14: Building 01

02	**Building ID**	3_Comm._TVM_Kerala_18985				
Building Information						
Year of Completion	1995					
Basic details	**City**	Thiruvananthapuram				
	Building type	Institutional Building		**Sub-type**	Educational	
	Built-up Area	18985.4 sq.m.		**Conditioned Floor Area**	2847.81 sq.m.	
	Floors above ground	3		**Floors below ground**	0	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	5902.753 cu.m.		Quantity	1900.899 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	834.078 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	4746		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				19.8 kW	
Operational Data	**Total Connected Load**				629.4 kW	
	Annual Energy Consumption (Electricity)				128127.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				200.00 kWh/yr.	
	Annual Energy Generation (RE)					

	Energy Performance Index (EPI – Whole building)			6.7 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			45 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**239.5** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**620.7** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**860** kg CO_2e/sq.m.	

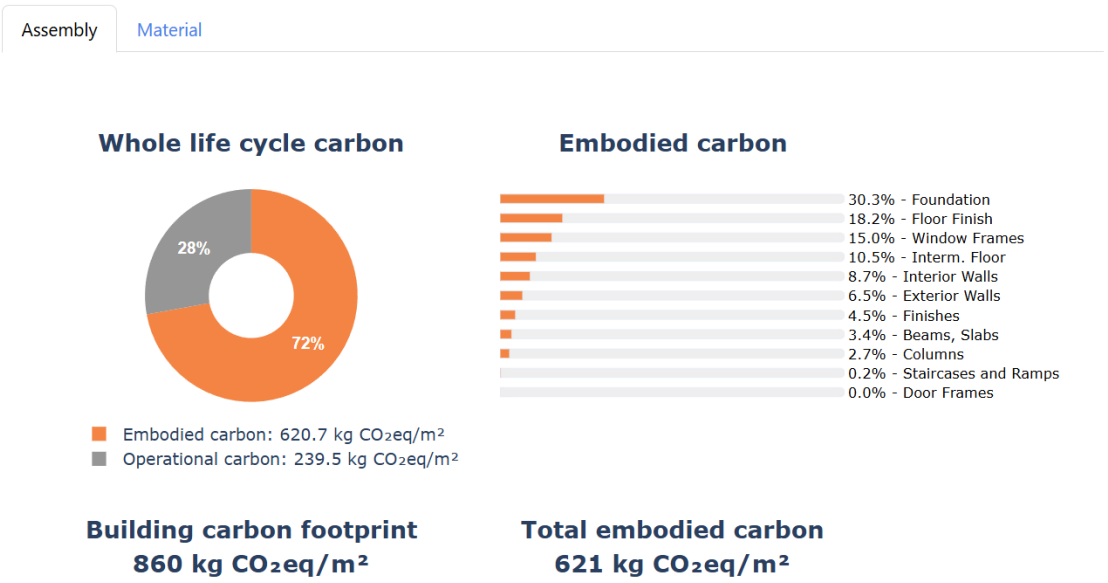


Figure 15: Building 02

03	**Building ID**	4_Comm._TVM_Kerala_18241		
Building Information				
Year of Completion	1999			
Basic details	**City**	Thiruvananthapuram		
	Building type	Institutional Building	**Sub-type**	Educational
	Built-up Area	18241.64 sq.m.	**Conditioned Floor Area**	2736.25 sq.m.
	Floors above ground	5	**Floors below ground**	0
Building Specifications				
Material Specifications and Quantities	**Foundation type**	Raft Foundation	**Structure type**	RCC
	Flooring	Vitrified Tiles	**Roofing**	RCC
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550
	Quantity	5363.827 cu.m.	Quantity	1637.59 Ton
	Window type	Alu. + Double glazing	**Walling**	Brick
	Quantity	xxx sq.m.	Quantity	1389.528 cu.m.

	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	4560		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				50.75 kW	
Operational Data	**Total Connected Load**				283.8 kW	
	Annual Energy Consumption (Electricity)				191370.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				75 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				10.5 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				69.9 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**370.5** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**557.9** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**928** kg CO_2e/sq.m.		

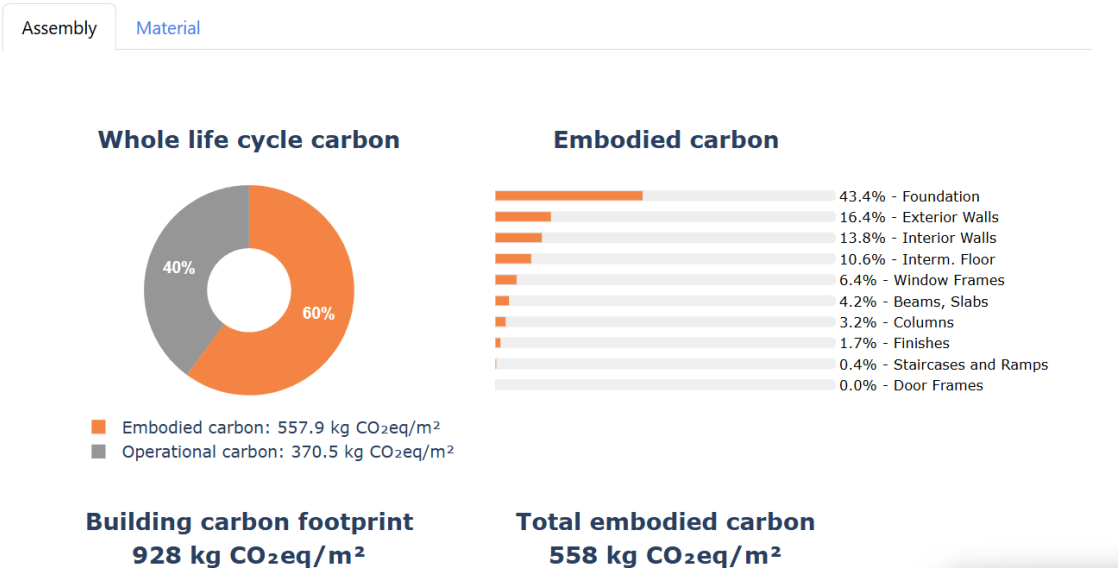


Figure 16: Building 03

04	**Building ID**	5_Comm._TVM_Kerala_1655			
Building Information					
Year of Completion	1999				
Basic details	**City**	Thiruvananthapuram			
	Building type	Commercial	**Sub-type**	Office	

	Built-up Area	1655 sq.m.		**Conditioned Floor Area**	1241.25 sq.m.	
	Floors above ground	4		**Floors below ground**	0	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	191.6794 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	577.1308 sq.m.		Quantity	242.448 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	166		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				2.1 kW	
Operational Data	**Total Connected Load**				151.4 kW	
	Annual Energy Consumption (Electricity)				66188.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				40 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				53.3 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**733.2** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**693** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**1426** kg CO_2e/sq.m.		

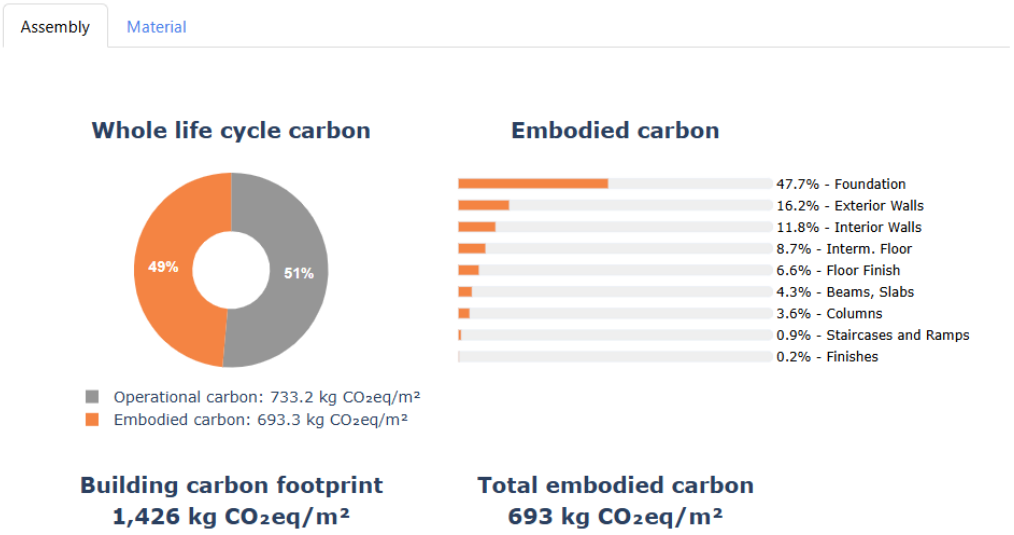


Figure 17: Building 04

05	**Building ID**	6_Comm._TVM_Kerala_3402				
Building Information						
Year of Completion	1991					
Basic details	**City**	Thiruvananthapuram				
	Building type	Commercial		**Sub-type**	Office	
	Built-up Area	3402.96 sq.m.		**Conditioned Floor Area**	612.53 sq.m.	
	Floors above ground	6		**Floors below ground**	0	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1060.094 cu.m.		Quantity	304.2172 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	464.965 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	340		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				7.225 kW	
Operational Data	**Total Connected Load**				212.2 kW	

	Annual Energy Consumption (Electricity)			67503.00 kWh/Yr
	Annual Energy Consumption (Diesel)			xxx kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			19.8 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			110.2 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**475.7** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**471.1** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**947** kg CO_2e/sq.m.	

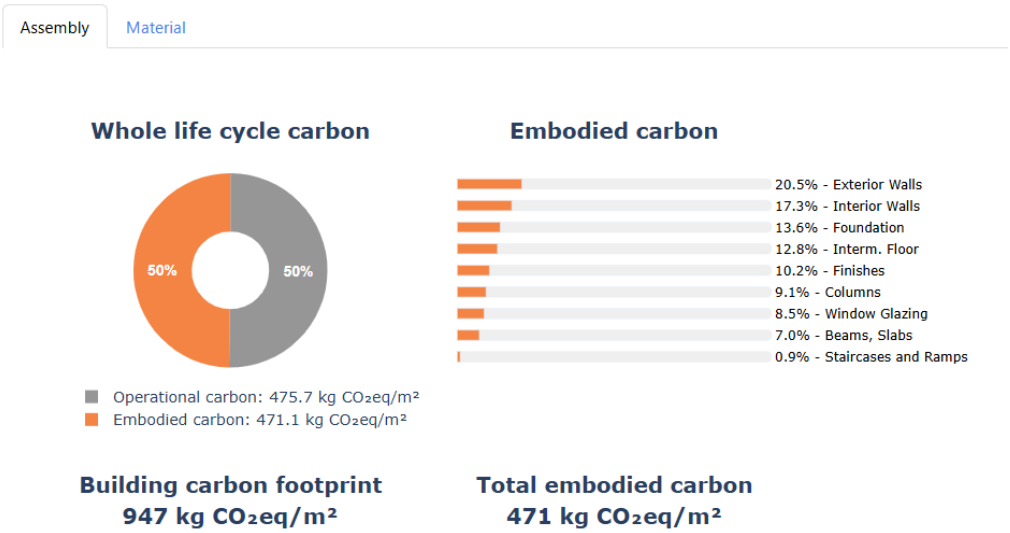


Figure 18: Buildng 05

06	**Building ID**	7_Comm._TVM_Kerala_1858		
Building Information				
Year of Completion	1978			
Basic details	**City**	Thiruvananthapuram		
	Building type	Institutional Building	**Sub-type**	Educational
	Built-up Area	1858 sq.m.	**Conditioned Floor Area**	278.7 sq.m.
	Floors above ground	2	**Floors below ground**	0
Building Specifications				
Material Specifications and Quantities	**Foundation type**	Raft Foundation	**Structure type**	RCC
	Flooring	Vitrified Tiles	**Roofing**	RCC
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550
	Quantity	437.0454 cu.m.	Quantity	96.74021 Ton
	Window type	Alu. + Double glazing	**Walling**	Brick
	Quantity	xxx sq.m.	Quantity	212.953 cu.m.

	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	260		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				13.9 kW	
Operational Data	**Total Connected Load**				199.5 kW	
	Annual Energy Consumption (Electricity)				26640.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				14.3 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				95.6 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**343.7** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**387.4** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**731** kg CO_2e/sq.m.		

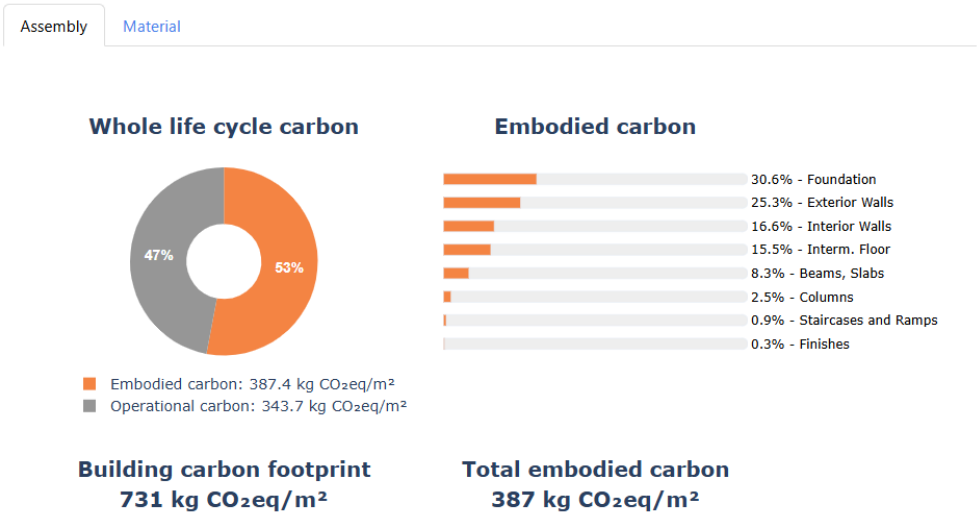


Figure 19: Building 06

07	**Building ID**	8_Comm._TVM_Kerala_5000			
Building Information					
Year of Completion	1964				
Basic details	**City**	Trivandrum			
	Building type	Institutional Building	**Sub-type**	Educational	
	Built-up Area	5000 sq.m.	**Conditioned Floor Area**	750 sq.m.	

	Floors above ground	4		**Floors below ground**	0	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1626.765 cu.m.		Quantity	531.1062 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	427.034 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	230		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				43.17 kW	
Operational Data	**Total Connected Load**				402 kW	
	Annual Energy Consumption (Electricity)				522382.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				1200.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				104.5 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				696.5 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**4536.6** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**473.1** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**5010** kg CO_2e/sq.m.		

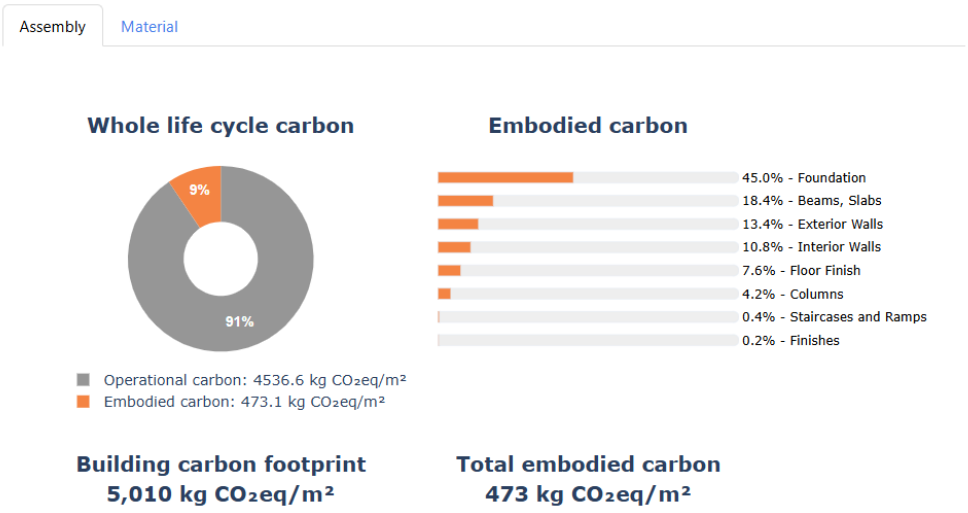


Figure 20: Building 07

08	**Building ID**	9_Comm._TVM_Kerala_11407				
Building Information						
Year of Completion	1982					
Basic details	**City**	Trivandrum				
	Building type	Commercial		**Sub-type**	Office	
	Built-up Area	11407.52 sq.m.		**Conditioned Floor Area**	3422.256 sq.m..	
	Floors above ground	5		**Floors below ground**	0	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	3682.121 cu.m.		Quantity	1208.974 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	1164.732 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	260		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				25.46 kW	
Operational Data	**Total Connected Load**				225.9 kW	
	Annual Energy Consumption (Electricity)				291357.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				25.5 kWh/sq.m..yr.	

	Energy Performance Index (EPI – Conditioned area)			85.1 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**901** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**2297** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**3198** kg CO_2e/sq.m.	

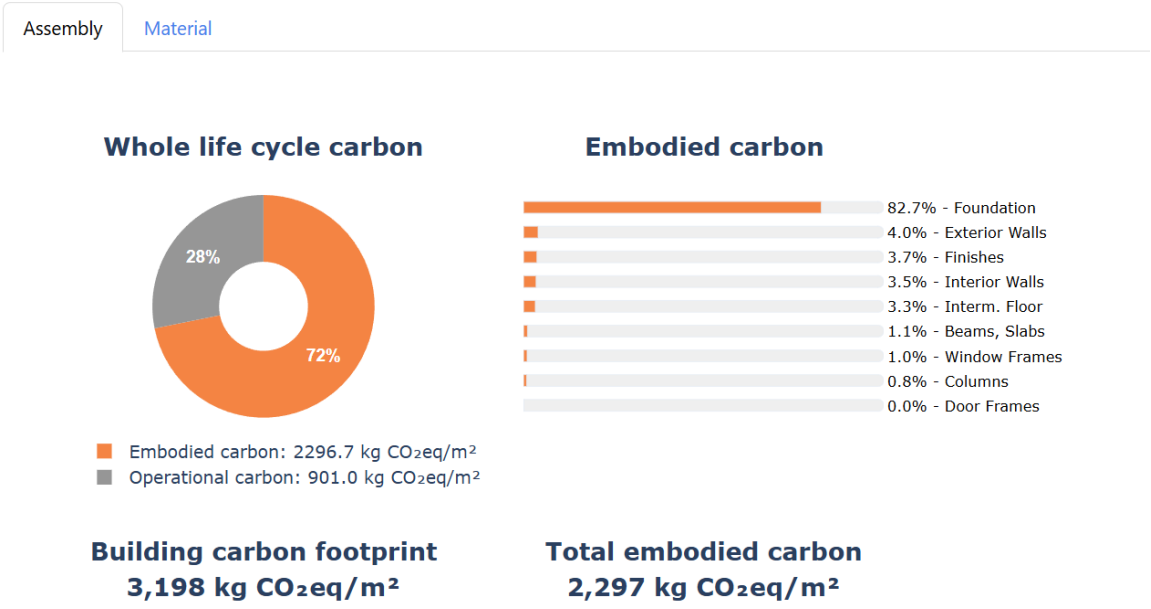


Figure 21: Building 08

09	**Building ID**	**10_Comm._TVM_Kerala_22040**				
Building Information						
Year of Completion	2015					
Basic details	**City**	Trivandrum				
	Building type	Commercial		**Sub-type**	Office	
	Built-up Area	22040 sq.m.		**Conditioned Floor Area**	9918 sq.m.	
	Floors above ground	5		**Floors below ground**	0	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	6338.59 cu.m.		Quantity	1908.988 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	1034.157 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights

	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	230		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				77.99 kW	
Operational Data	**Total Connected Load**				931.2 kW	
	Annual Energy Consumption (Electricity)				1572948.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				14800.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				71.4 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				158.6 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**2516** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**144.8** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**2661** kg CO_2e/sq.m.		

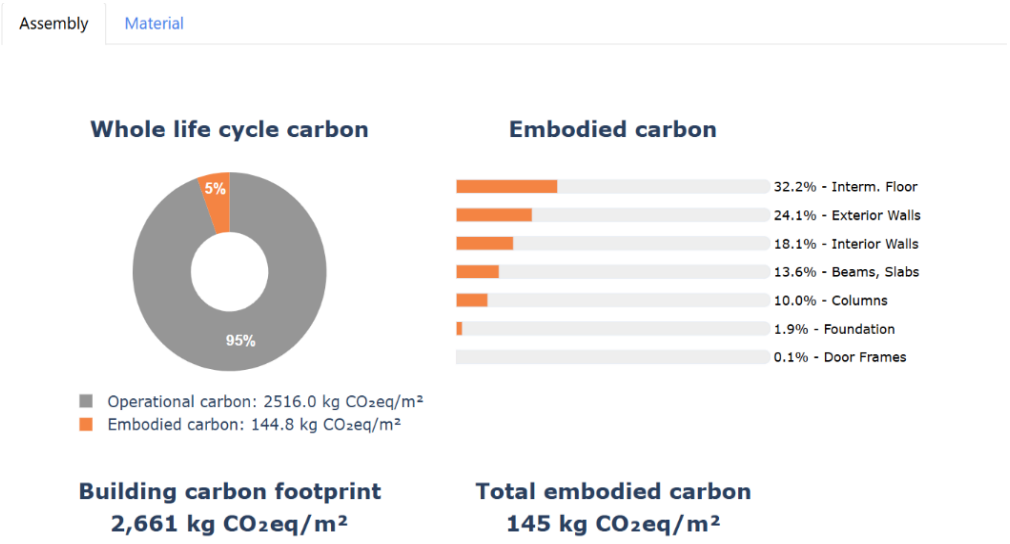


Figure 22: Building 09

10	**Building ID**	**11_Comm._KKD_Kerala_10293**			
Building Information					
Year of Completion	1999				
Basic details	**City**	Kozhikode			
	Building type	Institutional	**Sub-type**	Education	
	Built-up Area	10293 sq.m.	**Conditioned Floor Area**	1543.95 sq.m.	
	Floors above ground	3	**Floors below ground**	1	
Building Specifications					

Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	2213.135 cu.m.		Quantity	459.2878 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	572.194 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	2573		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				55.86 kW	
Operational Data	**Total Connected Load**				306.14 kW	
	Annual Energy Consumption (Electricity)				153072.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				14.9 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				99.1 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**713.3** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**363.3** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**1077** kg CO_2e/sq.m.		

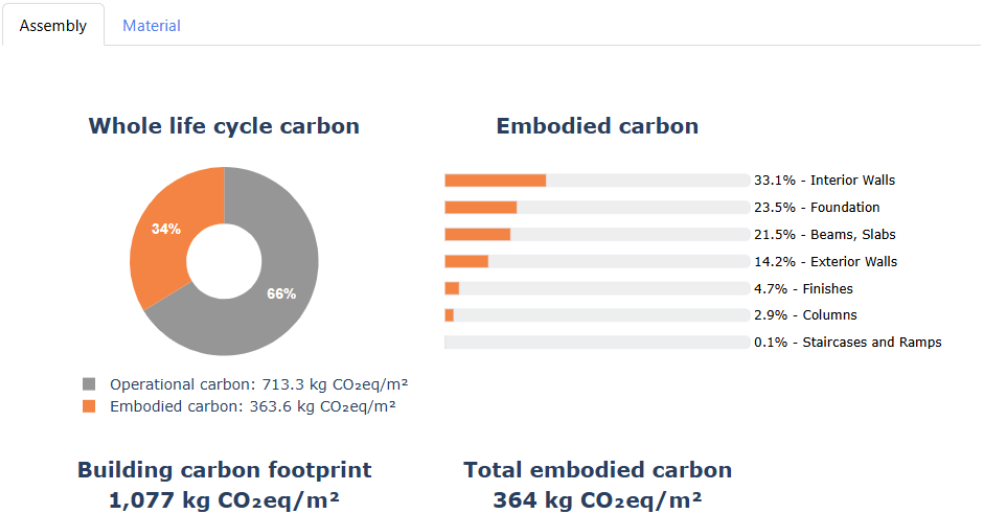


Figure 23: Building 10

11	**Building ID**	**12_Comm._KKD_Kerala_8400**
Building Information		

Year of Completion	1999					
Basic details	**City**	Kozhikode				
	Building type	Institutional		**Sub-type**	Education	
	Built-up Area	8400 sq.m.		**Conditioned Floor Area**	1260 sq.m.	
	Floors above ground	1		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	2025.935 cu.m.		Quantity	430.2799 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	739.783 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	2100		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				35.14 kW	
Operational Data	**Total Connected Load**				1085 kW	
	Annual Energy Consumption (Electricity)				78642.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				9.4 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				62.4 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**330** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**438.1** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**768** kg CO_2e/sq.m.		

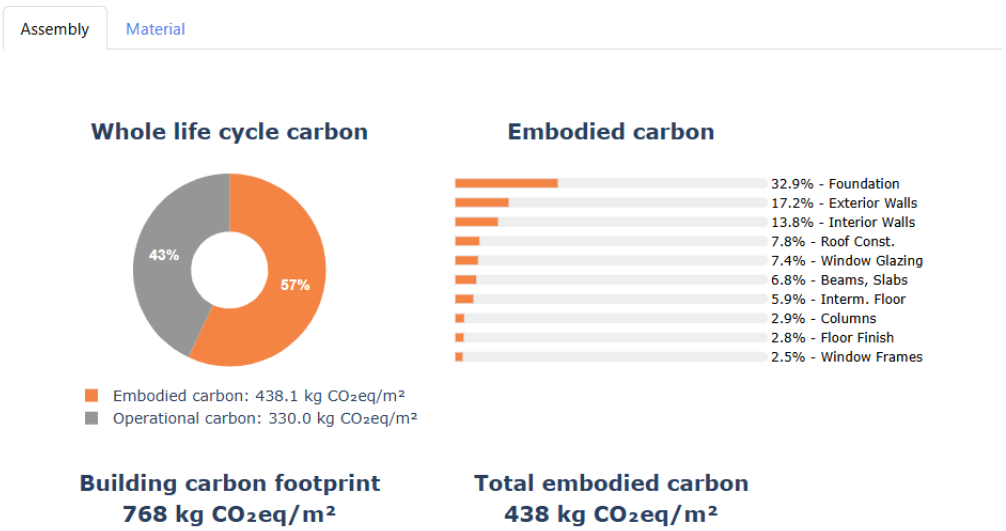


Figure 24: Building 11

12	**Building ID**	**16_Comm._EKM_Kerala_13073**				
Building Information						
Year of Completion	1888					
Basic details	**City**	Ernakulam				
	Building type	Institutional		**Sub-type**	Education	
	Built-up Area	13073 sq.m.		**Conditioned Floor Area**	1960.95 sq.m.	
	Floors above ground	1		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	2889.308 cu.m.		Quantity	597.0204 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	599.177 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	3268		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				28.84kW	
Operational Data	**Total Connected Load**				153 kW	
	Annual Energy Consumption (Electricity)				384299.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				3047.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				29.4 kWh/sq.m..yr.	

	Energy Performance Index (EPI – Conditioned area)			196 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**2931.8** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**256** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**3187** kg CO_2e/sq.m.	

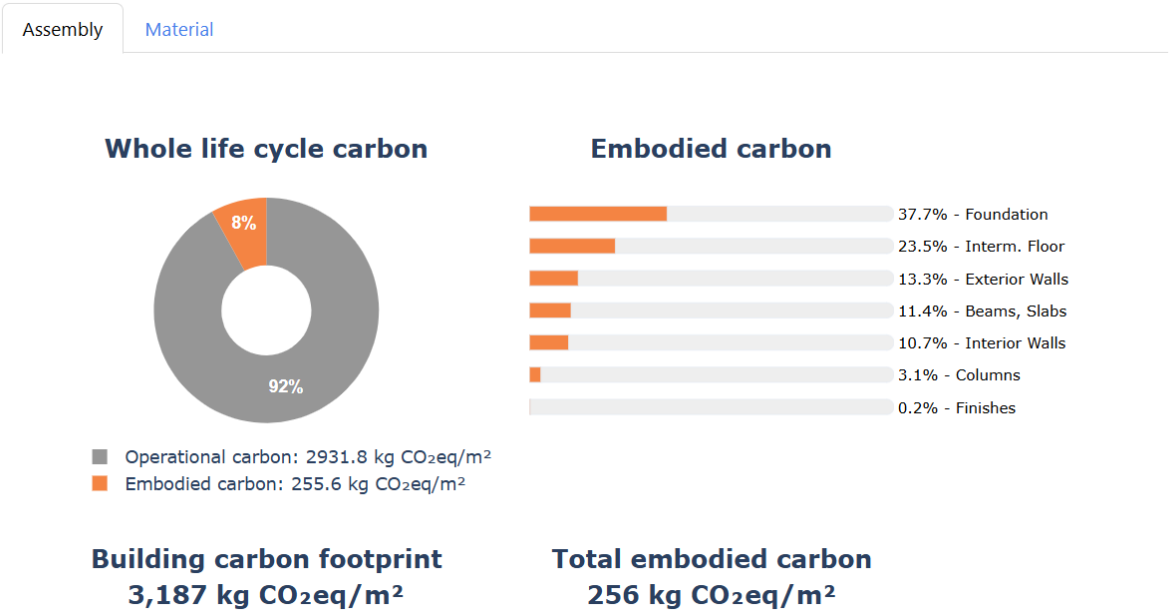
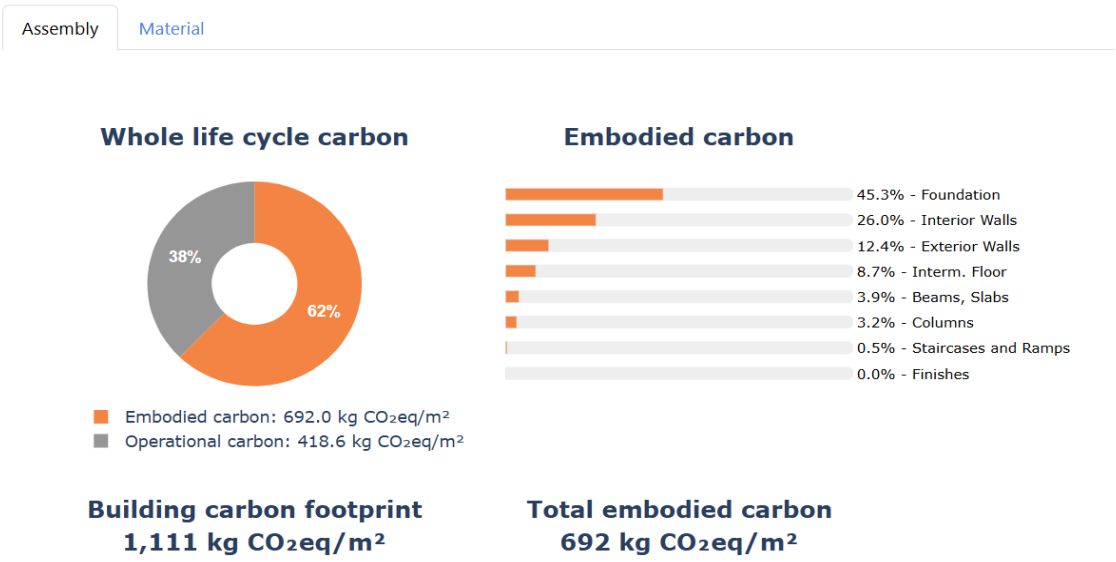


Figure 25: Building 12

13	**Building ID**	**17_Comm._EKM_Kerala_3250**				
Building Information						
Year of Completion	2013					
Basic details	**City**	Ernakulam				
	Building type	Institutional		**Sub-type**	Hospital	
	Built-up Area	3250 sq.m.		**Conditioned Floor Area**	1300 sq.m.	
	Floors above ground	4		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1085.72 cu.m.		Quantity	358.711 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	375.500 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights

	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	83		**Occupancy hours**	8 hrs /day	
	Ventilation type				Mechanically Ventilated	
	Capacity				7.82 kW	
Operational Data	**Total Connected Load**				186.4 kW	
	Annual Energy Consumption (Electricity)				159894.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				210.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				49.2 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				123 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**418.6** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**692** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**1111** kg CO_2e/sq.m.		

Figure 26: Building 13



14	**Building ID**	**18_Comm._ALP_Kerala_10500**
Building Information		
Year of Completion	2014	
Basic details	**City**	Alappuzha
	Building type	Institutional
	Sub-type	Hospital
	Built-up Area	10500 sq.m.
	Conditioned Floor Area	1575 sq.m.
	Floors above ground	0
	Floors below ground	
Building Specifications		

Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	2900.114 cu.m.		Quantity	590.4924 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	368.833 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	2625		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				36.54 kW	
Operational Data	**Total Connected Load**				438 kW	
	Annual Energy Consumption (Electricity)				328437.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				31.3 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				208.5 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**242.7** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**284.2** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**527** kg CO_2e/sq.m.		

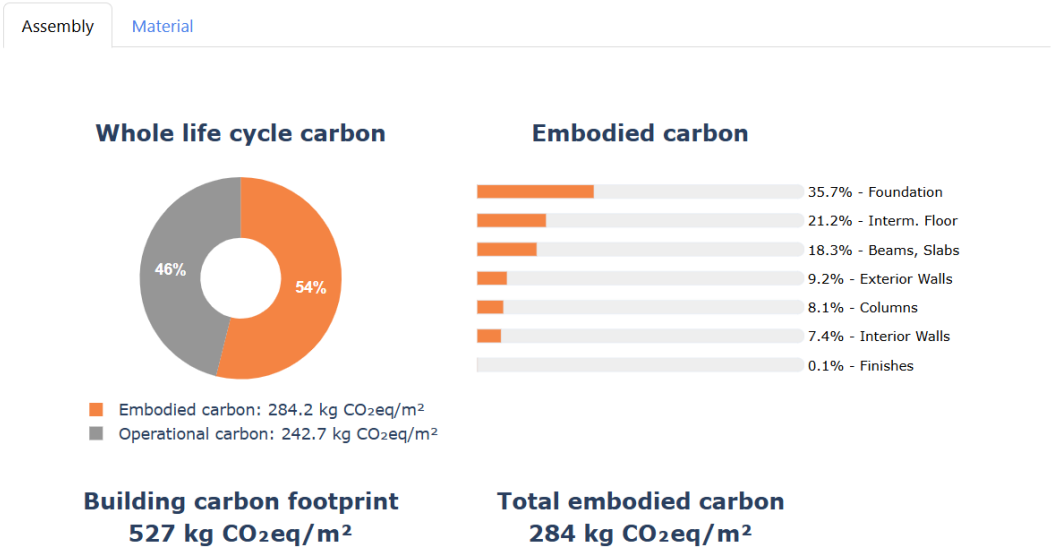


Figure 27: Building 14

15	**Building ID**	**19_Comm._TSR_Kerala_47447**
Building Information		

Year of Completion	1957					
Basic details	**City**	Trichur				
	Building type	Institutional		**Sub-type**	Education	
	Built-up Area	47447.47 sq.m.		**Conditioned Floor Area**	7117.1205 sq.m.	
	Floors above ground	2		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	10343.34 cu.m.		Quantity	2105.993 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	1730.338 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	11862		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				106.54 kW	
Operational Data	**Total Connected Load**				861 kW	
	Annual Energy Consumption (Electricity)				283509.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				155.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				6 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				39.8 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**287** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**246** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**533** kg CO_2e/sq.m.		

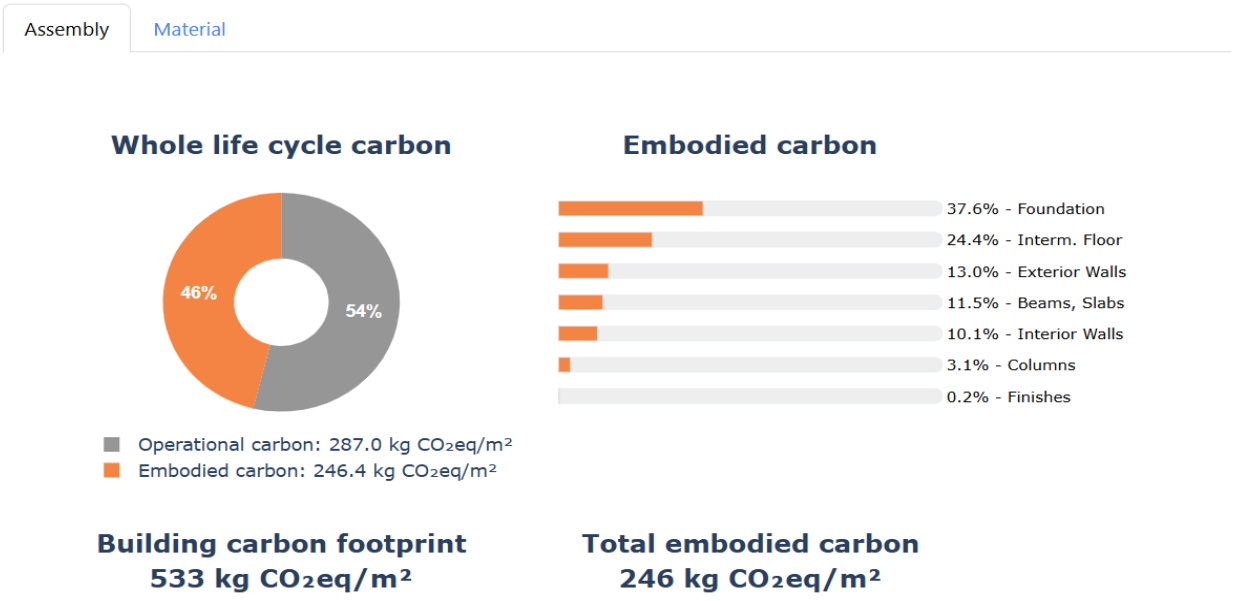


Figure 28: Building 15

16	**Building ID**	**21_Comm._TSR_Kerala_5461**				
Building Information						
Year of Completion	2010					
Basic details	**City**	Chalakudy, Thrissur				
	Building type	Institutional		**Sub-type**	Education	
	Built-up Area	5461 sq.m.		**Conditioned Floor Area**	982.98 sq.m.	
	Floors above ground	6		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1651.063 cu.m.		Quantity	469.9 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	598.243 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	11862		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				47.81 kW	
Operational Data	**Total Connected Load**				212 kW	
	Annual Energy Consumption (Electricity)				86760.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				1620.00 kWh/yr.	
	Annual Energy Generation (RE)					

	Energy Performance Index (EPI – Whole building)			15.9 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			88.3 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**181** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**482** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**663** kg CO_2e/sq.m.	

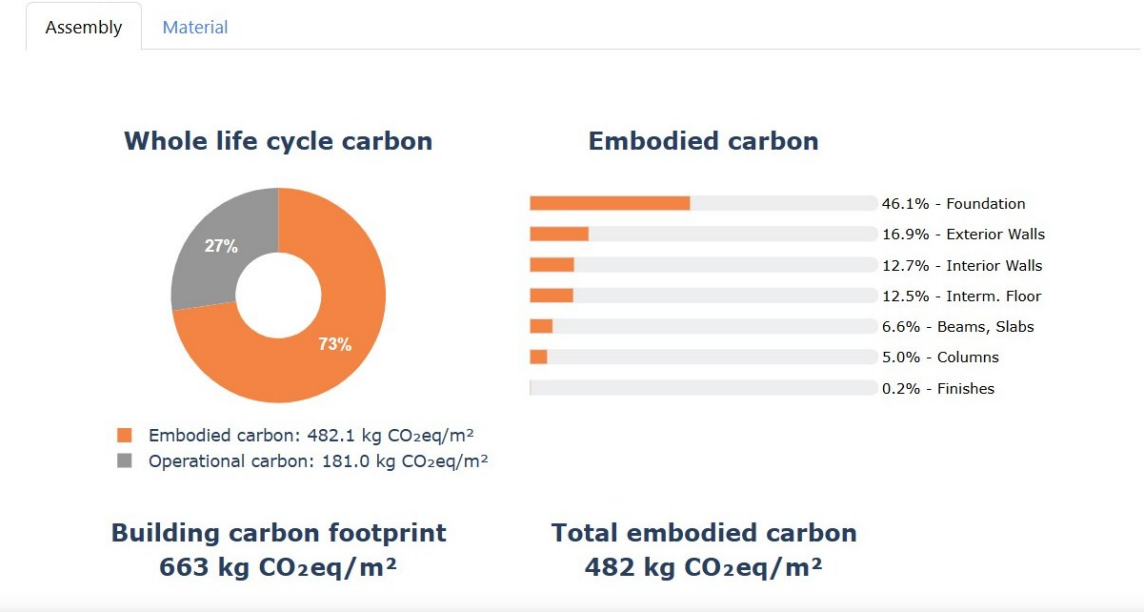


Figure 29: Building 16

17	**Building ID**	**26_Comm._KSD_Kerala_5109**				
Building Information						
Year of Completion	1996					
Basic details	**City**	Udinur, Kasargod				
	Building type	Institutional		**Sub-type**	Education	
	Built-up Area	5109 sq.m.		**Conditioned Floor Area**	766 sq.m.	
	Floors above ground	2		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1153.15 cu.m.		Quantity	243.4877 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	341.632 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights

	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	11862		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				22.68 kW	
Operational Data	**Total Connected Load**				128 kW	
	Annual Energy Consumption (Electricity)				58512.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				11.5 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				76.4 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**234** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**291** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**526** kg CO_2e/sq.m.		

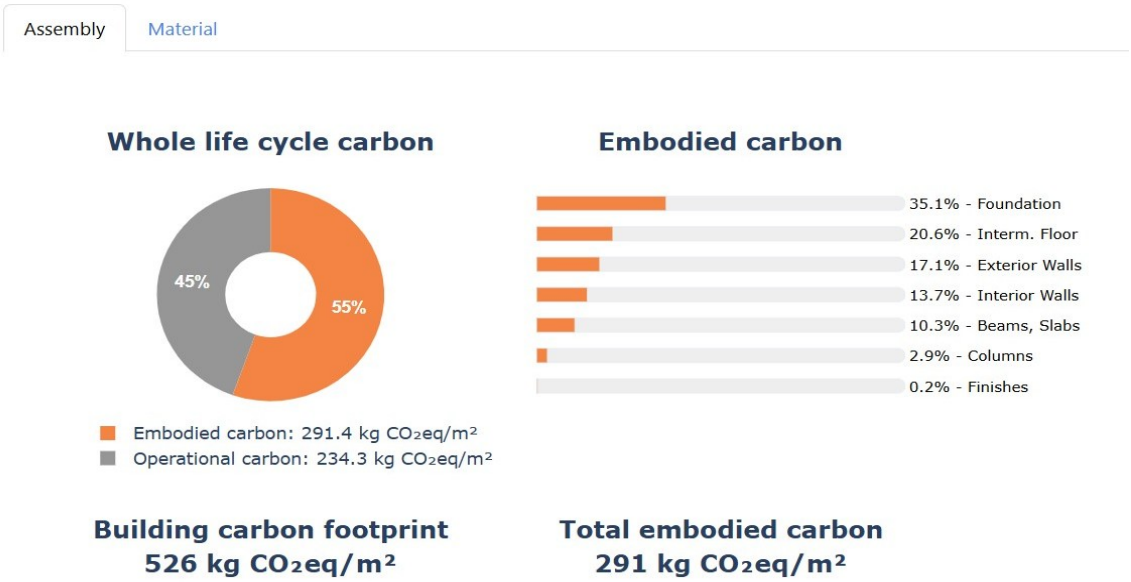


Figure 30: Building 17

18	**Building ID**	**27_Comm._KNR_Kerala_17519**			
Building Information					
Year of Completion	2000				
Basic details	**City**	Dharmasala, Kannur			
	Building type	Institutional		**Sub-type**	Education
	Built-up Area	17519 sq.m.		**Conditioned Floor Area**	2627.85 sq.m.
	Floors above ground	2		**Floors below ground**	
Building Specifications					

Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	4010.934 cu.m.		Quantity	871.8292 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	1733.793 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	4380		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				72.97kW	
Operational Data	**Total Connected Load**				428.7 kW	
	Annual Energy Consumption (Electricity)				248256.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				14.2 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				94.5 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**249.8** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**334** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**584** kg CO_2e/sq.m.		

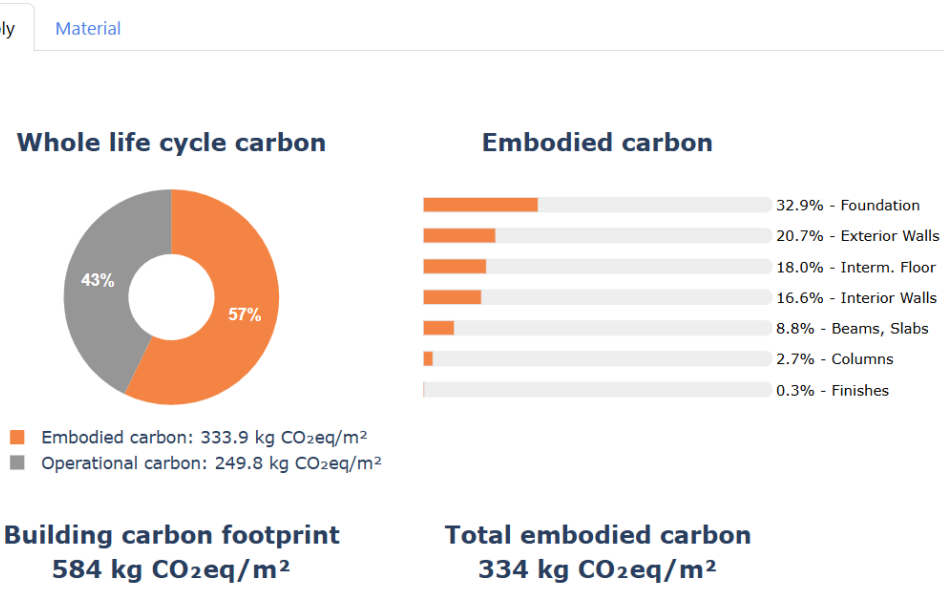


Figure 31: Building 18

19	**Building ID**	**28_Comm._KNR_Kerala_12068**				
Building Information						
Year of Completion	1991					
Basic details	**City**	Payyanur, Kannur				
	Building type	Institutional		**Sub-type**	Education	
	Built-up Area	12068 sq.m.		**Conditioned Floor Area**	1810.2 sq.m.	
	Floors above ground	1		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	2947.833 cu.m.		Quantity	635.5723 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	1306.575 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	678		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				33.65 kW	
Operational Data	**Total Connected Load**				188.3 kW	
	Annual Energy Consumption (Electricity)				55668.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				4.6 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				30.8 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**110.5** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**389** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**500** kg CO_2e/sq.m.		

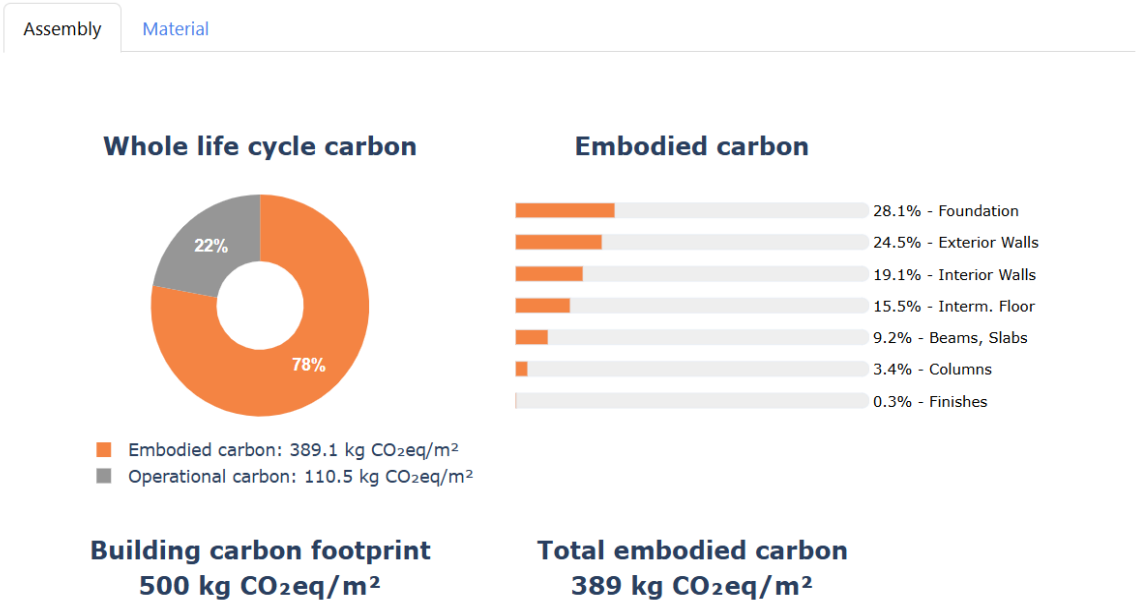


Figure 32: Building 19

20	Building ID	30_Comm._MPM_Kerala_7073					
Building Information							
Year of Completion		2018					
Basic details	**City**	Ponnani, Malappuram					
	Building type	Institutional		**Sub-type**	Education		
	Built-up Area	7073.53 sq.m.		**Conditioned Floor Area**	1061.03 sq.m.		
	Floors above ground	3		**Floors below ground**			
Building Specifications							
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC		
	Flooring	Vitrified Tiles		**Roofing**	RCC		
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550		
	Quantity	1539.776 cu.m.		Quantity	322.2425 Ton		
	Window type	Alu. + Double glazing		**Walling**	Brick		
	Quantity	xxx sq.m.		Quantity	455.448 cu.m.		
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights	
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW	
	No. of occupants	202		**Occupancy hours**	8 hrs / day		
	Ventilation type				Mechanically Ventilated		
	Capacity				25.41 kW		
	Total Connected Load				338.41 kW		

Operational Data	**Annual Energy Consumption (Electricity)**			325398.00 kWh/Yr
	Annual Energy Consumption (Diesel)			3122.00 kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			46 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			306.7 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**236.1** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**280** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**561** kg CO_2e/sq.m.	

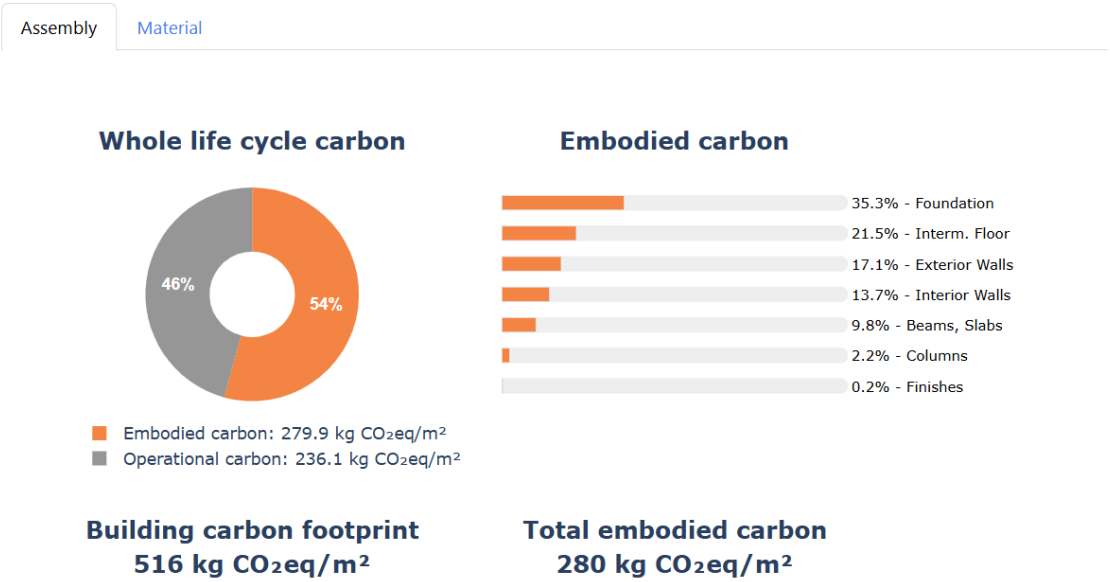


Figure 33: Building 20

21	**Building ID**	**31_Comm._KSD_Kerala_3818**			
Building Information					
Year of Completion	2004				
Basic details	**City**	Thayalangadi, Kasargod			
	Building type	Institutional	**Sub-type**	Hospital	
	Built-up Area	3818 sq.m.	**Conditioned Floor Area**	572 sq.m.	
	Floors above ground	5	**Floors below ground**		
Building Specifications					
Material Specifications and Quantities	**Foundation type**	Raft Foundation	**Structure type**	RCC	
	Flooring	Vitrified Tiles	**Roofing**	RCC	
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550	
	Quantity	1172.145 cu.m.	Quantity	360.3943 Ton	
	Window type	Alu. + Double glazing	**Walling**	Brick	
	Quantity	xxx sq.m.	Quantity	467.373 cu.m.	

	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	298		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				21.24 kW	
Operational Data	**Total Connected Load**				372 kW	
	Annual Energy Consumption (Electricity)				461724.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				6102.80 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				120.9 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				807.2 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**4497.5** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**559** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**5057** kg CO_2e/sq.m.		

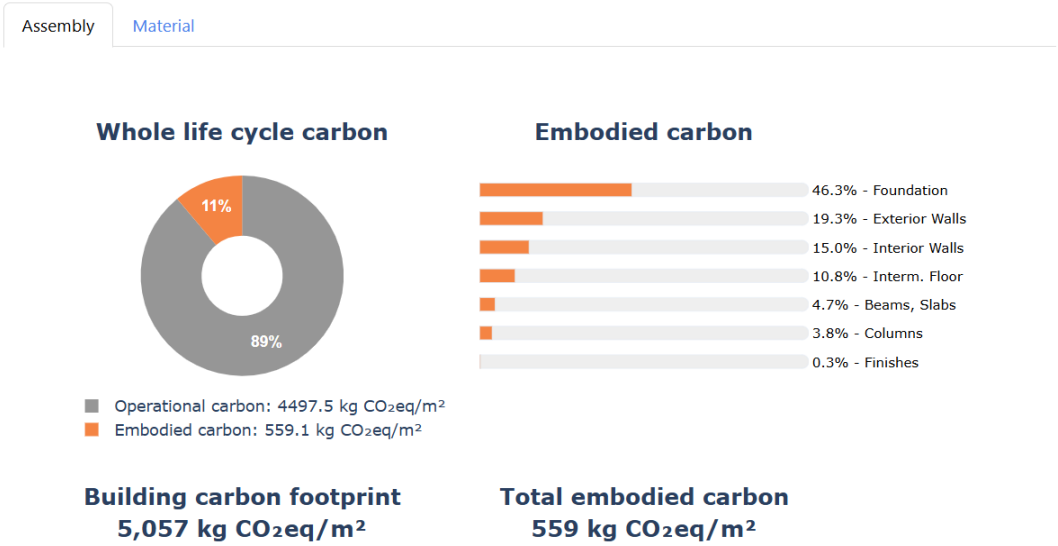


Figure 34: Building 21

22	Building ID	33_Comm._EKM_Kerala_10850					
Building Information							
Year of Completion	2017						
Basic details	**City**	Ernakulam					
	Building type	Institutional		**Sub-type**	Assembly		
	Built-up Area	10850 sq.m.		**Conditioned Floor Area**	1627.5 sq.m.		
	Floors above ground	6		**Floors below ground**			
Building Specifications							
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC		
	Flooring	Vitrified Tiles		**Roofing**	RCC		
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550		
	Quantity	3180.764 cu.m.		Quantity	888.2699 Ton		
	Window type	Alu. + Double glazing		**Walling**	Brick		
	Quantity	xxx sq.m.		Quantity	747.949 cu.m.		
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights	
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW	
	No. of occupants	2713		**Occupancy hours**	8 hrs / day		
	Ventilation type				Mechanically Ventilated		
	Capacity				26.54 kW		
Operational Data	**Total Connected Load**				165 kW		
	Annual Energy Consumption (Electricity)				94674.00 kWh/Yr		
	Annual Energy Consumption (Diesel)				xxx kWh/yr.		
	Annual Energy Generation (RE)						
	Energy Performance Index (EPI – Whole building)				8.7 kWh/sq.m..yr.		
	Energy Performance Index (EPI – Conditioned area)				58.2 kWh/sq.m..yr.		
Building Carbon							
Emissions	**Operational Carbon Intensity (50 years)**	**49.2** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**416** kgCO2e/sq.m.		
	Building Carbon Footprint (Whole-life)			**465** kg CO_2e/sq.m.			

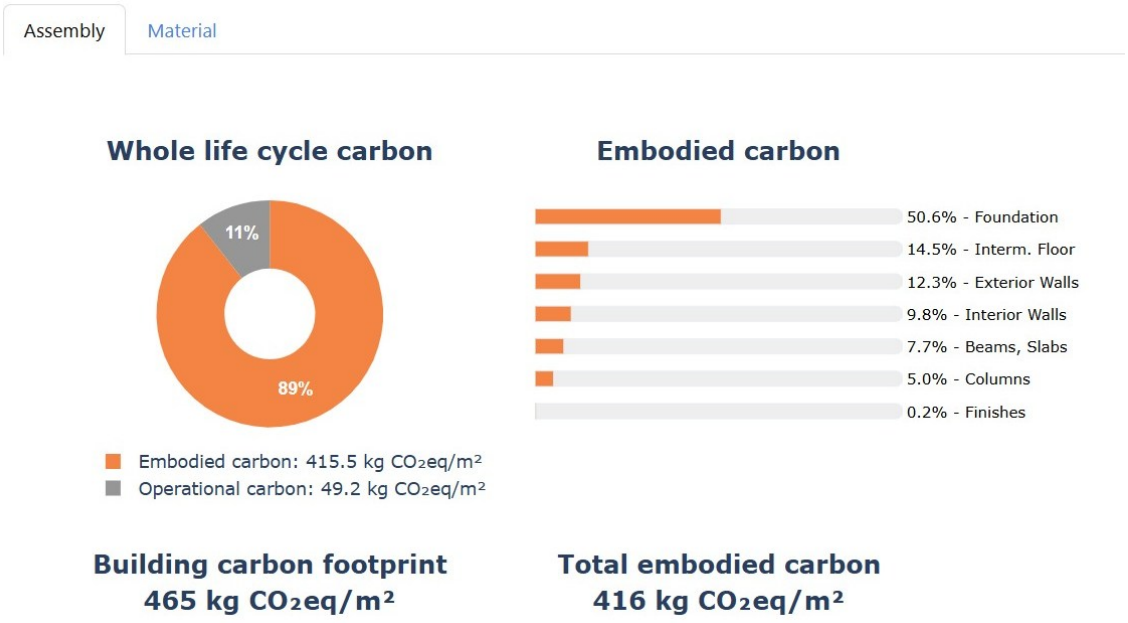


Figure 35: Building 22

23	**Building ID**	**34_Comm._MPM_Kerala_17041**				
Building Information						
Year of Completion	2013					
Basic details	**City**	Manjeri, Malappuram				
	Building type	Institutional		**Sub-type**	Hospital	
	Built-up Area	17041 sq.m.		**Conditioned Floor Area**	2556.15 sq.m.	
	Floors above ground	4		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	5332.086 cu.m.		Quantity	1725.525 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	907.903 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	4260		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				12 kW	
Operational Data	**Total Connected Load**				227 kW	
	Annual Energy Consumption (Electricity)				258257.00 kWh/Yr	

	Annual Energy Consumption (Diesel)			30.00 kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			15.2 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			101 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**128.4** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**459** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**588** kg CO_2e/sq.m.	

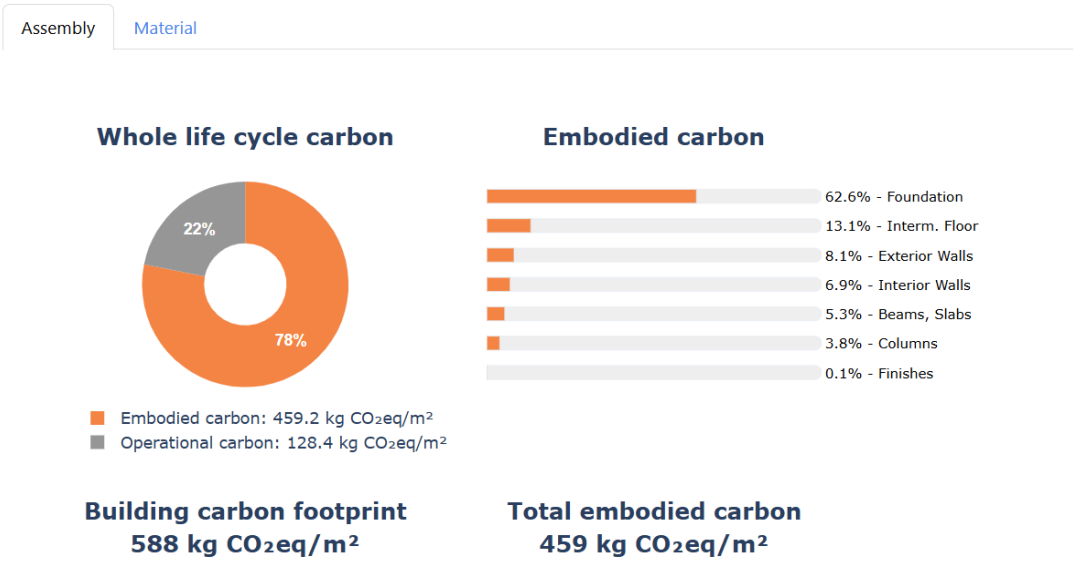


Figure 36: Building 23

24	**Building ID**	**35_Comm._KSD_Kerala_5741**		
Building Information				
Year of Completion	1950			
Basic details	**City**	Hsodurg, Kasargod		
	Building type	Institutional	**Sub-type**	Hospital
	Built-up Area	5741 sq.m.	**Conditioned Floor Area**	861.15 sq.m.
	Floors above ground	2	**Floors below ground**	
Building Specifications				
Material Specifications and Quantities	**Foundation type**	Raft Foundation	**Structure type**	RCC
	Flooring	Vitrified Tiles	**Roofing**	RCC
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550
	Quantity	1327.211 cu.m.	Quantity	291.1743 Ton
	Window type	Alu. + Double glazing	**Walling**	Brick
	Quantity	xxx sq.m.	Quantity	709.150 cu.m.

	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	1435		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				35.27 kW	
Operational Data	**Total Connected Load**				286.2 kW	
	Annual Energy Consumption (Electricity)				400266.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				1479.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				69.7 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				464.8 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**3743.2** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**407** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**4150** kg CO_2e/sq.m.		

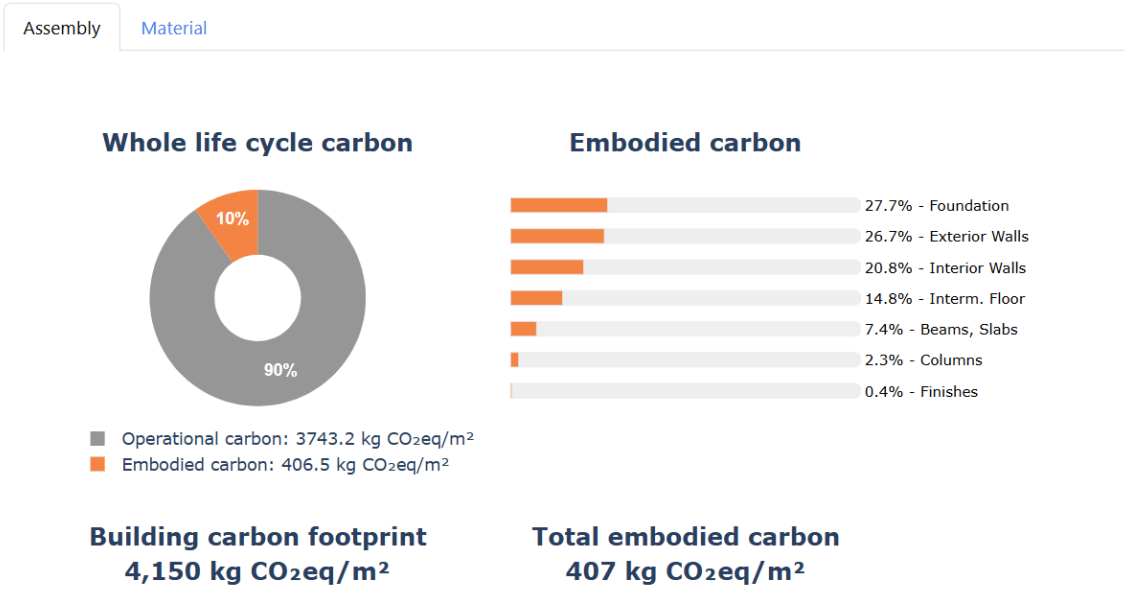


Figure 37: Building 24

25	**Building ID**	**36_Comm._KKD_Kerala_7626**		
Building Information				
Year of Completion	2013			
Basic details	**City**	Kozhikode		
	Building type	Institutional	**Sub-type**	Hospital

	Built-up Area	7626 sq.m.		**Conditioned Floor Area**	1143.9 sq.m.	
	Floors above ground	1		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1828.923 cu.m.		Quantity	385.73 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	527.034 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	1907		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				29.96 kW	
Operational Data	**Total Connected Load**				344.36 kW	
	Annual Energy Consumption (Electricity)				554399.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				2400.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				72.7 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				484.7 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**626.2** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**371** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**997** kg CO_2e/sq.m.		

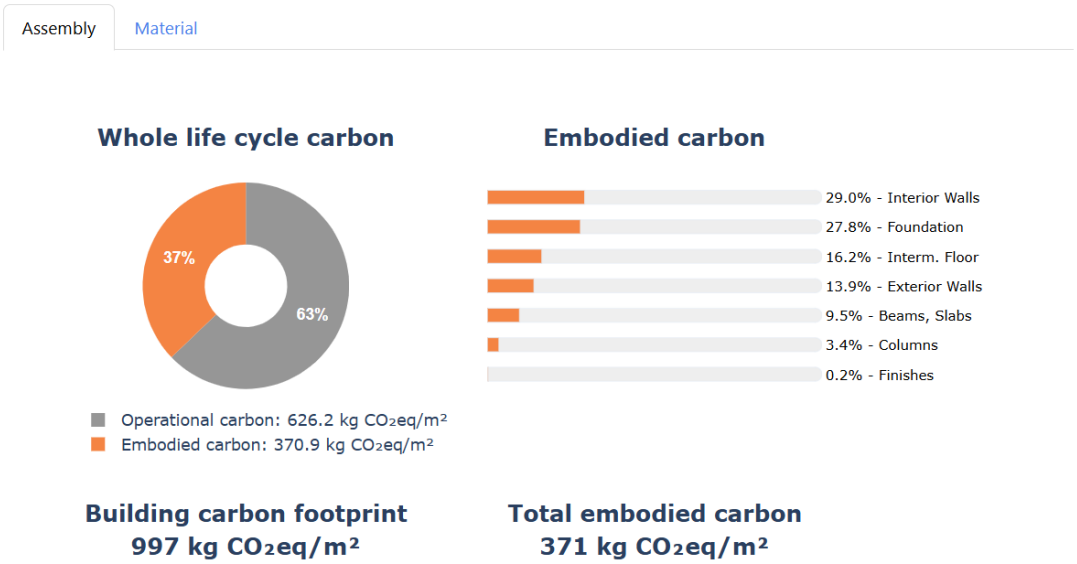


Figure 38: Building 25

26	**Building ID**	**37_Comm._TVM_Kerala_1955**				
Building Information						
Year of Completion	1976					
Basic details	**City**	Thuruvikkal, Trivandrum				
	Building type	Commercial		**Sub-type**	Office	
	Built-up Area	1955 sq.m.		**Conditioned Floor Area**	293.25 sq.m.	
	Floors above ground	4		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	672.2659 cu.m.		Quantity	223.125 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	268.754 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	1907		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				25.86 kW	
Operational Data	**Total Connected Load**				139.8 kW	
	Annual Energy Consumption (Electricity)				84290.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				170.00 kWh/yr.	
	Annual Energy Generation (RE)					

	Energy Performance Index (EPI – Whole building)			43.1 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			287.4 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**1501.8** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**616** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**2118** kg CO_2e/sq.m.	

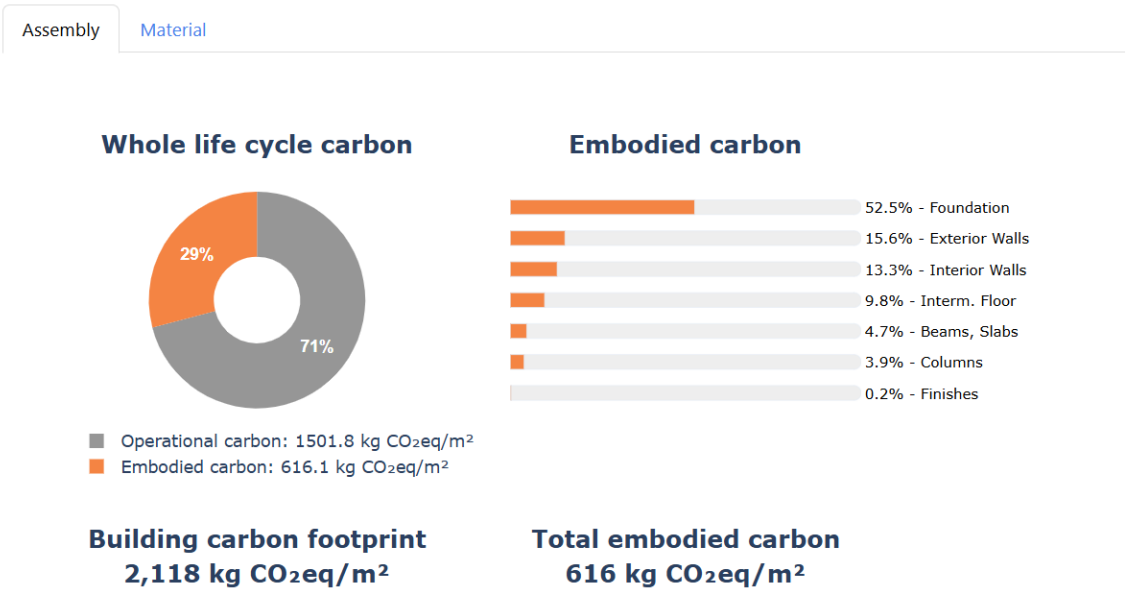


Figure 39: Building 27

27	**Building ID**	**38_Comm._KKD_Kerala_36594**				
Building Information						
Year of Completion	1888					
Basic details	**City**	Kozhikode				
	Building type	Commercial		**Sub-type**	Office	
	Built-up Area	36594 sq.m.		**Conditioned Floor Area**	5489 sq.m.	
	Floors above ground	1		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	8435.13 cu.m.		Quantity	1698.112 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	906.876 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights

	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	9149		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				50.45 kW	
Operational Data	**Total Connected Load**				671.35 kW	
	Annual Energy Consumption (Electricity)				1163396.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				31.8 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				212 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**3071.5** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**235** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**3307** kg CO_2e/sq.m.		

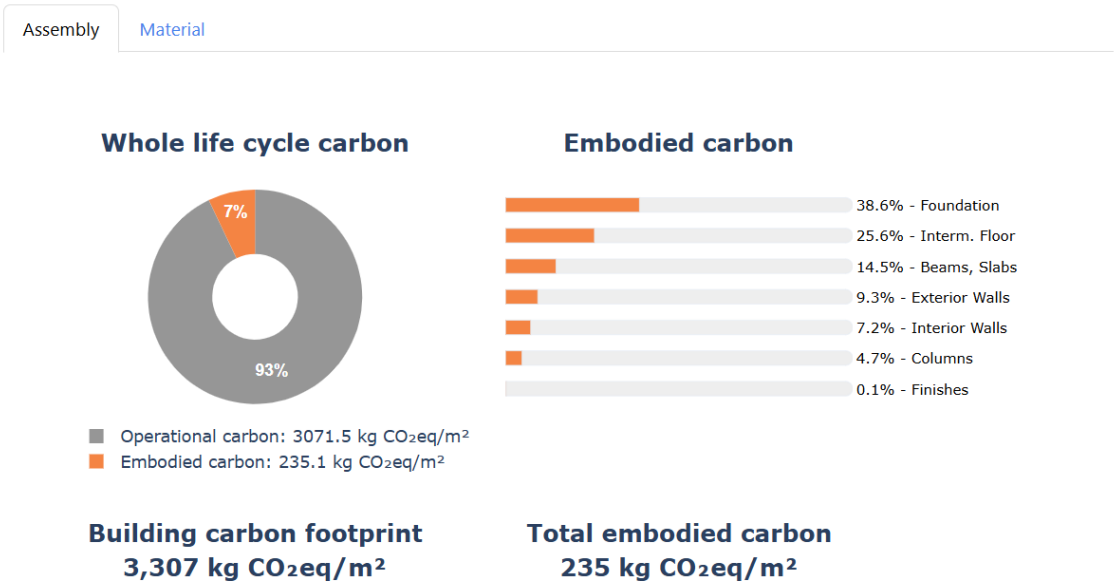


Figure 40: Building 27

28	**Building ID**	**39_Comm._IDK_Kerala_9581**			
Building Information					
Year of Completion	2000				
Basic details	**City**	Painavu, Idukki			
	Building type	Institutional		**Sub-type**	Educational
	Built-up Area	9581 sq.m.		**Conditioned Floor Area**	1437.15 sq.m.
	Floors above ground	3		**Floors below ground**	
Building Specifications					
	Foundation type	Raft Foundation		**Structure type**	RCC

Material Specifications and Quantities	**Flooring**	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	2072.569 cu.m.		Quantity	435.1754 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	731.528 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	2395		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				51.71 kW	
Operational Data	**Total Connected Load**				322 kW	
	Annual Energy Consumption (Electricity)				121980.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				12.7 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				84.9 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**224.5** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**313** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**537** kg CO_2e/sq.m.		

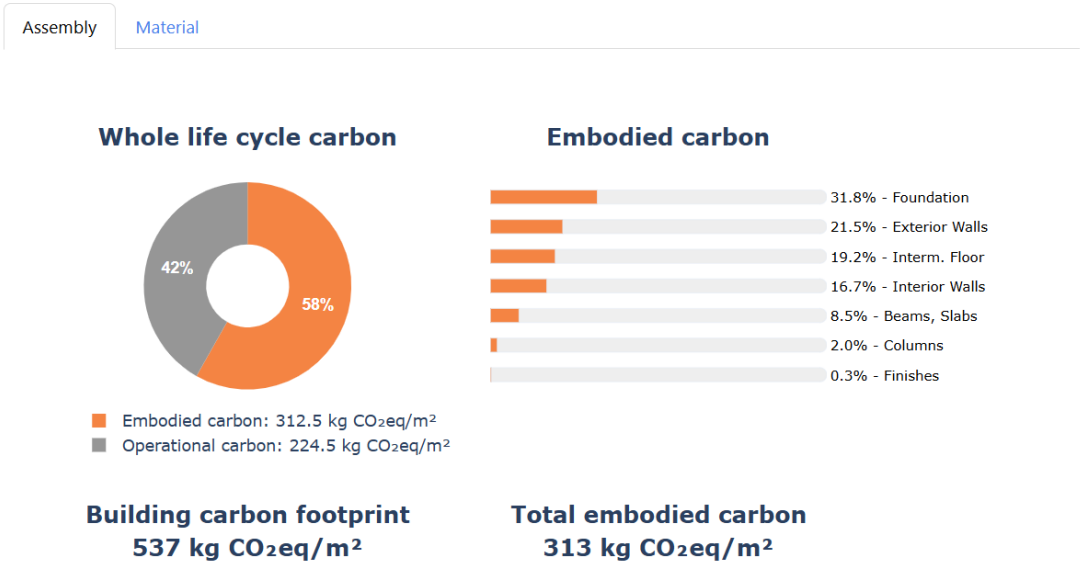


Figure 41: Building 28

29	**Building ID**	**41_Comm._ALP_Kerala_5480**
Building Information		
Year of Completion	1961	

Basic details	**City**	Chengannur, Alapuzha				
	Building type	Institutional		**Sub-type**	Educational	
	Built-up Area	5480 sq.m.		**Conditioned Floor Area**	822 sq.m.	
	Floors above ground	2		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	1370		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				25.6 kW	
Operational Data	**Total Connected Load**				376.43 kW	
	Annual Energy Consumption (Electricity)				67136.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				12.3 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				81.7 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**553** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**120** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**673** kg CO_2e/sq.m.		

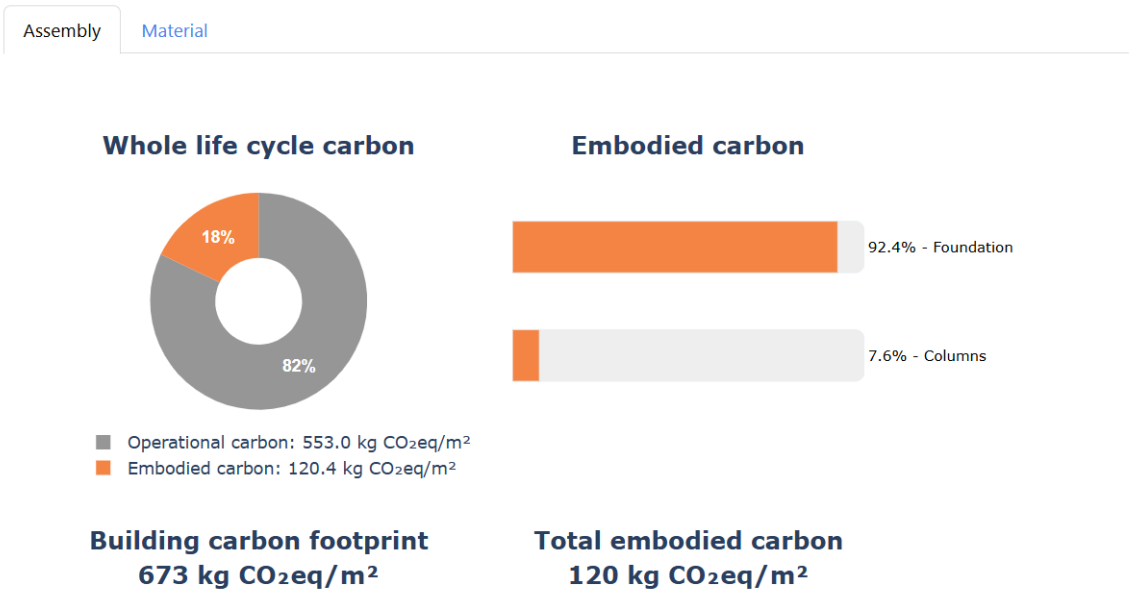


Figure 42: Building 29

30	**Building ID**	**42_Comm._ALP_Kerala_12500**				
Building Information						
Year of Completion	2000					
Basic details	**City**	Chengannur, Alapuzha				
	Building type	Institutional		**Sub-type**	Educational	
	Built-up Area	12500 sq.m.		**Conditioned Floor Area**	1875 sq.m.	
	Floors above ground	4		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	3930.412 cu.m.		Quantity	1269.86 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	770.756 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	3125		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				42.32 kW	
Operational Data	**Total Connected Load**				528.58 kW	
	Annual Energy Consumption (Electricity)				87812.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				300.00 kWh/yr.	
	Annual Energy Generation (RE)					

	Energy Performance Index (EPI – Whole building)			7 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			46.8 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**125.5** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**489** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**615** kg CO_2e/sq.m.	

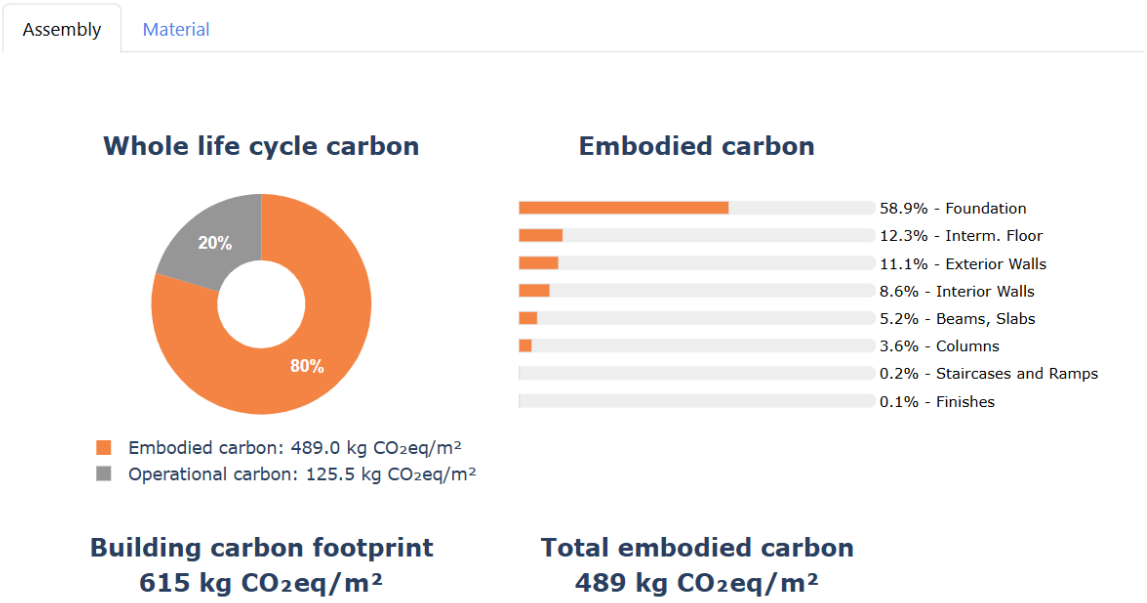


Figure 43: Building 30

31	**Building ID**	**43_Comm._TSR_Kerala_73500**				
Building Information						
Year of Completion	1957					
Basic details	**City**	Trichur				
	Building type	Institutional		**Sub-type**	Hospital	
	Built-up Area	73500 sq.m.		**Conditioned Floor Area**	11025 sq.m.	
	Floors above ground	5		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	20742.6 cu.m.		Quantity	6209.425 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	2199.217 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights

	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	1478		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				196.1 kW	
Operational Data	**Total Connected Load**				3838.51 kW	
	Annual Energy Consumption (Electricity)				6439030.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				3200.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				87.6 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				584 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**3837.8** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**370** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**4208** kg CO_2e/sq.m.		

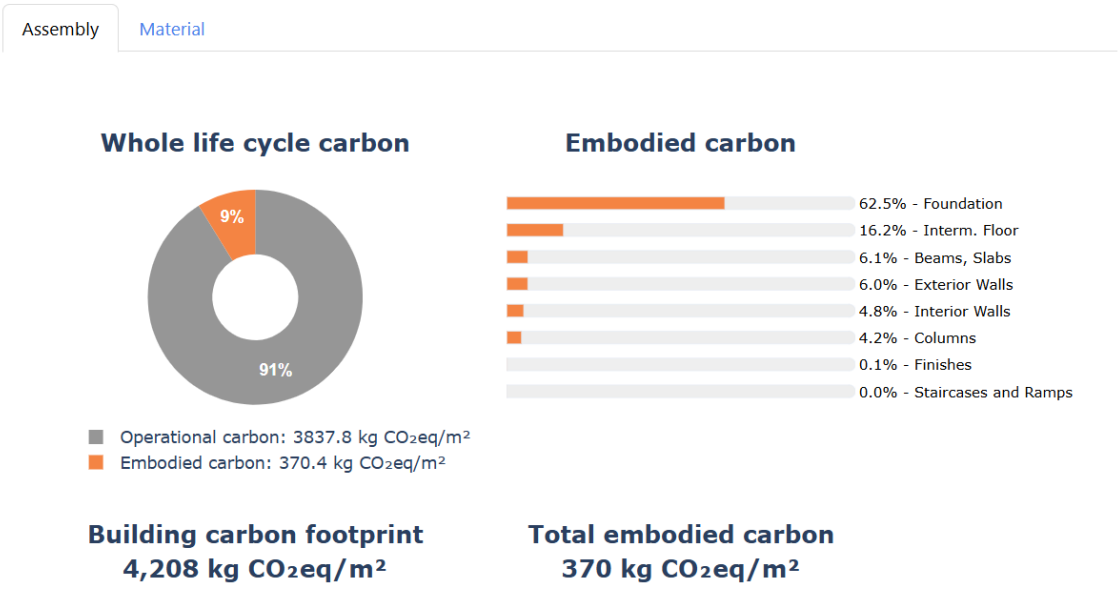


Figure 44: Building 31

32	**Building ID**	**44_Comm._TSR_Kerala_1675**				
Building Information						
Year of Completion	1957					
Basic details	**City**	Trichur				
	Building type	Institutional		**Sub-type**	Educational	
	Built-up Area	1675 sq.m.		**Conditioned Floor Area**	301.5 sq.m.	
	Floors above ground	3		**Floors below ground**		
Building Specifications						

Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	386.073 cu.m.		Quantity	86.61142 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	222.048 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	375		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				11.1 kW	
Operational Data	**Total Connected Load**				185.5 kW	
	Annual Energy Consumption (Electricity)				9310.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				20.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				5.6 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				30.9 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**268.6** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**412** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**680** kg CO_2e/sq.m.		

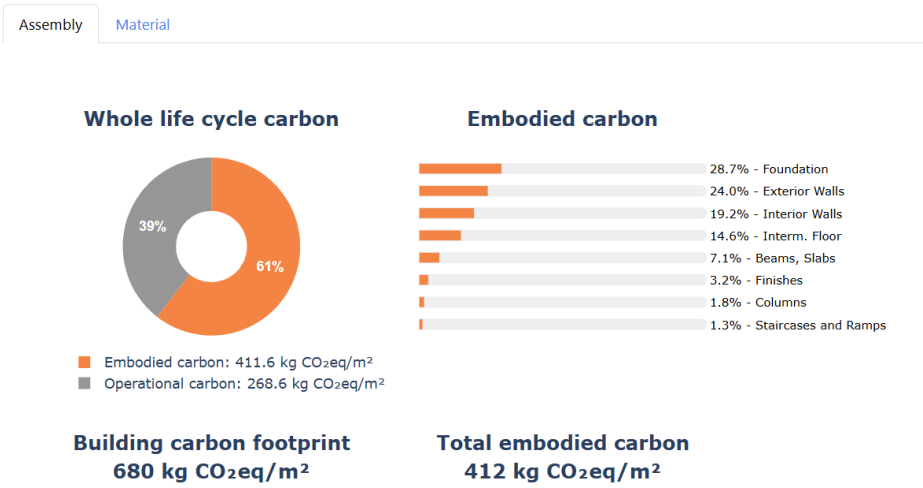


Figure 45: Building 32

33	**Building ID**	**45_Comm._TSR_Kerala_26500**
Building Information		
Year of Completion	1963	
Basic details	**City**	Trichur

	Building type	Institutional		**Sub-type**	Hospital	
	Built-up Area	26500 sq.m.		**Conditioned Floor Area**	3975 sq.m.	
	Floors above ground	2		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	5915.452 cu.m.		Quantity	1244.486 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	1697.528 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	172		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				52.74 kW	
Operational Data	**Total Connected Load**				434.37 kW	
	Annual Energy Consumption (Electricity)				1100586.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				2500.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				41.5 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				276.9 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**1833** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**519** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**2352** kg CO_2e/sq.m.		

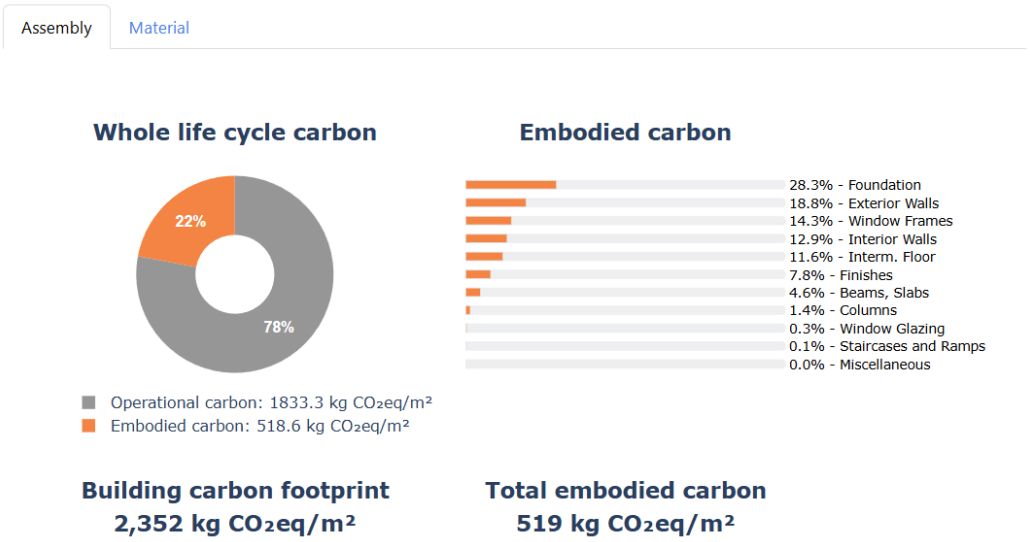


Figure 46: Building 33

34	**Building ID**	**46_Comm._TSR_Kerala_6725**				
Building Information						
Year of Completion	2000					
Basic details	**City**	Trichur				
	Building type	Institutional		**Sub-type**	Hospital	
	Built-up Area	6725 sq.m.		**Conditioned Floor Area**	1008.75 sq.m.	
	Floors above ground	3		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1476.013 cu.m.		Quantity	316.305 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	585.581 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	1681		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				16.63 kW	
Operational Data	**Total Connected Load**				124.4 kW	
	Annual Energy Consumption (Electricity)				276806.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				41.2 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				274.4 kWh/sq.m..yr.	

Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**725.5** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**697** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**1423** kg CO_2e/sq.m.	

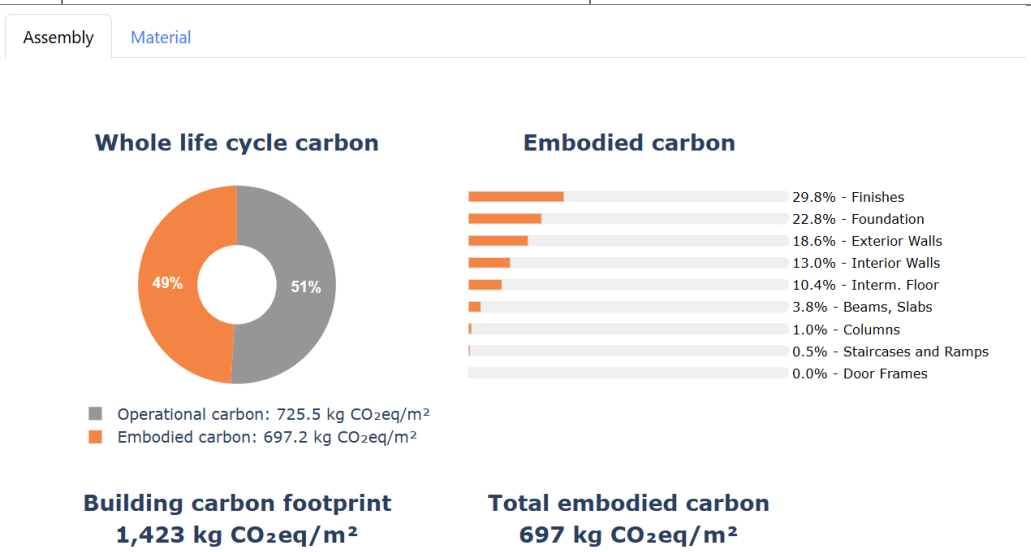


Figure 47: Building 34

35	**Building ID**	47_Comm._KKD_Kerala_11000				
Building Information						
Year of Completion	1995					
Basic details	**City**	Kozhikode				
	Building type	Institutional		**Sub-type**	Educational	
	Built-up Area	11000 sq.m.		**Conditioned Floor Area**	1650 sq.m.	
	Floors above ground	1		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	2579.904 cu.m.		Quantity	529.3411 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	444.019 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	1330		**Occupancy hours**	8 hrs / day	

	Ventilation type			Mechanically Ventilated
	Capacity			36.94 kW
Operational Data	**Total Connected Load**			135 kW
	Annual Energy Consumption (Electricity)			63380.00 kWh/Yr
	Annual Energy Consumption (Diesel)			xxx kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			15.8 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			38.4 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**203** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**707** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**910** kg CO_2e/sq.m.	

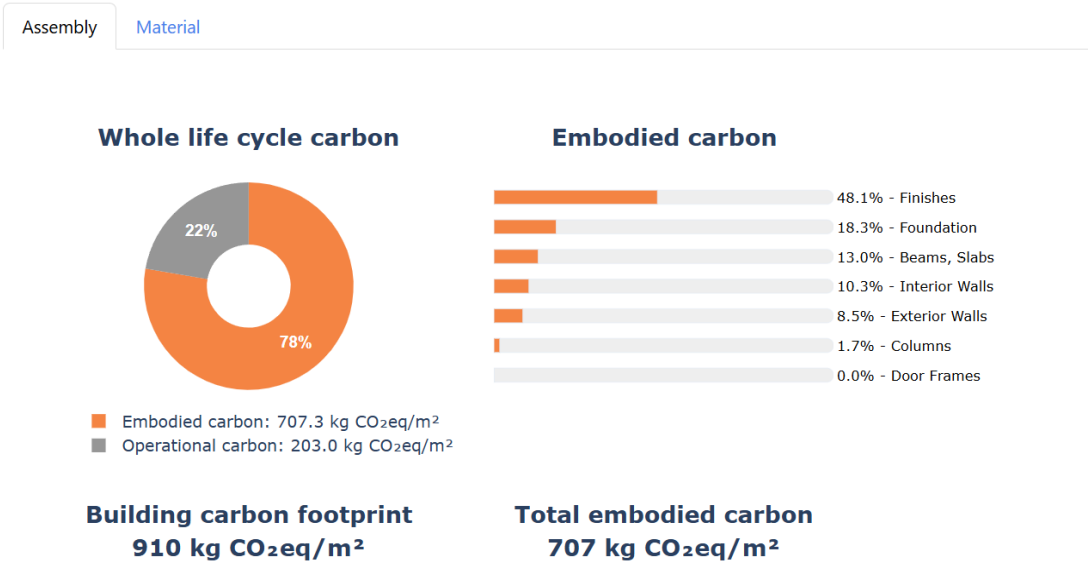


Figure 48: Building 35

36	**Building ID**	**53_Comm._IDK_Kerala_3385**		
Building Information				
Year of Completion	1996			
Basic details	**City**	Purapuzha, Idukki		
	Building type	Institutional	**Sub-type**	Educational
	Built-up Area	3385 sq.m.	**Conditioned Floor Area**	507.75 sq.m.
	Floors above ground	1	**Floors below ground**	
Building Specifications				
Material Specifications and Quantities	**Foundation type**	Raft Foundation	**Structure type**	RCC
	Flooring	Vitrified Tiles	**Roofing**	RCC
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550

	Quantity	823.8554 cu.m.		Quantity	176.1052 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	321.273 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	248		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				20.15 kW	
Operational Data	**Total Connected Load**				124.56 kW	
	Annual Energy Consumption (Electricity)				14252.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				4.2 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				28.1 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**86.1** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**371** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**457** kg CO_2e/sq.m.		

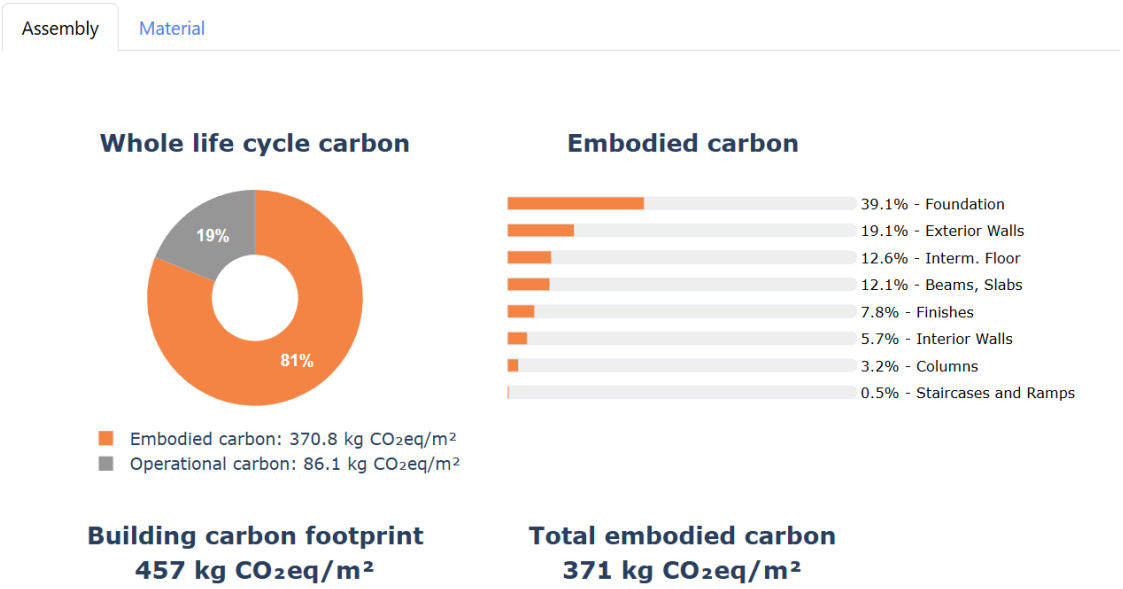


Figure 49: Building 36

37	**Building ID**	69_Comm._TVM_Kerala_10956
Building Information		

Year of Completion	2008					
Basic details	**City**	Trivandrum				
	Building type	Institutional		**Sub-type**	Hospital	
	Built-up Area	10956 sq.m.		**Conditioned Floor Area**	1643.4 sq.m.	
	Floors above ground	2		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	2531.741 cu.m.		Quantity	556.3273 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	1215.074 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	2739		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				59.59 kW	
Operational Data	**Total Connected Load**				140 kW	
	Annual Energy Consumption (Electricity)				127750.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				11.7 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				77.7 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**139.7** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**405** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**544** kg CO_2e/sq.m.		

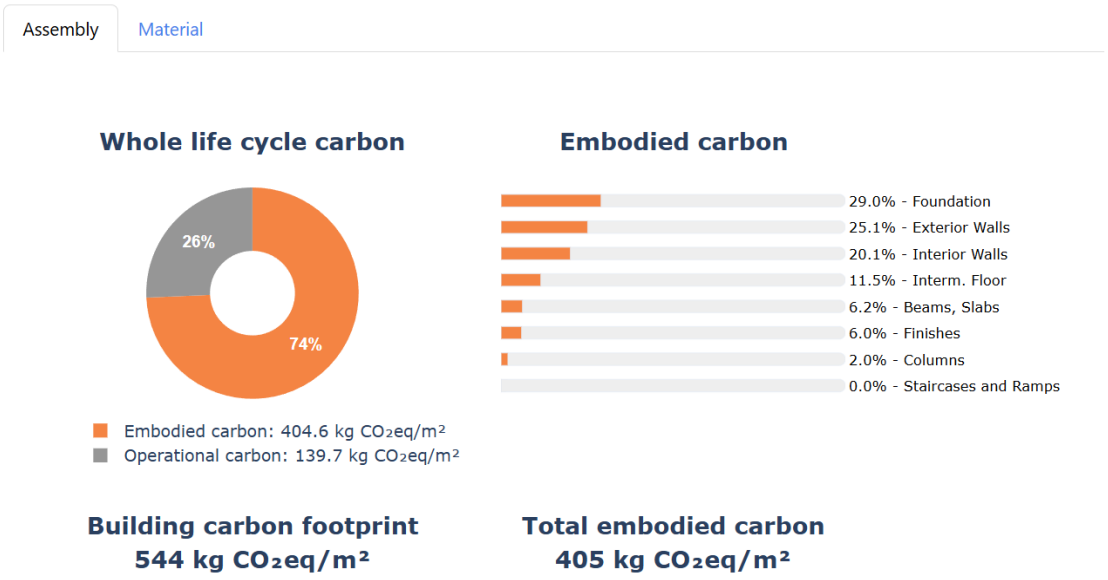


Figure 50: Building 37

38	**Building ID**	**74_Comm._ALP_Kerala_31338**				
Building Information						
Year of Completion	1888					
Basic details	**City**	Alappuzha				
	Building type	Institutional		**Sub-type**	Hospital	
	Built-up Area	31338 sq.m.		**Conditioned Floor Area**	4700.7 sq.m.	
	Floors above ground	5		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	8939.571 cu.m.		Quantity	2682.076 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	1365.630 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	411		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				61.29 kW	
Operational Data	**Total Connected Load**				391.9 kW	
	Annual Energy Consumption (Electricity)				564115.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				3200.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				18 kWh/sq.m..yr.	

	Energy Performance Index (EPI – Conditioned area)			120 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**480.6** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**461** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**941** kg CO_2e/sq.m.	

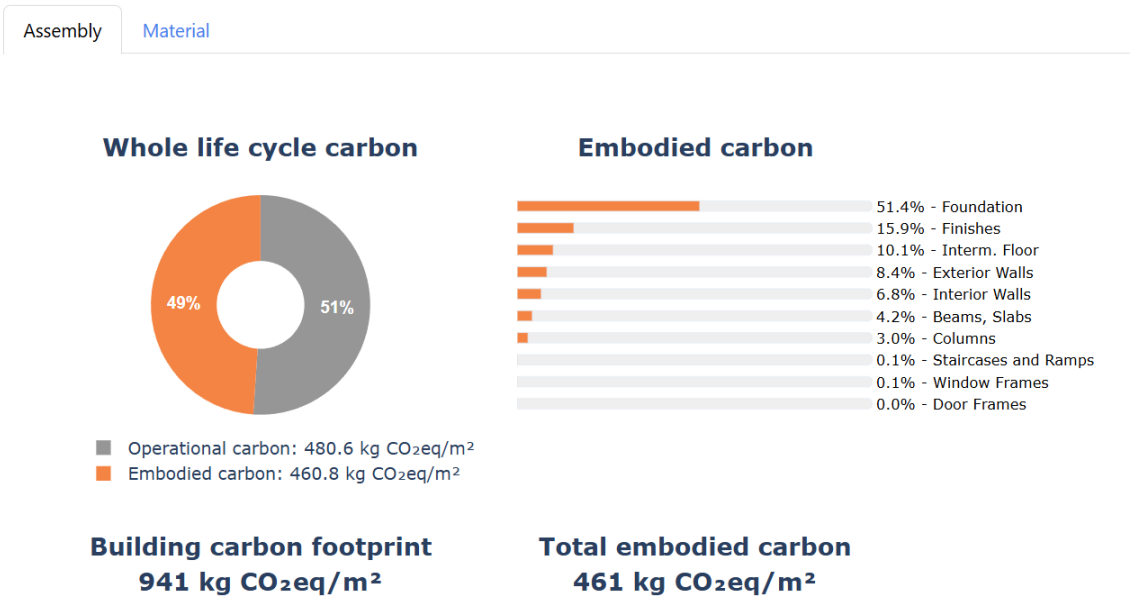


Figure 51: Building 38

39	**Building ID**	**79_Comm._TSR_Kerala_21450**			
Building Information					
Year of Completion	2017				
Basic details	**City**	Thiruvananthapuram			
	Building type	Institutional		**Sub-type**	Hospital
	Built-up Area	21450 sq.m.		**Conditioned Floor Area**	3217.5 sq.m.
	Floors above ground	4		**Floors below ground**	
Building Specifications					
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC
	Flooring	Vitrified Tiles		**Roofing**	RCC
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550
	Quantity	6649.734 cu.m.		Quantity	2140.129 Ton
	Window type	Alu. + Double glazing		**Walling**	Brick
	Quantity	xxx sq.m.		Quantity	892.763 cu.m.

	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	5363		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				54 kW	
Operational Data	**Total Connected Load**				374.2 kW	
	Annual Energy Consumption (Electricity)				143784.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				6.7 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				44.7 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**141.9** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**477** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**619** kg CO_2e/sq.m.		

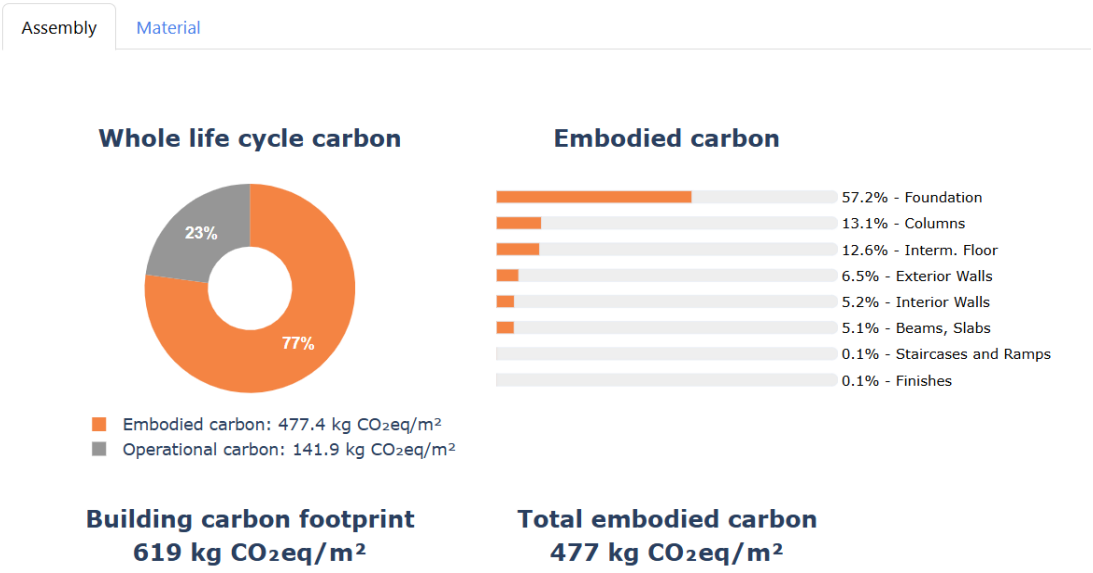


Figure 52: Building 39

40	**Building ID**	80_Comm._TSR_Kerala_13478			
Building Information					
Year of Completion	2009				
Basic details	**City**	Trivandrum			
	Building type	Institutional	**Sub-type**	Assembly	

	Built-up Area	13478 sq.m.		**Conditioned Floor Area**	2021.7 sq.m.	
	Floors above ground	5		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	3925.355 cu.m.		Quantity	1186.529 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	780.878 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	3370		**Occupancy hours**	8 hrs / day	
	Ventilation type				Mechanically Ventilated	
	Capacity				15.39 kW	
Operational Data	**Total Connected Load**				155 kW	
	Annual Energy Consumption (Electricity)				139405.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				420.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				10.3 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				69 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**118.1** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**421** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**539** kg CO_2e/sq.m.		

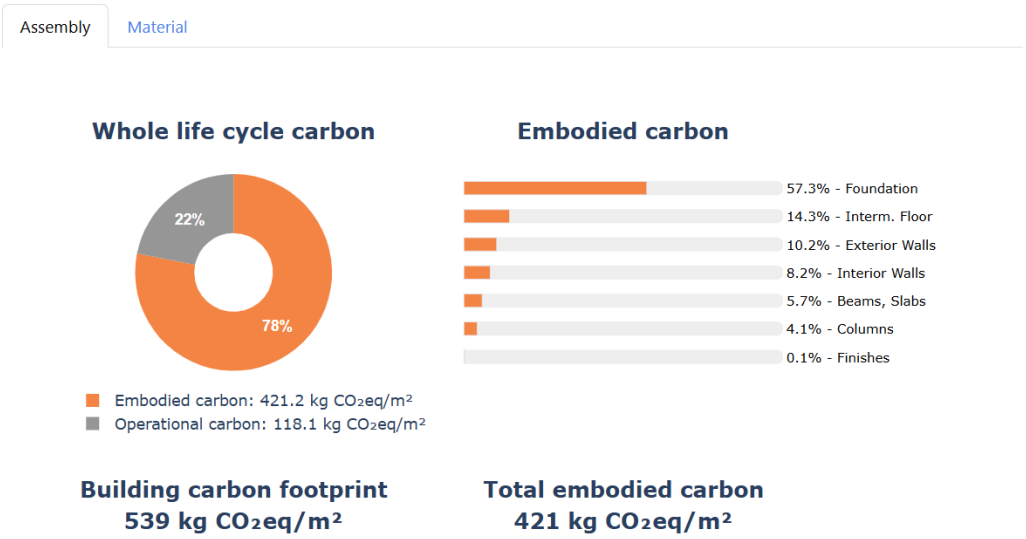


Figure 53: Building 40

41	**Building ID**	**80_Comm._TSR_Kerala_13592**				
Building Information						
Year of Completion	1976					
Basic details	**City**	Calicut, Kozhikode				
	Building type	Institutional		**Sub-type**	Hospital	
	Built-up Area	13592.4 sq.m.		**Conditioned Floor Area**	2038.86 sq.m.	
	Floors above ground	2		**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Raft Foundation		**Structure type**	RCC	
	Flooring	Vitrified Tiles		**Roofing**	RCC	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	3009.962 cu.m.		Quantity	624.3506 Ton	
	Window type	Alu. + Double glazing		**Walling**	Brick	
	Quantity	xxx sq.m.		Quantity	770.347 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	T5 and T8 Fluorescent Tube Lights
	Heating capacity	NA	**Cooling capacity**	309.18 KW	**Lighting capacity**	92.75 KW
	No. of occupants	3398		**Occupancy hours**	8 hrs / day`	
	Ventilation type				Mechanically Ventilated	
	Capacity				9.77 kW	
Operational Data	**Total Connected Load**				194.1 kW	
	Annual Energy Consumption (Electricity)				305805.00 kWh/Yr	
	Annual Energy Consumption (Diesel)				222.50 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				22.5 kWh/sq.m..yr.	

	Energy Performance Index (EPI – Conditioned area)			150 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**922.8** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**286** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**1209** kg CO_2e/sq.m.	

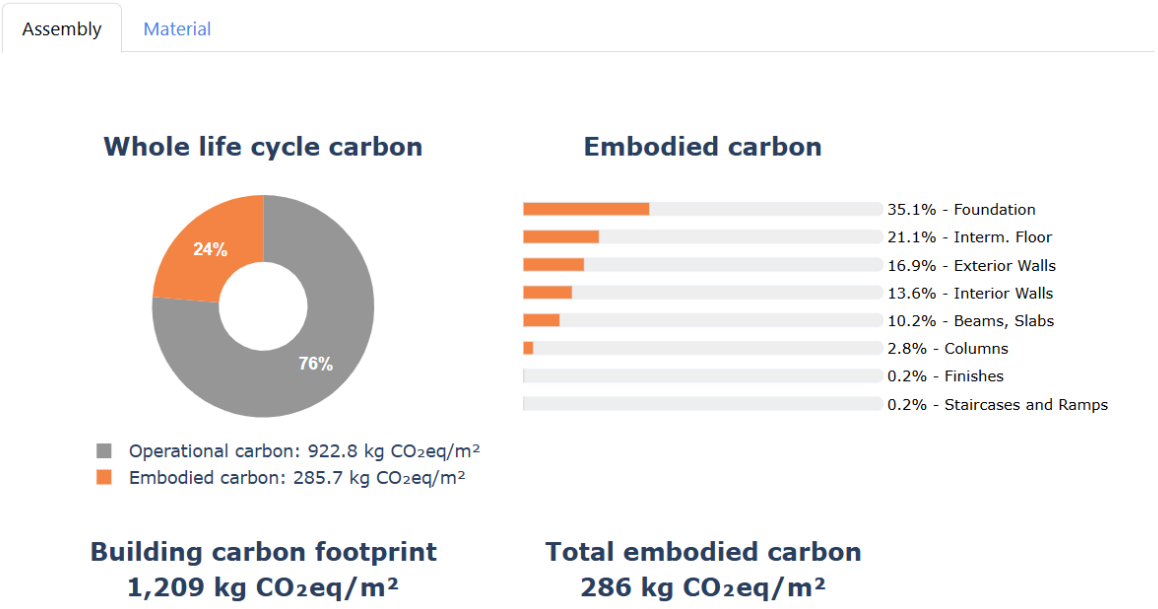


Figure 54: Building 41

42	**Building ID**	82_Comm._TVM_Kerala_54428				
Building Information						
Year of Completion	1939					
Basic details	**City**	Trivandrum				
	Building type	Institutional Building		**Sub-type**	Education	
	Built-up Area	54428.5 sq.m.		**Conditioned Floor Area**	8164.28 sq.m.	
	Floors above ground	3		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	11412.65 cu.m.		Quantity	2297.782 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	1497.434 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	13607		**Occupancy hours**	8 hrs / day	

	Ventilation type			BLDC Ceiling Fans
	Capacity			176.4 kW
Operational Data	**Total Connected Load**			1977 kW
	Annual Energy Consumption (Electricity)			652932.00 kWh/yr.
	Annual Energy Consumption (Diesel)			250.00 kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			12 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			80 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**728.4** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**233** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**961** kg CO_2e/sq.m.	

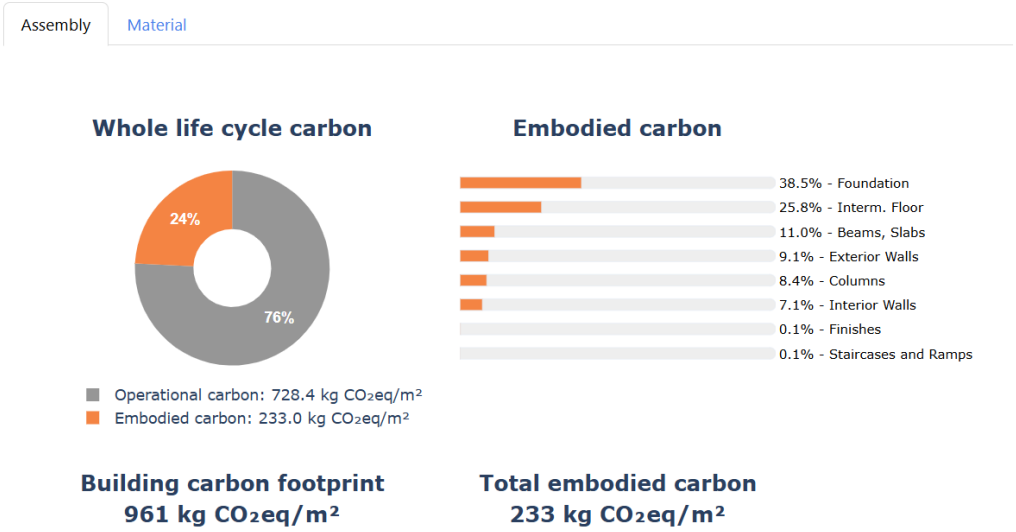


Figure 55: Building 42

43	**Building ID**	99_Comm._TVM_Kerala_8718			
Building Information					
Year of Completion	2008				
Basic details	**City**	Trivandrum			
	Building type	Institutional Building	**Sub-type**	Education	
	Built-up Area	8718.87 sq.m.	**Conditioned Floor Area**	1307.83 sq.m.	
	Floors above ground	1	**Floors below ground**	1	
Building Specifications					
Material Specifications and Quantities	**Foundation type**	Isolated Footing	**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile	**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550	
	Quantity	2051.513 cu.m.	Quantity	421.9089 Ton	
	Window type	Alu. + Double glazing	**Walling**	Red brick	

	Quantity	xxx sq.m.		Quantity	372.790 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	2180		**Occupancy hours**	8 hrs/day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				22.48 kW	
Operational Data	**Total Connected Load**				912 kW	
	Annual Energy Consumption (Electricity)				86756.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				10 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				66.3 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**119.3** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**241** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**360** kg CO_2e/sq.m.		

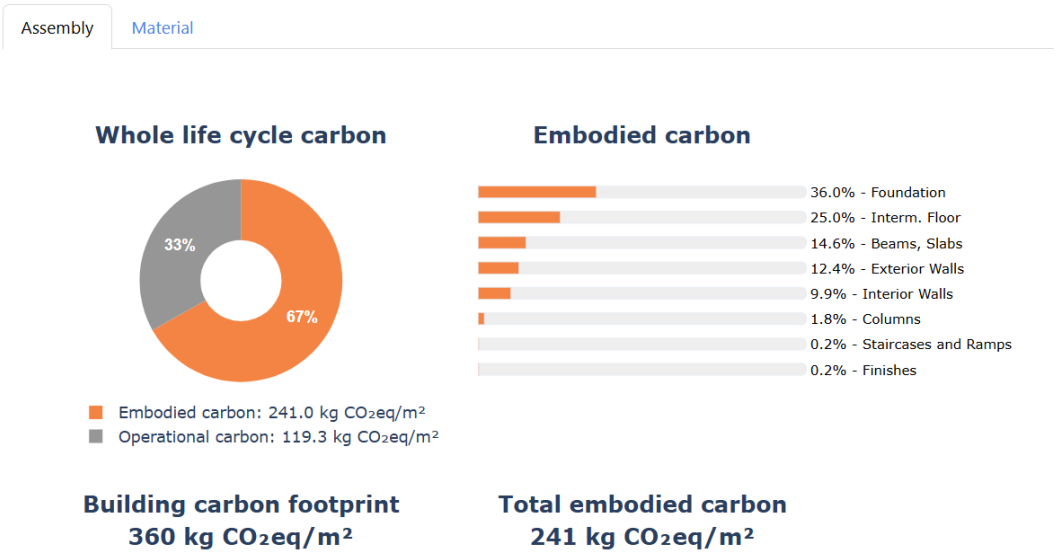


Figure 56: Building 43

44	**Building ID**	100_Comm._TVM_Kerala_6300		
Building Information				
Year of Completion	2018			
Basic details	**City**	Trivandrum		
	Building type	Institutional Building	**Sub-type**	Education
	Built-up Area	6300 sq.m.	**Conditioned Floor Area**	945 sq.m.

	Floors above ground	2	**Floors below ground**	1	
Building Specifications					
Material Specifications and Quantities	**Foundation type**	Isolated Footing	**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile	**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550	
	Quantity	1437.551 cu.m.	Quantity	310.0674 Ton	
	Window type	Alu. + Double glazing	**Walling**	Red brick	
	Quantity	xxx sq.m.	Quantity	561.988 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	1575	**Occupancy hours**	8 hrs / day	
	Ventilation type			BLDC Ceiling Fans	
	Capacity			22.08 kW	
Operational Data	**Total Connected Load**			823 kW	
	Annual Energy Consumption (Electricity)			67735.00 kWh/yr.	
	Annual Energy Consumption (Diesel)			xxx kWh/yr.	
	Annual Energy Generation (RE)				
	Energy Performance Index (EPI – Whole building)			10.8 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)			71.7 kWh/sq.m..yr.	
Building Carbon					
Emissions	**Operational Carbon Intensity (50 years)**	**53.1** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**327** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)		**380** kg CO_2e/sq.m.		

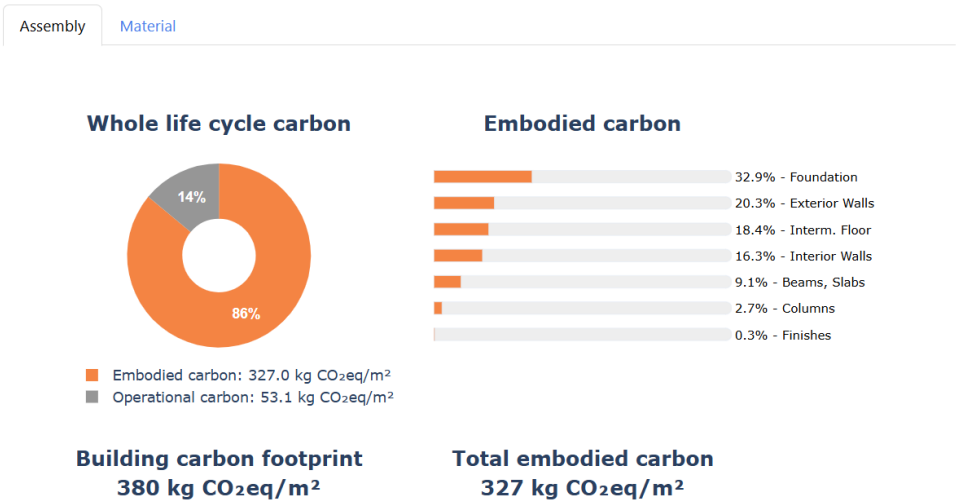


Figure 57: Building 44

45	**Building ID**	101_Comm._TVM_Kerala_4354				
Building Information						
Year of Completion	2019					
Basic details	**City**	Trivandrum				
	Building type	Institutional Building		**Sub-type**	Education	
	Built-up Area	4354.24 sq.m.		**Conditioned Floor Area**	653.14 sq.m.	
	Floors above ground	4		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1428.122 cu.m.		Quantity	468.5447 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	418.326 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	1089		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				15.89 kW	
Operational Data	**Total Connected Load**				296.8 kW	
	Annual Energy Consumption (Electricity)				63314.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				14.5 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				96.9 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**61.5** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**541** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**602** kg CO_2e/sq.m.		

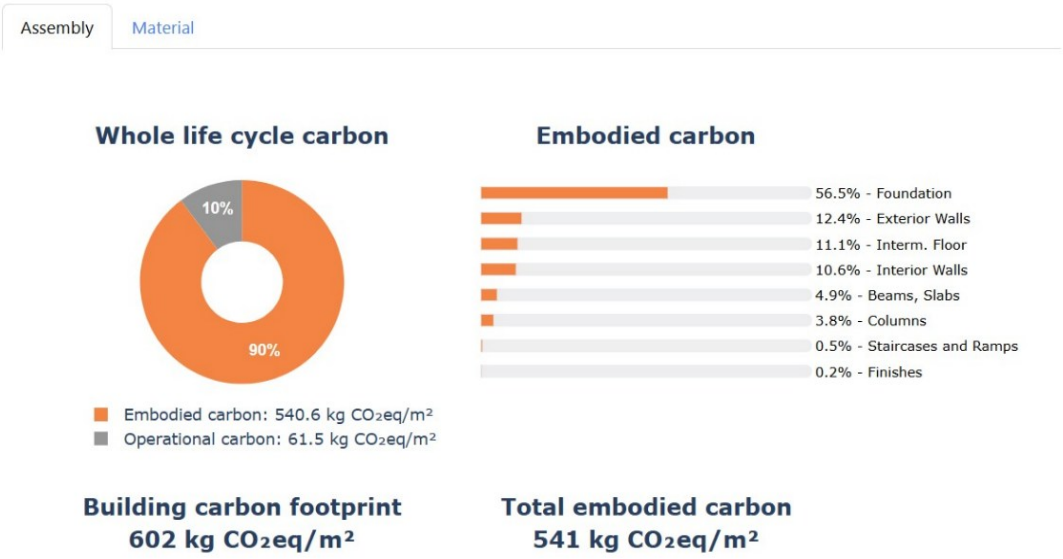


Figure 58: Building 45

46	**Building ID**	104_Comm._TVM_Kerala_1504				
Building Information						
Year of Completion	1963					
Basic details	**City**	Trivandrum				
	Building type	Commercial		**Sub-type**	Commercial	
	Built-up Area	1504.7 sq.m.		**Conditioned Floor Area**	225.71 sq.m.	
	Floors above ground	1		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	374.8779 cu.m.		Quantity	81.56283 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	152.697 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	50		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				12.66 kW	
Operational Data	**Total Connected Load**				165 kW	
	Annual Energy Consumption (Electricity)				133328.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				895.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				88.6 kWh/sq.m..yr.	

	Energy Performance Index (EPI – Conditioned area)			590.7 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**33853** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**373** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**4227** kg CO_2e/sq.m.	

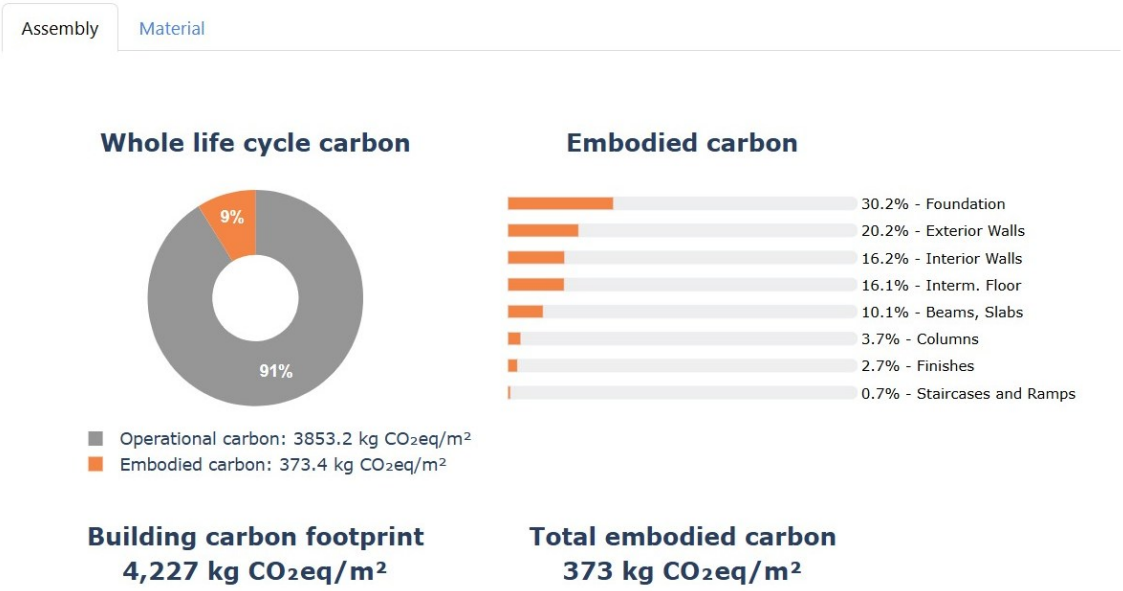


Figure 59: Building 46

47	**Building ID**	116_Comm._ALP_Kerala_6000				
Building Information						
Year of Completion	2000					
Basic details	**City**	Kerala				
	Building type	Institutional Building		**Sub-type**	Education	
	Built-up Area	6000 sq.m.		**Conditioned Floor Area**	900 sq.m.	
	Floors above ground	2		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1362.233 cu.m.		Quantity	291.6152 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	486.051 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	

	No. of occupants	777	**Occupancy hours**	8 hrs / day
	Ventilation type			BLDC Ceiling Fans
	Capacity			19.8 kW
Operational Data	**Total Connected Load**			246.62 kW
	Annual Energy Consumption (Electricity)			64463.00 kWh/yr.
	Annual Energy Consumption (Diesel)			xxx kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			10.7 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			71.6 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**189.5** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**314** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**503** kg CO_2e/sq.m.	

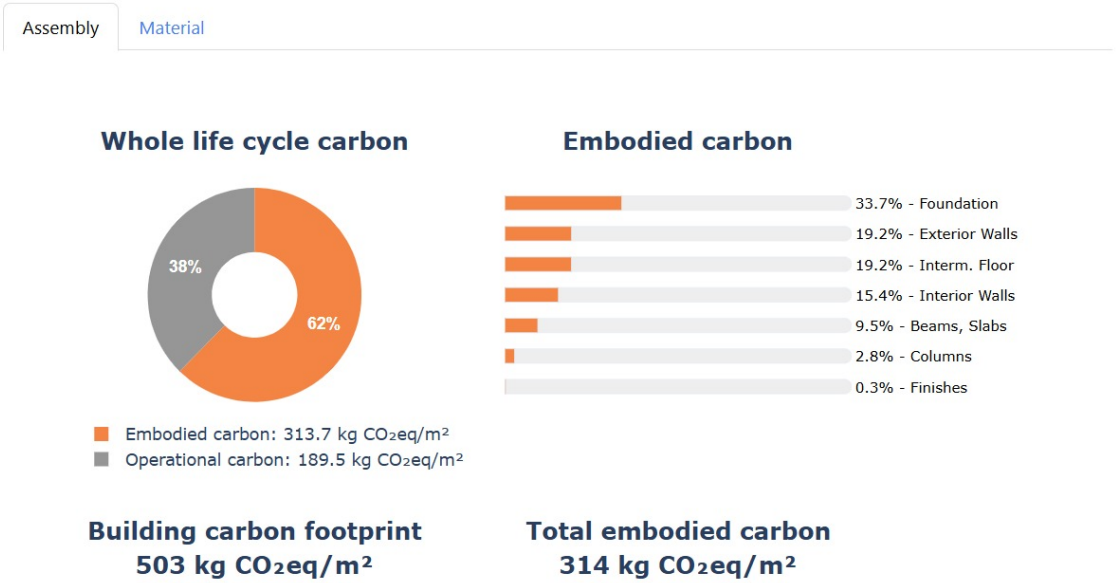


Figure 60: Building 47

48	**Building ID**	119_Comm._TVM_Kerala_5500		
Building Information				
Year of Completion	2017			
Basic details	**City**	Kerala		
	Building type	Commercial	**Sub-type**	Office
	Built-up Area	5500 sq.m.	**Conditioned Floor Area**	825 sq.m.
	Floors above ground	7	**Floors below ground**	1
Building Specifications				

Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1595.14 cu.m.		Quantity	432.3738 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	639.701 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	550		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				32.4 kW	
Operational Data	**Total Connected Load**				441 kW	
	Annual Energy Consumption (Electricity)				315000.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				57.3 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				381.8 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**2019** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**325** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**2344** kg CO_2e/sq.m.		

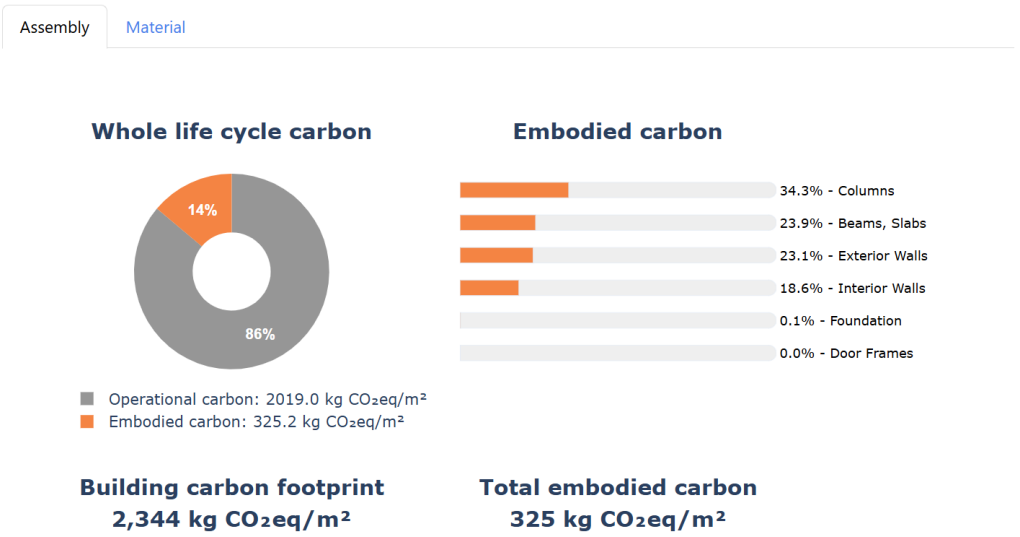


Figure 61: Building 48

49	**Building ID**	120_Comm._TVM_Kerala_13531				
Building Information						
Year of Completion	2012					
Basic details	**City**	Kerala				
	Building type	Institutional Building		**Sub-type**	Hospital	
	Built-up Area	13531 sq.m.		**Conditioned Floor Area**	2029.65 sq.m.	
	Floors above ground	2		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	3008.361 cu.m.		Quantity	627.9261 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	753.928 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	3383		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				22 kW	
Operational Data	**Total Connected Load**				133 kW	
	Annual Energy Consumption (Electricity)				263599.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				19.5 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				129.9 kWh/sq.m..yr.	

Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**687** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**203** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**890** kg CO_2e/sq.m.	

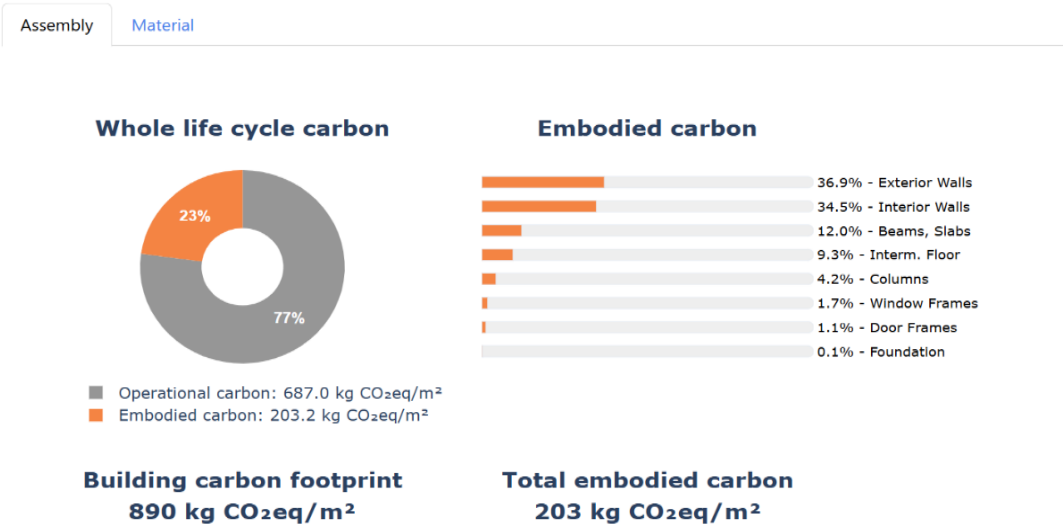


Figure 62: Building 49

50	**Building ID**	145_Comm._EKM_Kerala_3771				
Building Information						
Year of Completion	1963					
Basic detail s	**City**	Kerala				
	Building type	Commercial		**Sub-type**	Hotel	
	Built-up Area	3771 sq.m.		**Conditioned Floor Area**	2564.8376 sq.m.	
	Floors above ground	4		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	3538.976 cu.m.		Quantity	1159.92 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	934.854 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	1100		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	

	Capacity			2.35 kW
Operational Data	**Total Connected Load**			377.7 kW
	Annual Energy Consumption (Electricity)			872739.00 kWh/yr.
	Annual Energy Consumption (Diesel)			xxx kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			231.4 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			340.3 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**9628.2** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**1756.3** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**11384** kg CO_2e/sq.m.	

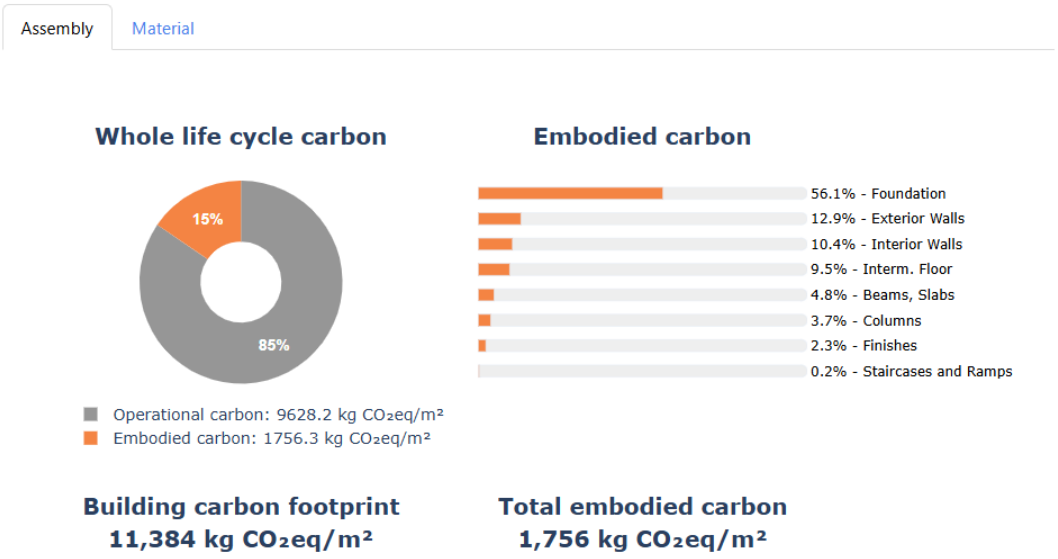


Figure 63: Building 50

51	**Building ID**	363_Comm._EKM_Kerala_61379		
Building Information				
Year of Completion	2002			
Basic details	**City**	Ernakulam		
	Building type	Institutional Building	**Sub-type**	Education
	Built-up Area	61379.99 sq. m.	**Conditioned Floor Area**	9207 sq.m.
	Floors above ground	5	**Floors below ground**	1
Building Specifications				
Material Specifications and Quantities	**Foundation type**	Isolated Footing	**Structure type**	RCC + Masonry infill
	Flooring	Glazed ceramic tile	**Roofing**	RCC Flat slab
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550
	Quantity	17606.89 cu.m.	Quantity	5319.942 Ton

	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	3065.304 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	1234		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				88 kW	
Operational Data	**Total Connected Load**				411.689 kW	
	Annual Energy Consumption (Electricity)				385517.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				49292.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				6.3 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				41.9 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**221.5** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**148** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**370** kg CO_2e/sq.m.		

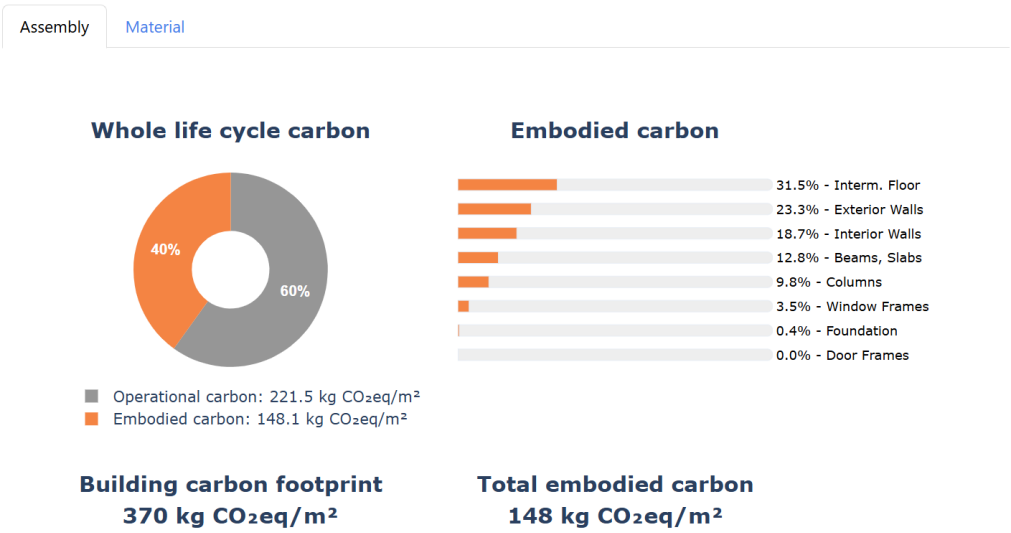


Figure 64: Building 51

52	**Building ID**	365_Comm._IDK_Kerala_5759				
Building Information						
Year of Completion	2015					
Basic details	**City**	Ernakulam				
	Building type	Commercial		**Sub-type**	Hotel	
	Built-up Area	5759.9885 sq. m.		**Conditioned Floor Area**	4319.99 sq.m.	
	Floors above ground	1		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1375.438 cu.m.		Quantity	288.0461 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	352.697 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	576		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				15.177 kW	
Operational Data	**Total Connected Load**				245 kW	
	Annual Energy Consumption (Electricity)				481500.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				83.6 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				111.5 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**2947** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**390** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**3337** kg CO_2e/sq.m.		

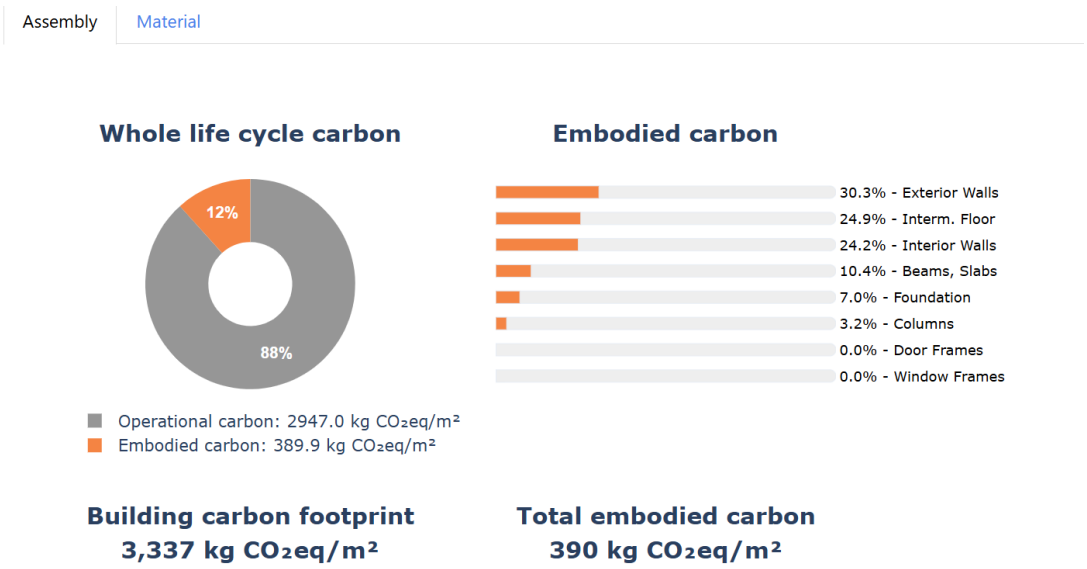


Figure 65: Building 52

53	**Building ID**	367_Comm._IDK_Kerala_1654				
Building Information						
Year of Completion	2001					
Basic details	**City**	Munnar				
	Building type	Commercial		**Sub-type**	Hotel	
	Built-up Area	1654.4173 sq.m.		**Conditioned Floor Area**	0	
	Floors above ground	1		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	412.3968 cu.m.		Quantity	90.09438 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	200.963 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	165		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				5.51 kW	
Operational Data	**Total Connected Load**				153 kW	
	Annual Energy Consumption (Electricity)				199887.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				8225.00 kWh/yr.	
	Annual Energy Generation (RE)					

	Energy Performance Index (EPI – Whole building)			120.8 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			xxx kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**4217** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**359** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**4577** kg CO_2e/sq.m.	

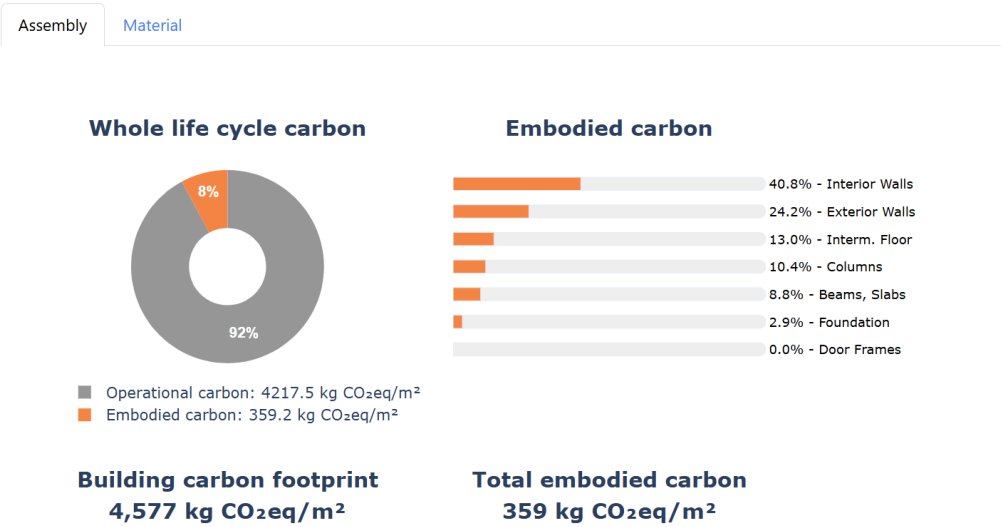


Figure 66: Building 53

54	**Building ID**	366_Comm._ALP_Kerala_4602				
Building Information						
Year of Completion	2008					
Basic details	**City**	Alappuza				
	Building type	Commercial		**Sub-type**	Hotel	
	Built-up Area	4602 sq.m.		**Conditioned Floor Area**	3451.5 sq.m.	
	Floors above ground	1		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	847.7156 cu.m.		Quantity	183.2577 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	378.994 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels

	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	460		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				7.485 kW	
Operational Data	**Total Connected Load**				441.9 kW	
	Annual Energy Consumption (Electricity)				474264.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				103.1 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				137.4 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**34935** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**311** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**35246** kg CO_2e/sq.m.		

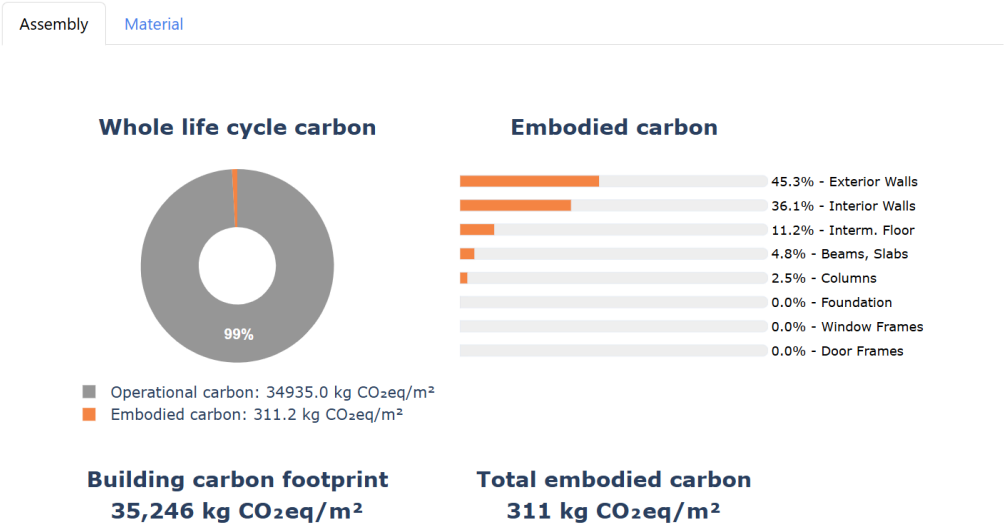


Figure 67: Building 54

55	**Building ID**	369_Comm._KLM_Kerala_859		
Building Information				
Year of Completion	1997			
Basic details	**City**	Kerala		
	Building type	Commercial	**Sub-type**	Office
	Built-up Area	859 sq.m.	**Conditioned Floor Area**	429.675 sq.m.
	Floors above ground	1	**Floors below ground**	1
Building Specifications				

Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	2020.515 cu.m.		Quantity	426.7972 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	607.803 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	900		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				2.16 kW	
Operational Data	**Total Connected Load**				160 kW	
	Annual Energy Consumption (Electricity)				133741.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				155.6 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				311.3 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**5489.2** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**2938** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**8427** kg CO_2e/sq.m.		

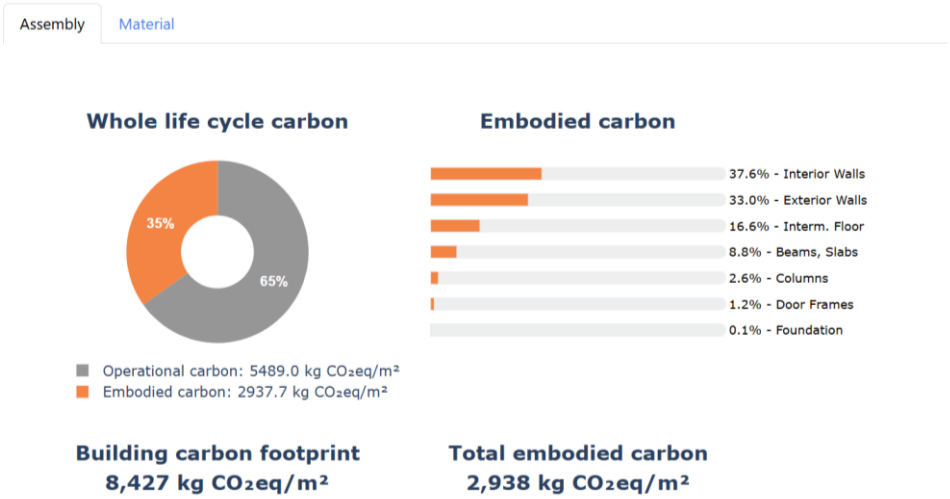


Figure 68: Building 55

56	**Building ID**	409_Comm._TSR_Kerala_16567				
Building Information						
Year of Completion	1889					
Basic details	**City**	Kerala				
	Building type	Institutional		**Sub-type**	Educational	
	Built-up Area	16567 sq.m.		**Conditioned Floor Area**	4970.1 sq.m.	
	Floors above ground	2		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	3387.843 cu.m.		Quantity	693.7593 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	662.142 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	235		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				49 kW	
Operational Data	**Total Connected Load**				109.47 kW	
	Annual Energy Consumption (Electricity)				53054.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				194.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				3.2 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				10.7 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**113** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**219** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**332** kg CO_2e/sq.m.		

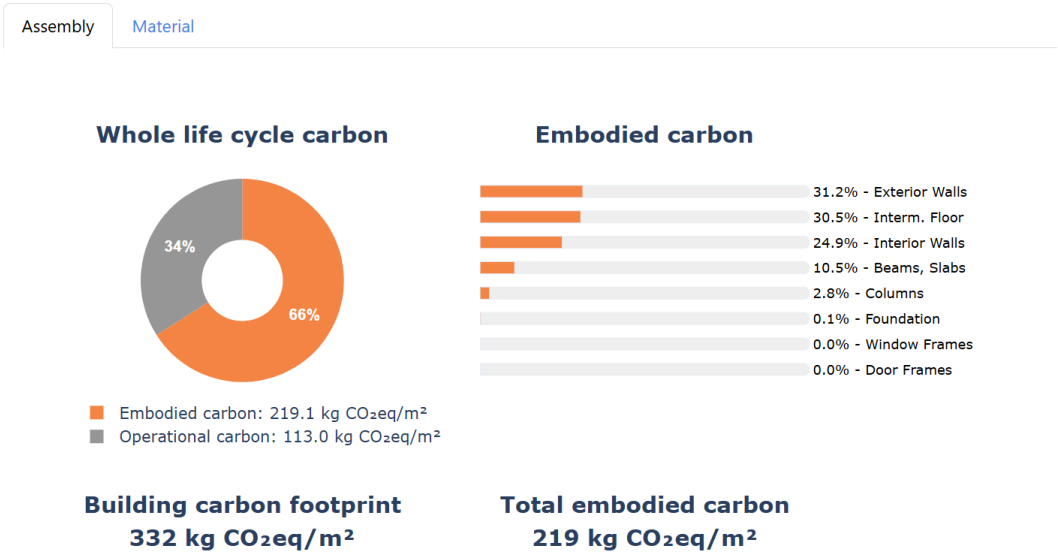


Figure 69: Building 56

57	**Building ID**	103_Comm._TVM_Kerala_22180				
Building Information						
Year of Completion	1970					
Basic details	**City**	Trivandrum				
	Building type	Institutional		**Sub-type**	Educational	
	Built-up Area	22180 sq. m.		**Conditioned Floor Area**	13308.000 sq.m.	
	Floors above ground	6		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	6564.192 cu.m.		Quantity	1873.096 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	2303.248 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	5545		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				31.245 kW	
Operational Data	**Total Connected Load**				1555 kW	
	Annual Energy Consumption (Electricity)				1561478.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				70.4 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				117.3 kWh/sq.m..yr.	

Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**2482** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**411.8** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**2894** kg CO_2e/sq.m.	

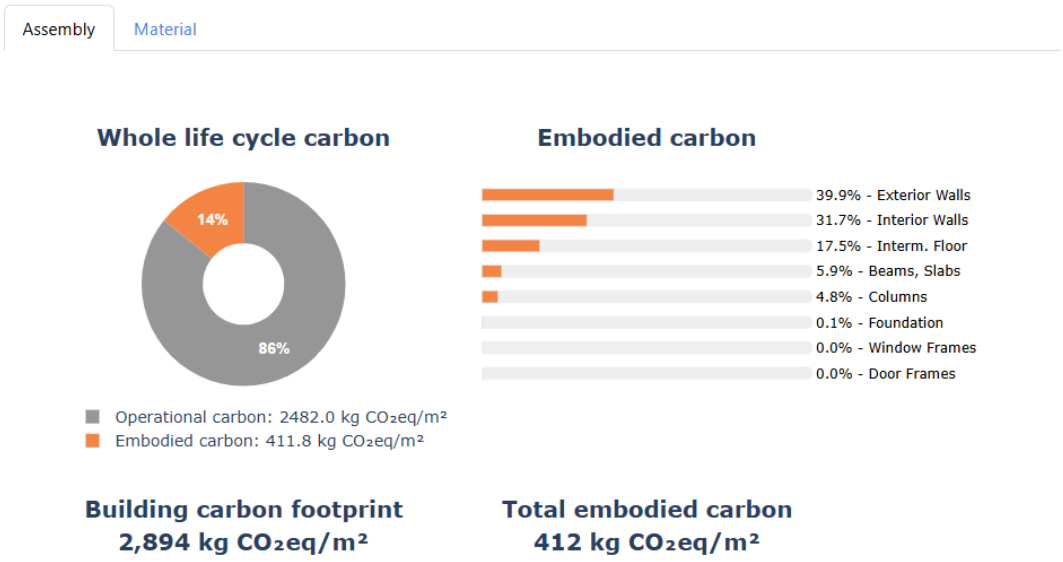


Figure 70: Building 57

58	**Building ID**	105_Comm._TVM_Kerala_6317				
Building Information						
Year of Completion	1970					
Basic details	**City**	Trivandrum				
	Building type	Commercial		**Sub-type**	Hospitality	
	Built-up Area	6317 sq.m.		**Conditioned Floor Area**	4421.9 sq.m.	
	Floors above ground	4		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	733.3956 cu.m.		Quantity	243.27 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	285.980 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	

	No. of occupants	215	**Occupancy hours**	8 hrs / day
	Ventilation type			BLDC Ceiling Fans
	Capacity			kW
Operational Data	**Total Connected Load**			476.5 kW
	Annual Energy Consumption (Electricity)			804724.00 kWh/yr.
	Annual Energy Consumption (Diesel)			xxx kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			127.4 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			182 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**4492** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**168** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**4660** kg CO_2e/sq.m.	

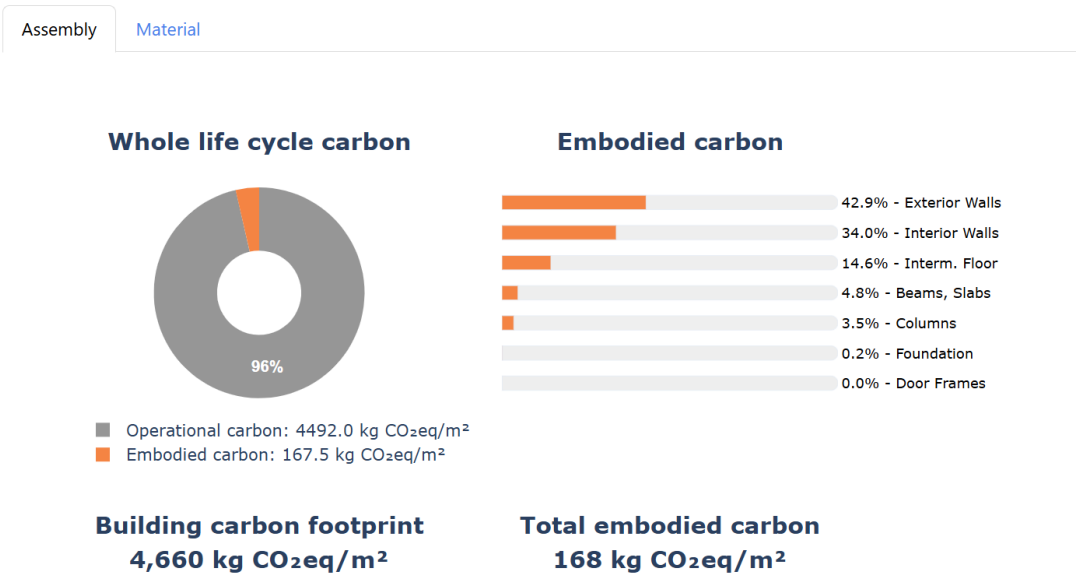


Figure 71: Building 58

59	**Building ID**	106_Comm._TVM_Kerala_3810		
Building Information				
Year of Completion	1975			
Basic details	**City**	Kovalam, Thiruvananthapuram		
	Building type	Commercial	**Sub-type**	Hospitality
	Built-up Area	3810.92 sq.m.	**Conditioned Floor Area**	2667 sq.m.
	Floors above ground	1	**Floors below ground**	1
Building Specifications				

Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	921.6786 cu.m.		Quantity	195.6175 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	286.875 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	318		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				3.99 kW	
Operational Data	**Total Connected Load**				550 kW	
	Annual Energy Consumption (Electricity)				232574.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				61 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				87.2 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**2152** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**468** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**2620** kg CO_2e/sq.m.		

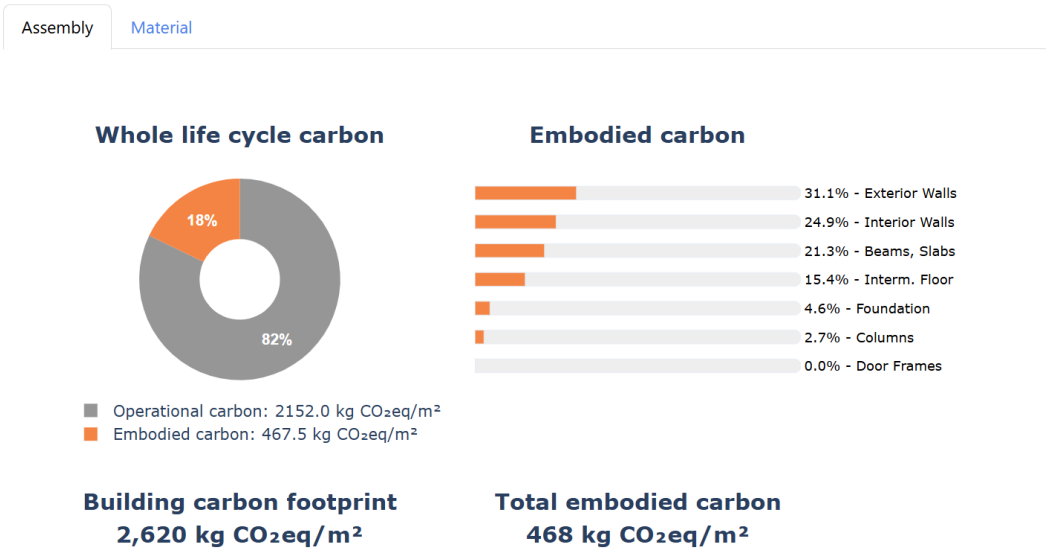


Figure 72: Building 59

60	**Building ID**	112_Comm._TVM_Kerala_13156				
Building Information						
Year of Completion	1987					
Basic details	**City**	Pattom				
	Building type	Institutional Building		**Sub-type**	Hospital	
	Built-up Area	13156 sq.m.		**Conditioned Floor Area**	7895.76 sq.m.	
	Floors above ground	6		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	40334.43 cu.m.		Quantity	11336.74 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	8956.018 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	35403		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				25.5 kW	
Operational Data	**Total Connected Load**				1106.33 kW	
	Annual Energy Consumption (Electricity)				2318208.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				3400.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				176.2 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				293.6 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**6707** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**4444** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**11152** kg CO_2e/sq.m.		

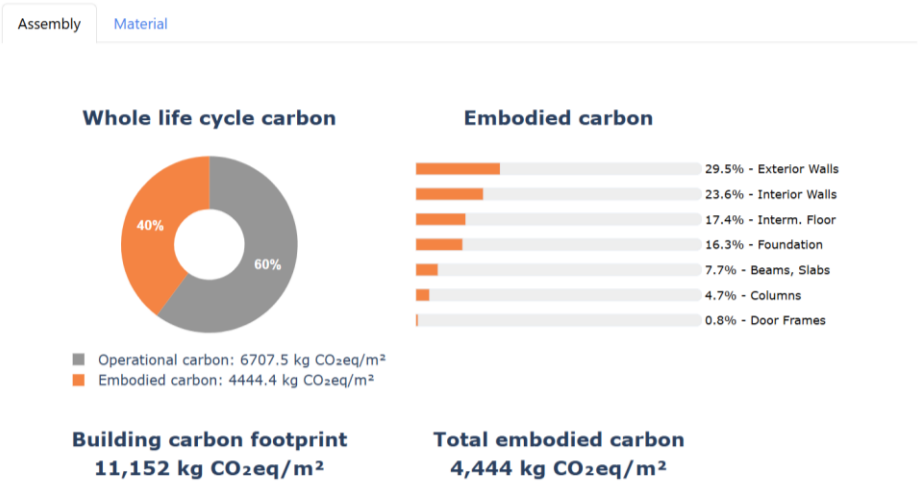


Figure 73: Building 60

61	**Building ID**	113_Comm._TVM_Kerala_39403				
Building Information						
Year of Completion	1973					
Basic details	**City**	Poojappura				
	Building type	Institutional Building		**Sub-type**	Hospital	
	Built-up Area	39403 sq.m.		**Conditioned Floor Area**	23642.166 sq.m.	
	Floors above ground	3		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	8367.053 cu.m.		Quantity	1719.209 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	1828.484 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	9851		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				52.6 kW	
Operational Data	**Total Connected Load**				1930.66 kW	
	Annual Energy Consumption (Electricity)				2481790.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				13200.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				63 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				105 kWh/sq.m..yr.	

Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**2175** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**331** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**2506** kg CO_2e/sq.m.	

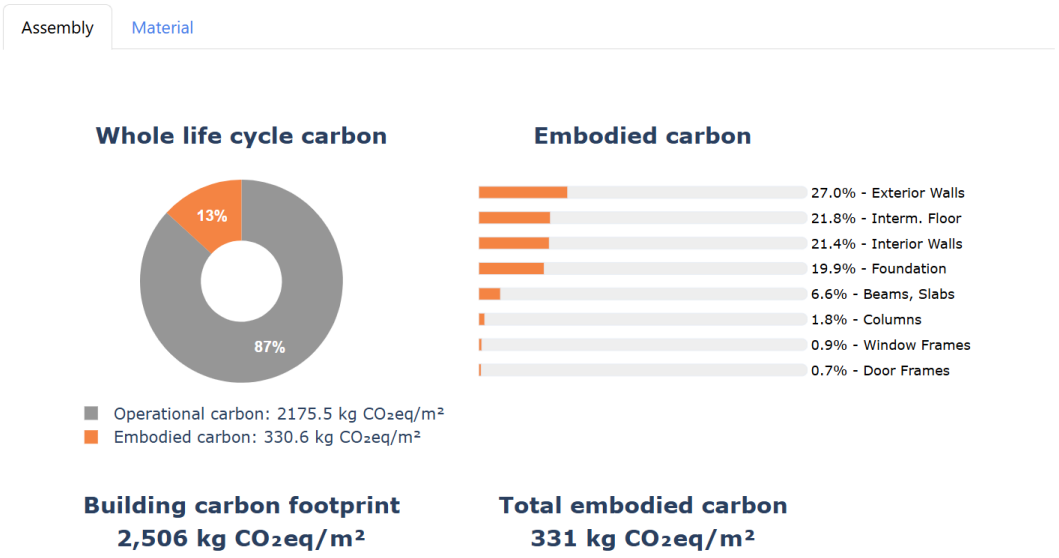


Figure 74: Building 61

62	**Building ID**	114_Comm._TVM_Kerala_2334			
Building Information					
Year of Completion	2002				
Basic details	**City**	Kerala			
	Building type	Institutional Building		**Sub-type**	Hospital
	Built-up Area	2334 sq.m.		**Conditioned Floor Area**	700.2 sq.m.
	Floors above ground	6		**Floors below ground**	1
Building Specifications					
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550
	Quantity	10680.96 cu.m.		Quantity	3015.267 Ton
	Window type	Alu. + Double glazing		**Walling**	Red brick
	Quantity	xxx sq.m.		Quantity	2805.463 cu.m.
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type** LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**
	No. of occupants	3700		**Occupancy hours**	8 hrs / day

	Ventilation type			BLDC Ceiling Fans
	Capacity			11.3 kW
Operational Data	**Total Connected Load**			145 kW
	Annual Energy Consumption (Electricity)			116479.00 kWh/yr.
	Annual Energy Consumption (Diesel)			xxx kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			49.9 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			166.4 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**1759.5** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**8433** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**10193** kg CO_2e/sq.m.	

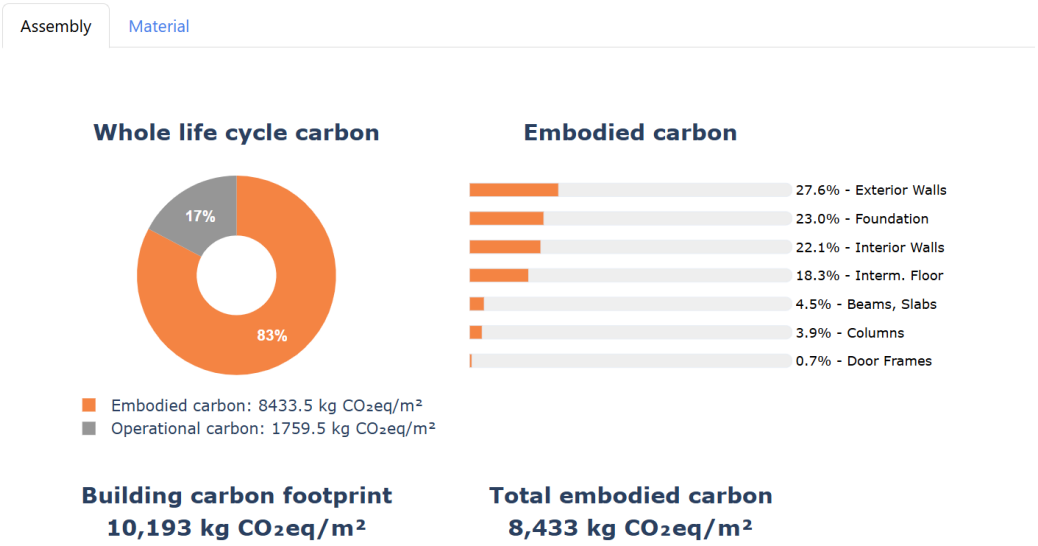


Figure 75: Building 62

63	**Building ID**	114_Comm._TVM_Kerala_34673		
Building Information				
Year of Completion	2002			
Basic details	**City**	Kerala		
	Building type	Institutional Building	**Sub-type**	Educational
	Built-up Area	34673 sq.m.	**Conditioned Floor Area**	3467.3 sq.m.
	Floors above ground	3	**Floors below ground**	1
Building Specifications				
Material Specifications and Quantities	**Foundation type**	Isolated Footing	**Structure type**	RCC + Masonry infill
	Flooring	Glazed ceramic tile	**Roofing**	RCC Flat slab
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550
	Quantity	7493.756 cu.m.	Quantity	1581.257 Ton
	Window type	Alu. + Double glazing	**Walling**	Red brick

	Quantity	xxx sq.m.		Quantity	2521.135 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	8668		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				106.24 kW	
Operational Data	**Total Connected Load**				662.5 kW	
	Annual Energy Consumption (Electricity)				275432.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				800.00 kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				7.9 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				79.4 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**32** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**352.4** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**384** kg CO_2e/sq.m.		

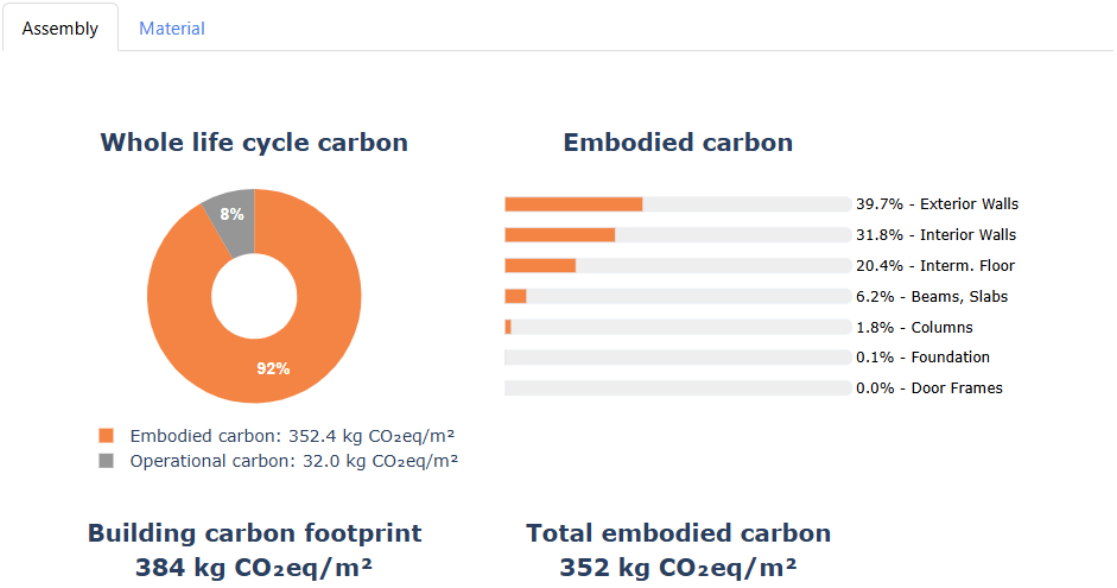


Figure 76: Building 63

64	**Building ID**	102_Comm._ALP_Kerala_5100				
Building Information						
Year of Completion						
Basic details	**City**	Kumarakom				
	Building type	Hospitality		**Sub-type**	Hotel	
	Built-up Area	5100 sq.m.		**Conditioned Floor Area**	4335 sq.m.	
	Floors above ground	1		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1646.281 cu.m.		Quantity	339.4908 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	364.024 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	80		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				9.354kW	
Operational Data	**Total Connected Load**				401 kW	
	Annual Energy Consumption (Electricity)				373576.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				73.3 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				86.2 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**2582** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**552** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**3135** kg CO_2e/sq.m.		

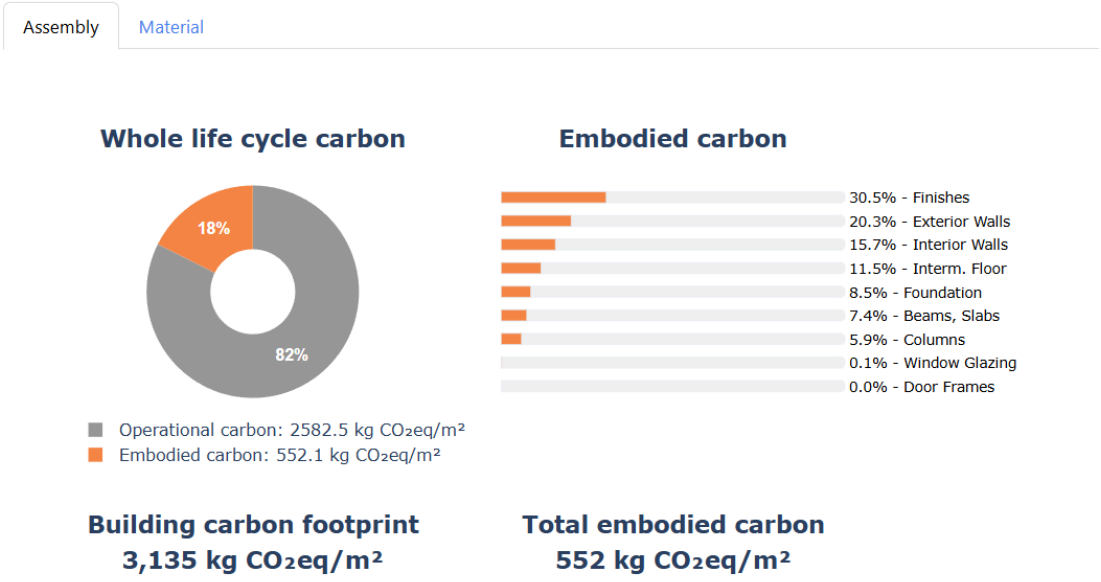


Figure 77: Building 64

65	**Building ID**	411_Comm._TVM_Kerala_3288				
Building Information						
Year of Completion						
Basic details	**City**	Trivandrum				
	Building type	Hospitality		**Sub-type**	Hotel	
	Built-up Area	3288 sq.m.		**Conditioned Floor Area**	2301.6 sq.m.	
	Floors above ground	3		**Floors below ground**	1	
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	1248.356 cu.m.		Quantity	264.0939 Ton	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	422.150 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants	100		**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				4.13 kW	
Operational Data	**Total Connected Load**				261.72 kW	
	Annual Energy Consumption (Electricity)				92356.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				28.1 kWh/sq.m..yr.	

	Energy Performance Index (EPI – Conditioned area)			40.1 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**2989** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**692** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**3682** kg CO_2e/sq.m.	

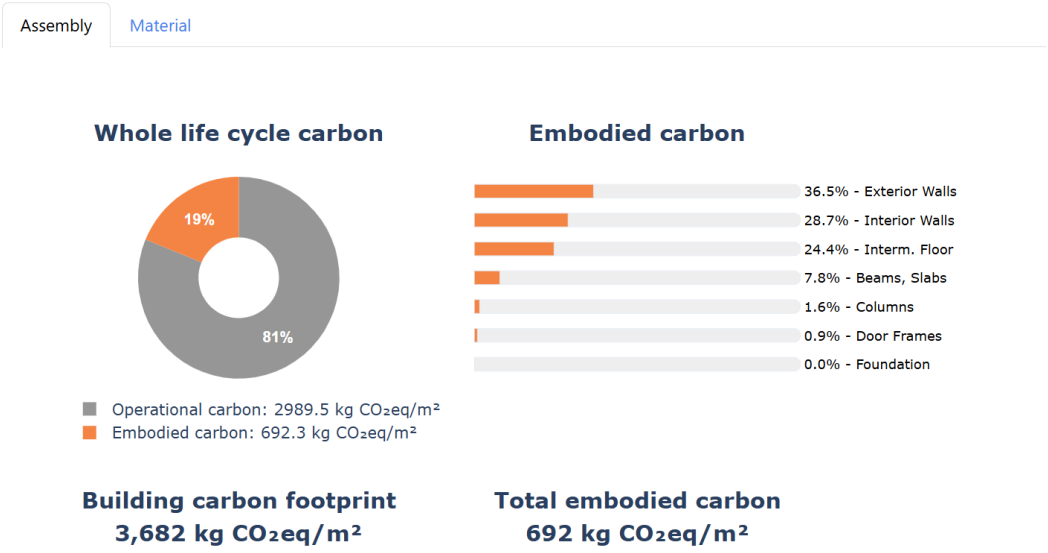


Figure 78: Building 65

66	**Building ID**	373_Comm._TSR_Kerala_38247				
Building Information						
Year of Completion	2025					
Basic details	**City**	Thrissur				
	Building type	Educational		**Sub-type**	Hospital	
	Built-up Area	38247 sq.m.		**Conditioned Floor Area**	22948.2 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	

	No. of occupants		**Occupancy hours**	8 hrs / day
	Ventilation type			BLDC Ceiling Fans
	Capacity			6.5kW
Operational Data	**Total Connected Load**			476.5 kW
	Annual Energy Consumption (Electricity)			5315272.00 kWh/yr.
	Annual Energy Consumption (Diesel)			xxx kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			138.97 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			231.6 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**4899.5** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**1726** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**6625** kg CO_2e/sq.m.	

Assembly | Material

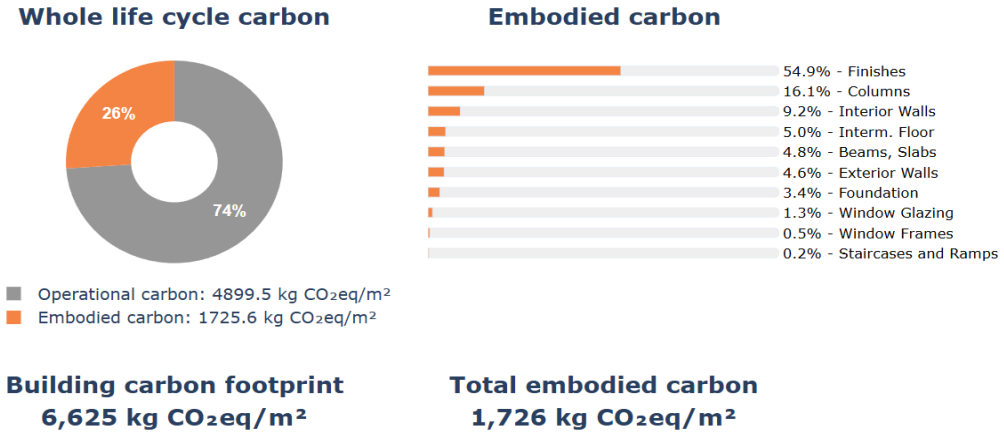


Figure 79: Building 66

67	**Building ID**	376_Comm._KNR_Kerala_5806		
Building Information				
Year of Completion	2025			
Basic details	**City**	Kannur		
	Building type	Institutional	**Sub-type**	Educational
	Built-up Area	5806 sq.m.	**Conditioned Floor Area**	2322.4 sq.m.
	Floors above ground		**Floors below ground**	
Building Specifications				
Material Specifications and Quantities	**Foundation type**	Isolated Footing	**Structure type**	RCC + Masonry infill
	Flooring	Glazed ceramic tile	**Roofing**	RCC Flat slab
	Concrete grade	M 25 (RMC)	**Steel grade**	Fe 550
	Quantity	xxx cu.m.	Quantity	xxx kg

	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				225715.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				38.88 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				97.2 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**1370.5** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**6559** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**7930** kg CO_2e/sq.m.		

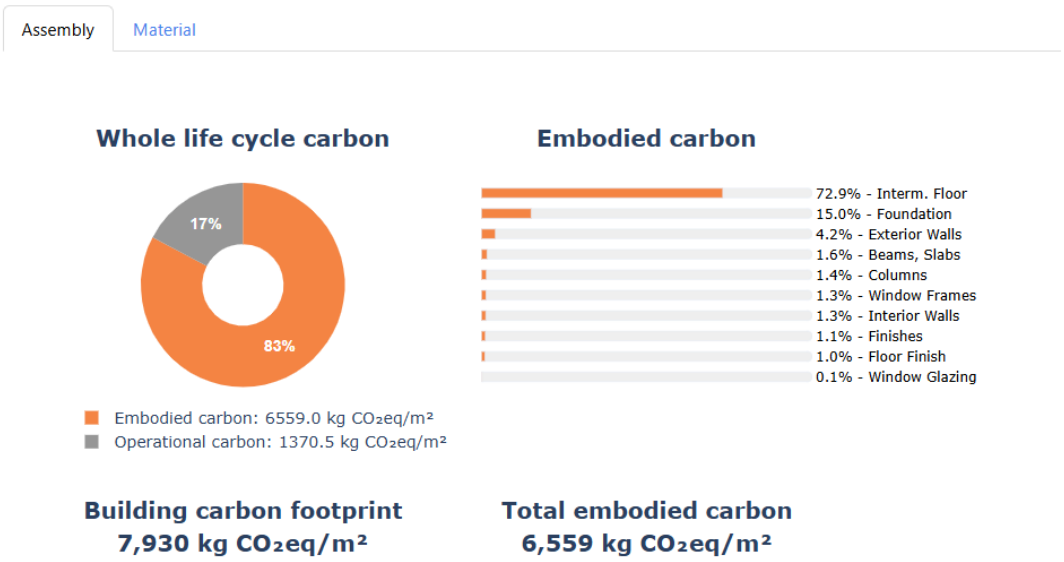


Figure 80: Building 67

68	**Building ID**	395_Comm._TSR_Kerala_47457			
Building Information					
Year of Completion	2025				
Basic details	**City**	Thrissur			
	Building type	Healthcare		**Sub-type**	Hospital

	Built-up Area	47457 sq.m.		**Conditioned Floor Area**	28474.344 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				9952241.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				209.71 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				349.5 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**7393** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**952** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**8346** kg CO_2e/sq.m.		

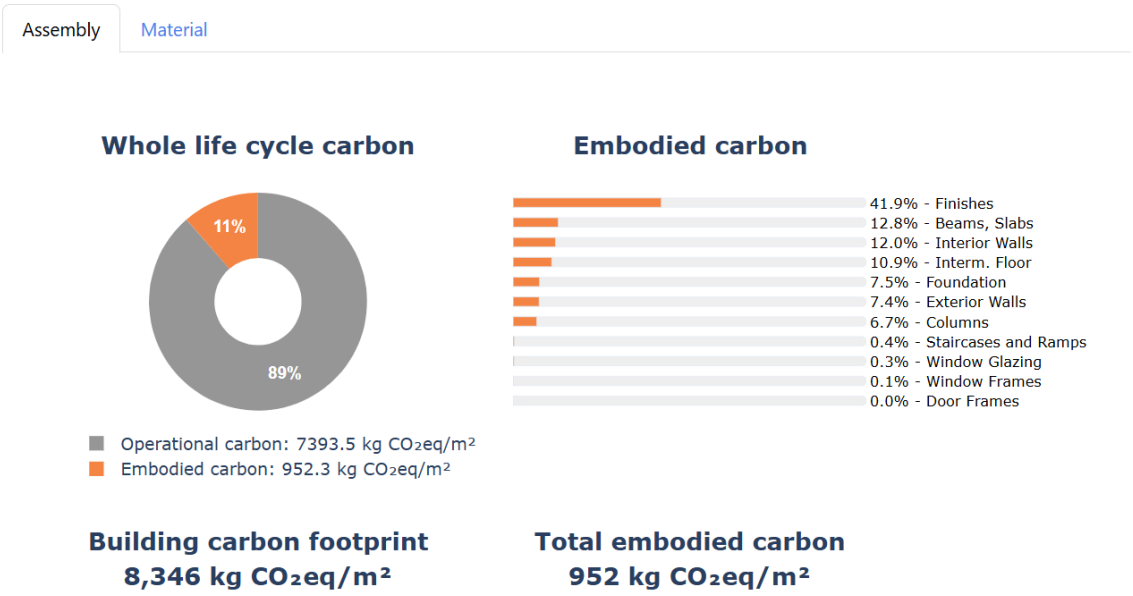


Figure 81: Building 68

69	**Building ID**	398_Comm._EKM_Kerala_58715				
Building Information						
Year of Completion	2025					
Basic details	**City**	Kochi				
	Building type	Healthcare		**Sub-type**	Hospital	
	Built-up Area	58715 sq.m.		**Conditioned Floor Area**	35229 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				5653513.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				96.29 kWh/sq.m..yr.	

	Energy Performance Index (EPI – Conditioned area)			160.5 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**3395** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**413.1** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**3808** kg CO_2e/sq.m.	

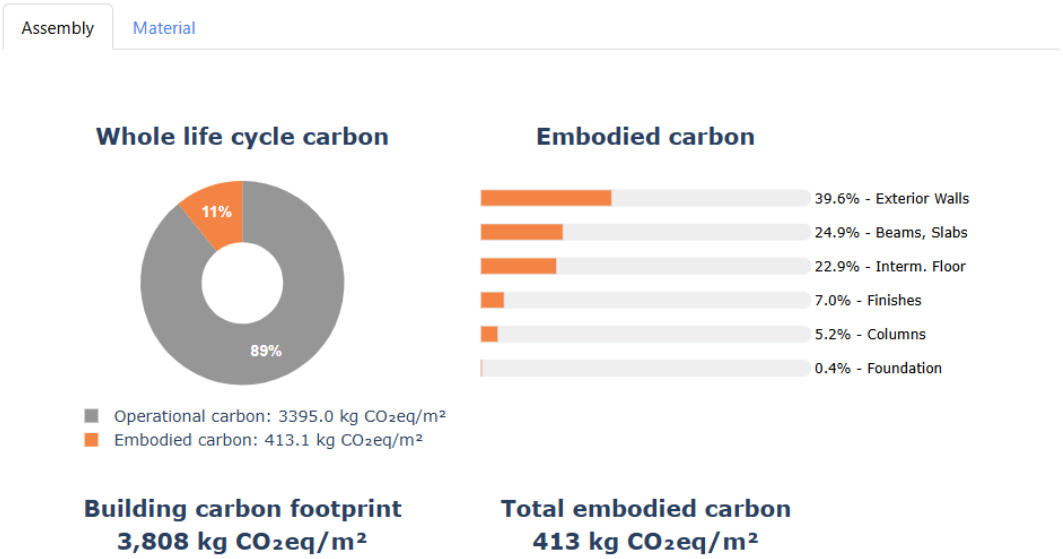


Figure 82: Building 69

70	**Building ID**	400_Comm._TVM_Kerala_20602				
Building Information						
Year of Completion	2025					
Basic details	**City**	Thiruvananthapuram				
	Building type	Commercial		**Sub-type**	Commercial	
	Built-up Area	20602 sq.m.		**Conditioned Floor Area**	14421.799 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	

	No. of occupants		**Occupancy hours**	8 hrs / day
	Ventilation type			BLDC Ceiling Fans
	Capacity			6.5kW
Operational Data	**Total Connected Load**			476.5 kW
	Annual Energy Consumption (Electricity)			2628611.00 kWh/yr.
	Annual Energy Consumption (Diesel)			xxx kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			127.59 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			182.3 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**449.8** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**26** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**476** kg CO_2e/sq.m.	

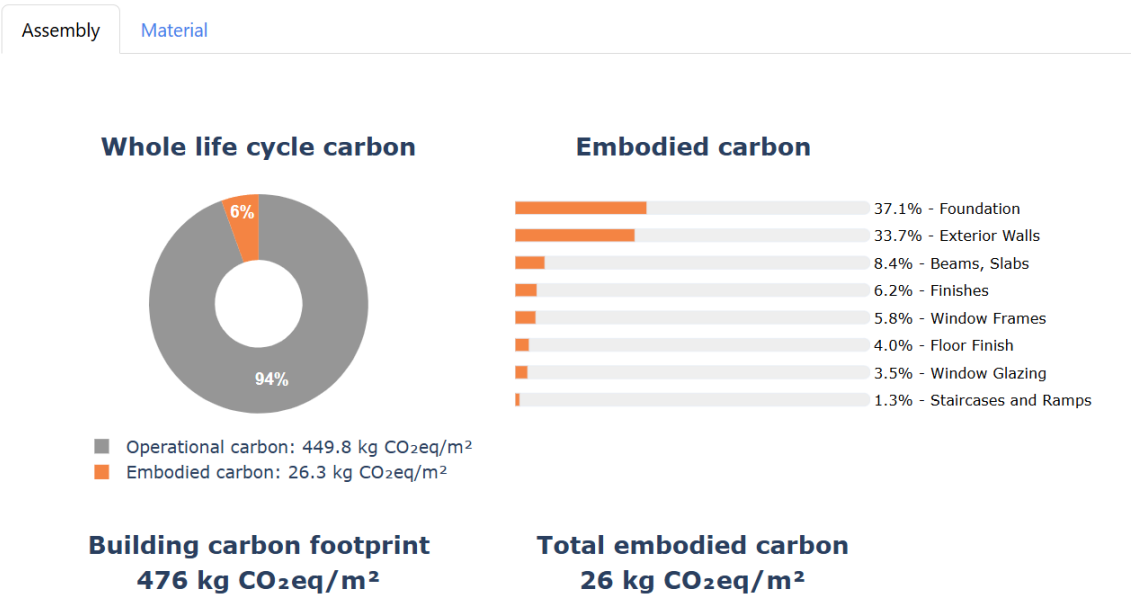


Figure 83: Building 70

71	**Building ID**	388_Comm._PKD_Kerala_17280		
Building Information				
Year of Completion	2025			
Basic details	**City**	Palakkad		
	Building type	Healthcare	**Sub-type**	Hospital
	Built-up Area	17280 sq.m.	**Conditioned Floor Area**	8640 sq.m.
	Floors above ground		**Floors below ground**	
Building Specifications				
	Foundation type	Isolated Footing	**Structure type**	RCC + Masonry infill

Material Specifications and Quantities	**Flooring**	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				2585100.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				149.60 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				299.2 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**0** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**807** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**807** kg CO_2e/sq.m.		

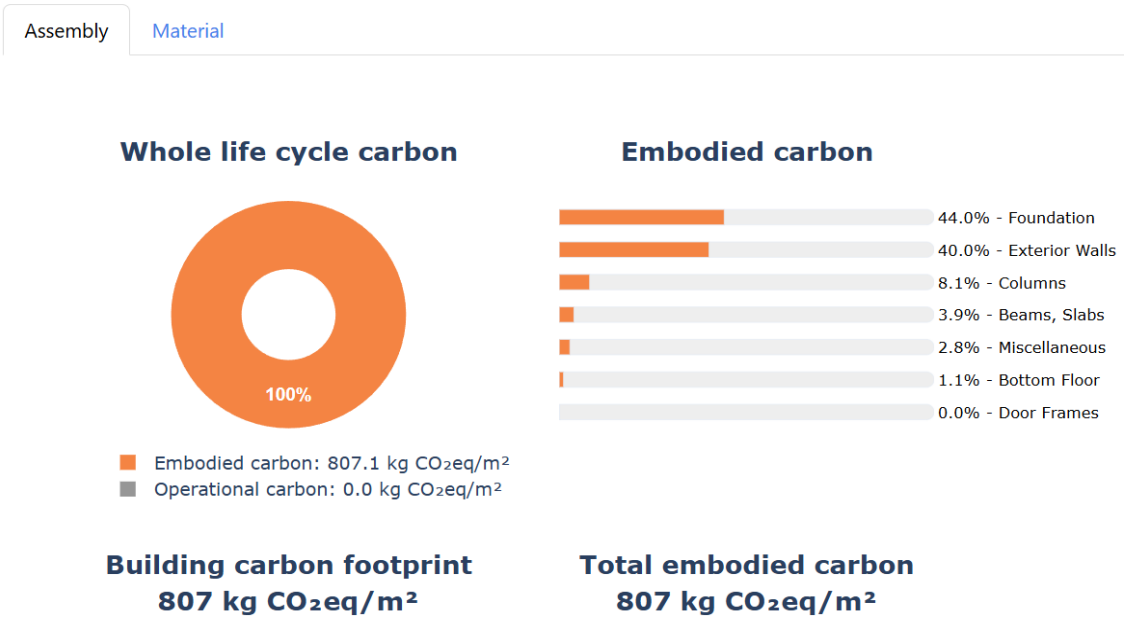


Figure 84: Building 71

72	**Building ID**	370_Comm._KTM_Kerala_26649
Building Information		

Year of Completion	2025					
Basic details	**City**	Kottayam				
	Building type	Healthcare		**Sub-type**	Hospital	
	Built-up Area	26649 sq.m.		**Conditioned Floor Area**	13324.5 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs /day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				2849100.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				106.91 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				213.8 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**75.4** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**1095** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**1135** kg CO_2e/sq.m.		

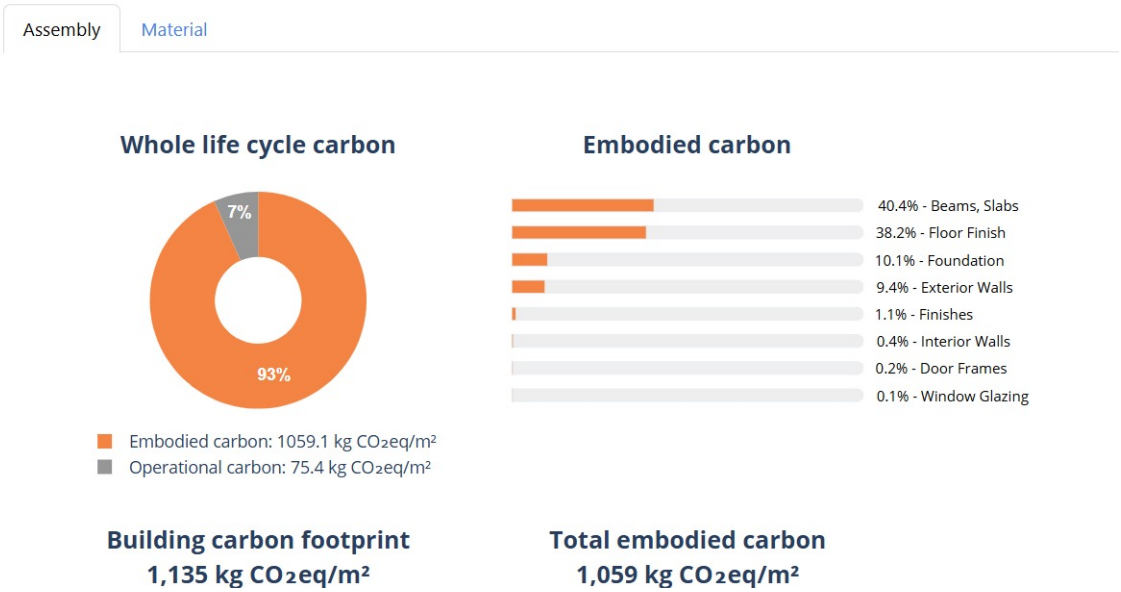


Figure 85: Building 72

73	**Building ID**	371_Comm._KLM_Kerala_18307				
Building Information						
Year of Completion	2025					
Basic details	**City**	Kollam				
	Building type	Healthcare		**Sub-type**	Hospital	
	Built-up Area	18307 sq.m.		**Conditioned Floor Area**	9153.5 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				3070030.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				167.70 kWh/sq.m..yr.	

	Energy Performance Index (EPI – Conditioned area)			335.4 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**661.9** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**662** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**780** kg CO_2e/sq.m.	

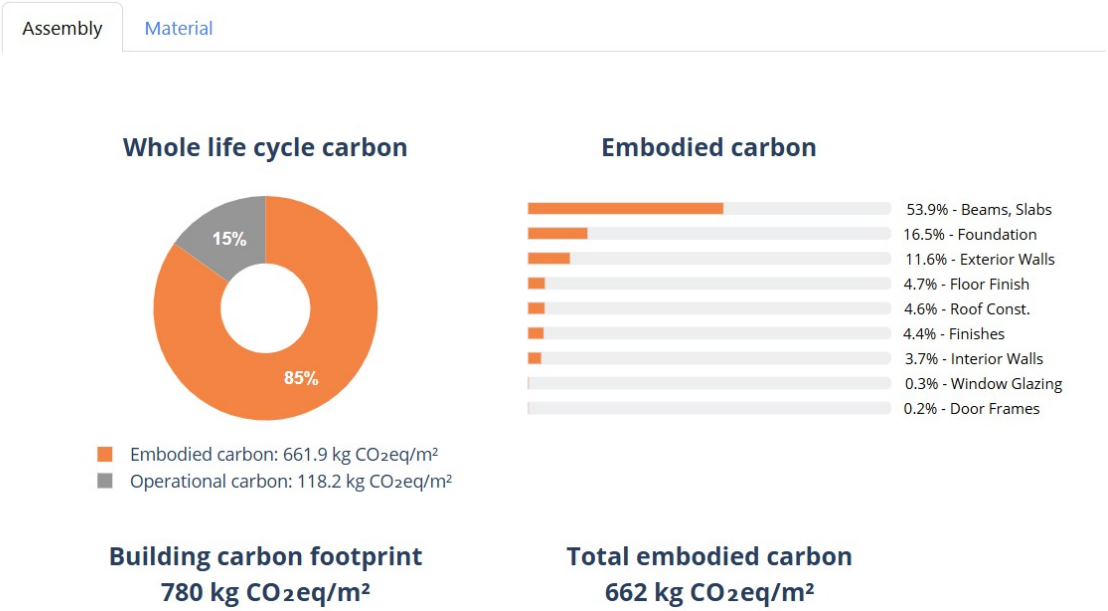


Figure 86: Building 73

74	**Building ID**	372_Comm._PTA_Kerala_53232				
Building Information						
Year of Completion	2025					
Basic details	**City**	Pathanamthitta				
	Building type	Healthcare		**Sub-type**	Hospital	
	Built-up Area	53232 sq.m.		**Conditioned Floor Area**	26616 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	

	No. of occupants		**Occupancy hours**	8 hrs / day
	Ventilation type			BLDC Ceiling Fans
	Capacity			6.5kW
Operational Data	**Total Connected Load**			476.5 kW
	Annual Energy Consumption (Electricity)			4462295.00 kWh/yr.
	Annual Energy Consumption (Diesel)			xxx kWh/yr.
	Annual Energy Generation (RE)			
	Energy Performance Index (EPI – Whole building)			83.83 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			167.7 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**2955** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**68** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**3024** kg CO_2e/sq.m.	

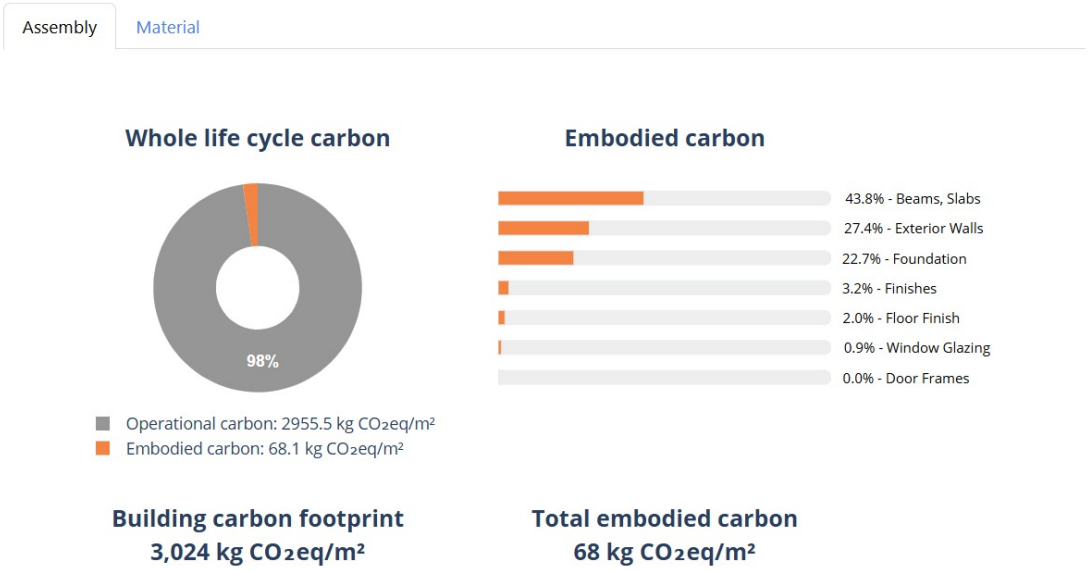


Figure 87: Building 74

75	**Building ID**	377_Comm._KNR_Kerala_3483		
Building Information				
Year of Completion	2025			
Basic details	**City**	Kannur		
	Building type	Institutional	**Sub-type**	Education
	Built-up Area	3483 sq.m.	**Conditioned Floor Area**	1741.5 sq.m.
	Floors above ground		**Floors below ground**	
Building Specifications				
	Foundation type	Isolated Footing	**Structure type**	RCC + Masonry infill
	Flooring	Glazed ceramic tile	**Roofing**	RCC Flat slab

Material Specifications and Quantities	**Concrete grade**	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	xxx cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				304548.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				87.44 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				174.9 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**61.7** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**270** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**332** kg CO_2e/sq.m.		

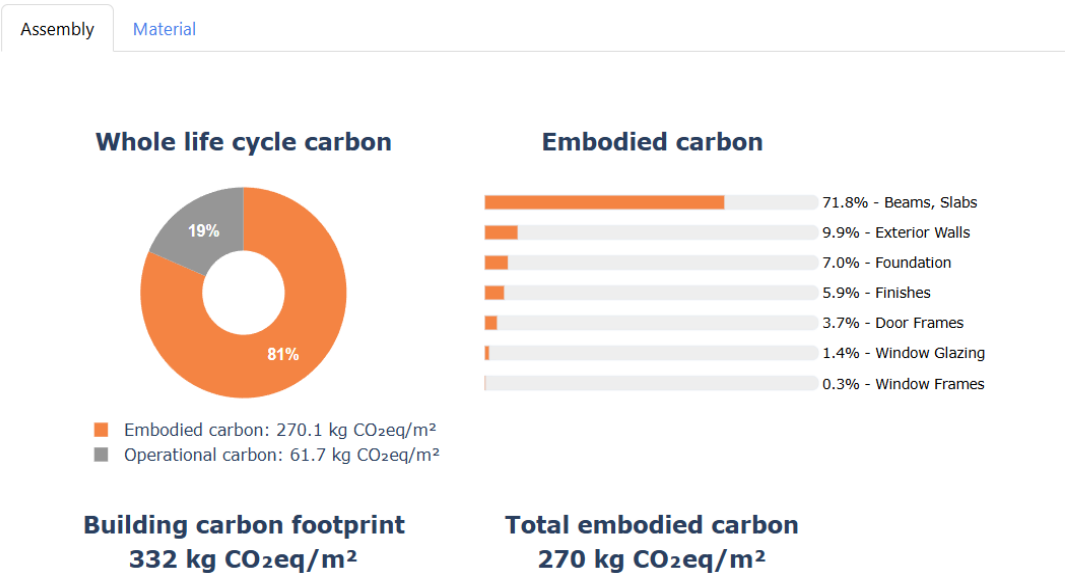


Figure 88: Building 75

76	**Building ID**	179_Comm._MPM_Kerala_24274				
Building Information						
Year of Completion	2024					
Basic details	**City**	Pottathpadi				
	Building type	Commercial		**Sub-type**	Commercial	
	Built-up Area	24274 sq.m.		**Conditioned Floor Area**	19419.2 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	2805.952697 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				5949900.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				245.11 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				306..4 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**172** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**337** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**510** kg CO_2e/sq.m.		

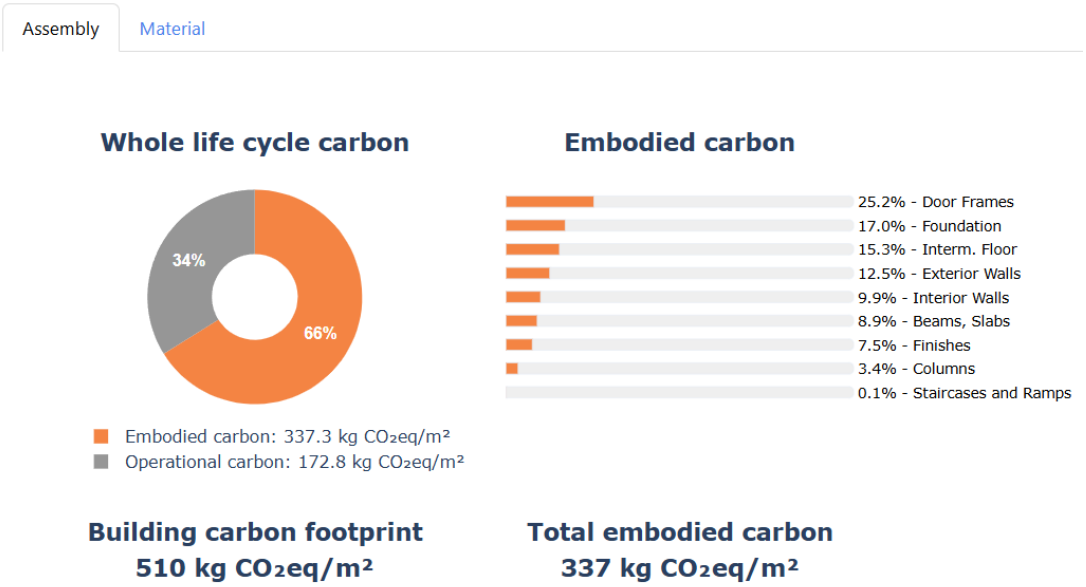


Figure 89: Building 76

77	**Building ID**	193_Comm._TVM_Kerala_24800				
Building Information						
Year of Completion	2025					
Basic details	**City**	Thiruvananthapuram				
	Building type	Commercial		**Sub-type**	Commercial	
	Built-up Area	24800 sq.m.		**Conditioned Floor Area**	12400.17 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	3675.808043 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				2294452.00kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					

	Energy Performance Index (EPI – Whole building)			92.52 kWh/sq.m..yr.
	Energy Performance Index (EPI – Conditioned area)			185 kWh/sq.m..yr.
Building Carbon				
Emissions	**Operational Carbon Intensity (50 years)**	**133** kgCO2e/sq.m.	**Embodied carbon intensity (Upfront)**	**383** kgCO2e/sq.m.
	Building Carbon Footprint (Whole-life)		**516** kg CO_2e/sq.m.	

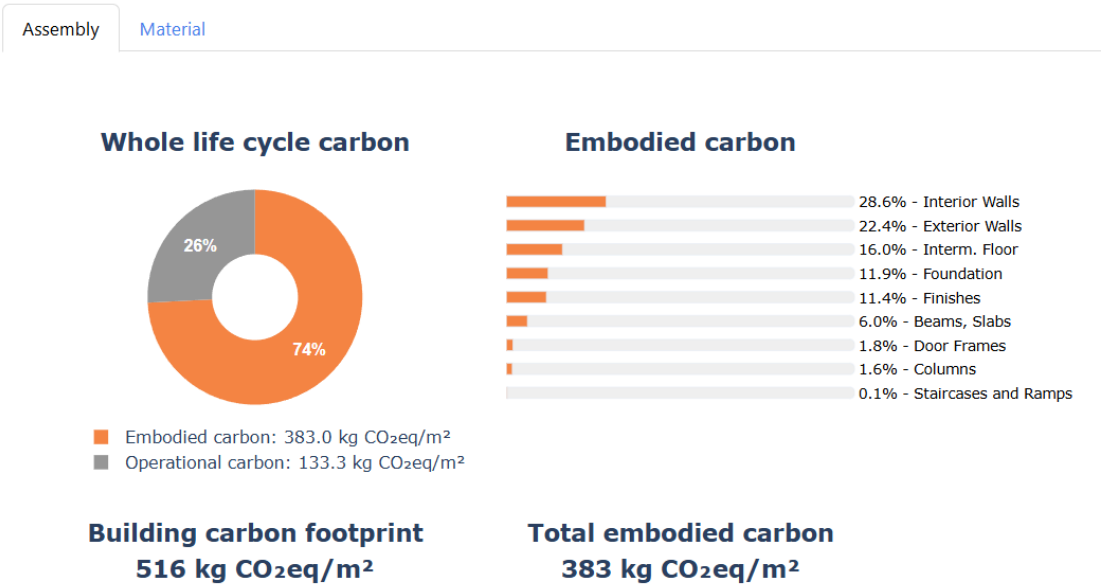


Figure 90: Building 77

78	**Building ID**	203_Comm._KNR_Kerala_51294				
Building Information						
Year of Completion	2023					
Basic details	**City**	Kannur				
	Building type	Healthcare		**Sub-type**	Hospital	
	Built-up Area	51294 sq.m.		**Conditioned Floor Area**	35906.283 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	2460.08 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels

	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				5939901.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				115.80 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				165.4 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**163** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**199** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**362** kg CO_2e/sq.m.		

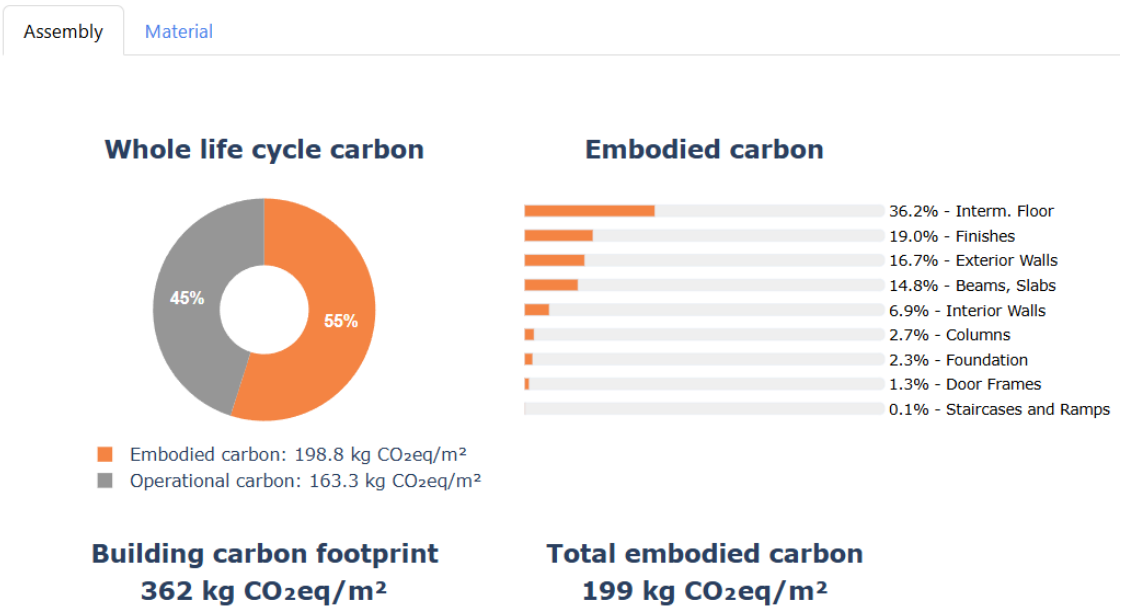


Figure 91: Building 78

79	**Building ID**	204_Comm._MPM_Kerala_12413			
Building Information					
Year of Completion	2025				
Basic details	**City**	Malappuram			
	Building type	Commercial	**Sub-type**	Commercial	
	Built-up Area	51294 sq.m.	**Conditioned Floor Area**	6206.5 sq.m.	

	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	766.7307147 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				2634500.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				212.24 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				424.5 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**149** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**258** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**408** kg CO_2e/sq.m.		

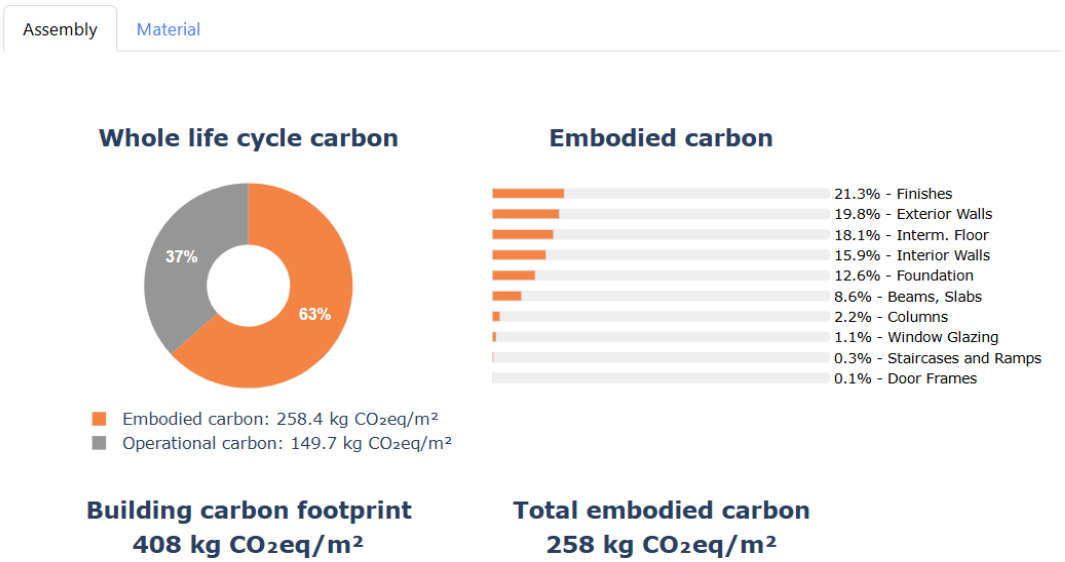


Figure 92:Building 79

80	**Building ID**	212_Comm._EKM_Kerala_11973
Building Information		

Year of Completion	2025					
Basic details	**City**	Ernakulam				
	Building type	Assembly		**Sub-type**		
	Built-up Area	11973 sq.m.		**Conditioned Floor Area**	9578.872 sq.m.	
	Floors above ground			**Floors below ground**		
Building Specifications						
Material Specifications and Quantities	**Foundation type**	Isolated Footing		**Structure type**	RCC + Masonry infill	
	Flooring	Glazed ceramic tile		**Roofing**	RCC Flat slab	
	Concrete grade	M 25 (RMC)		**Steel grade**	Fe 550	
	Quantity	xxx cu.m.		Quantity	xxx kg	
	Window type	Alu. + Double glazing		**Walling**	Red brick	
	Quantity	xxx sq.m.		Quantity	1067.141481 cu.m.	
	Heating type	NA	**Cooling type**	Split ACs	**Lighting type**	LED Panels
	Heating capacity	NA	**Cooling capacity**		**Lighting capacity**	
	No. of occupants			**Occupancy hours**	8 hrs / day	
	Ventilation type				BLDC Ceiling Fans	
	Capacity				6.5kW	
Operational Data	**Total Connected Load**				476.5 kW	
	Annual Energy Consumption (Electricity)				3183960.00 kWh/yr.	
	Annual Energy Consumption (Diesel)				xxx kWh/yr.	
	Annual Energy Generation (RE)					
	Energy Performance Index (EPI – Whole building)				265.92 kWh/sq.m..yr.	
	Energy Performance Index (EPI – Conditioned area)				322.4 kWh/sq.m..yr.	
Building Carbon						
Emissions	**Operational Carbon Intensity (50 years)**	**187** kgCO2e/sq.m.		**Embodied carbon intensity (Upfront)**	**312** kgCO2e/sq.m.	
	Building Carbon Footprint (Whole-life)			**499** kg CO_2e/sq.m.		

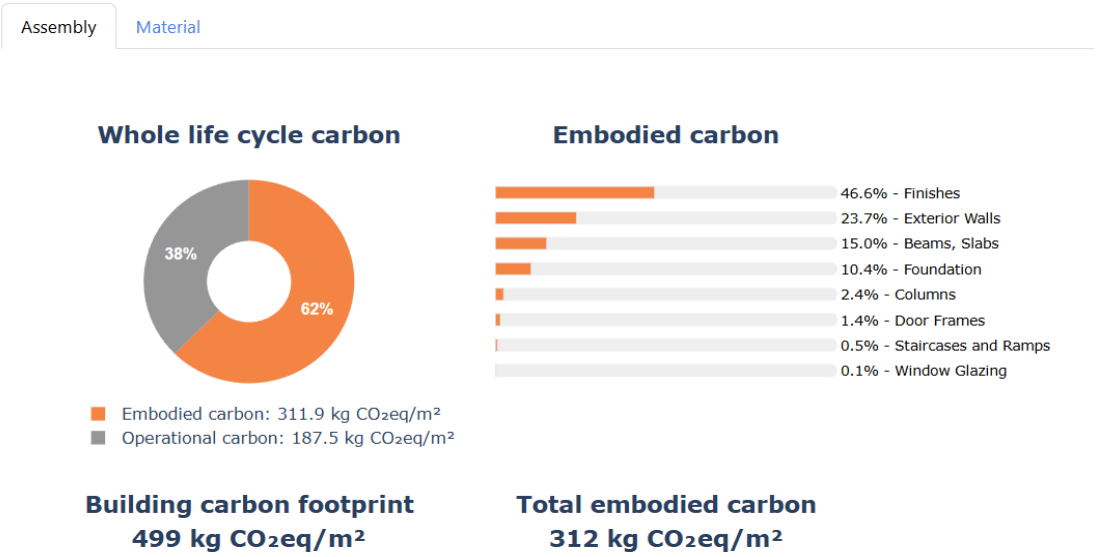


Figure 93: Building 80

About ALCBT Project

The Asia Low Carbon Buildings Transition (ALCBT) Project seeks to significantly reduce GHG emissions by catalyzing nationwide transition towards low-carbon buildings in Cambodia, India, Indonesia, Thailand, and Vietnam. The project is led by the Global Green Growth Institute (GGGI), in partnership with the ASEAN Centre for Energy (ACE), Energy Efficiency Services Limited (EESL), and HEAT GmbH. It is funded by the Government of Germany's Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN) via the International Climate Initiative (IKI).

In India, the project operates under the guidance of the Ministry of Housing and Urban Affairs (MoHUA). Capacity building efforts in the country will benefit over 2,000 individuals, including government officials, architects, engineers, building developers and owners, ESCOs, financial institutions, material manufactures, and technology providers, to promote low carbon building design and sustainable practices.

About GGGI

Global Green Growth Institute (GGGI), headquartered in Seoul, Republic of Korea is a treaty-based international, inter-governmental organization dedicated to supporting and promoting strong, inclusive and sustainable economic growth in developing countries and emerging economies.

About ACE

The ASEAN Centre for Energy (ACE) is an intergovernmental organization within the Association of Southeast Asian Nations' (ASEAN) structure that represents the 11 ASEAN Member States' (AMS) interests in the energy sector.

About EESL

Energy Efficiency Services Limited (EESL) is a super energy service company under the India's Ministry of Power. It seeks to unlock energy efficiency market in India through innovative business models and has expanded its operations in other Asian countries.

About HEAT GmbH

HEAT International is an independently acting consulting firm with 30 years of experience in the field of climate, heating & cooling, and transport. HEAT's goal is to support countries in their effort to mitigate emissions and to implement transformative pathways towards zero GHG emission solutions.

GGGI

ASIA LOW CARBON BUILDINGS TRANSITION PROJECT

Life Cycle Assessment for Transitioning to a Low-Carbon Economy

GGGI HQ
The Global Green Growth Institute
19F Jeongdong Building 21-15, Jeongdong-gil Jung-gu, Seoul, Republic of Korea
04518

GGGI India
The Global Green Growth Institute
M-6 Haus Khas, Third Floor, Aurobindo Marg. New Delhi – 110068
Contact: india@gggi.org | +91 +91 1140501471

Support the ALCBT project in India through our project hashtags

#AsiaLowCarbonBuildings
#IndiaTowardsLCBT
#LowCarbonHighComfort

Follow GGGI India

www.alcbt.gggi.org

Supported by:
Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety
based on a decision of the German Bundestag
IKI INTERNATIONAL CLIMATE INITIATIVE