

Leveraging Digital Tools to Promote Energy-Efficiency in Buildings

ECBC Compliance Tool & Building Load Calculation Tool

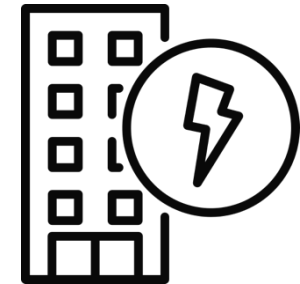
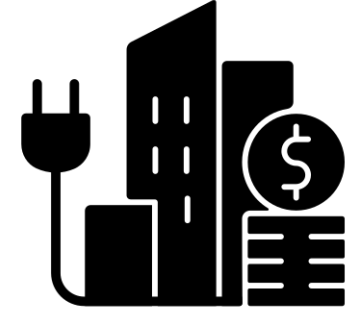
Mohammad Irshad Khan & Laiba Liaquat Khan – GIZ Pakistan

10 June 2026

PUBLIC

Background

- Urbanisation is on the rise in Pakistan
- Population growth in urban areas
2025: 38.7% (87 million)
2035: 43.1% (112.5 million)
- Buildings consume:
~**40% of Pakistan's total energy**
~**60% of the total electricity supply**



The Challenge?



- Rising energy cost and heavy cooling demand in the summer months
- **Base load: 12,000 MW**
Peak load (summer): 30,000 MW
Cooling demand: 18,000 MW
- Heavy energy bills for domestic and commercial consumers – entire building sector
- Increasing reliance on imported fossil fuels at the country level
- Ballooning trade deficit



- Government reacting to the ongoing energy crisis, rising fuel prices, and the impact of the Middle East fuel crisis on energy security
- Increasing pressure to design energy-efficient buildings through implementation of **Energy Conservation Building Code (ECBC)** & Green Building Code (GBC)



- Institutional and technical capacity challenges faced by building control authorities in implementing the codes effectively
- Need for capacity building, and guidance to support ECBC implementation and rollout



What is Energy Conservation Building Code (ECBC)?

- Building Energy Code in Pakistan approved by the Federal Government in March 2024
- Now being rolled out nationwide to:
 - Transform building design practices
 - Improve energy performance of buildings across Pakistan



What is Energy Conservation Building Code (ECBC)?



Building Design Framework



Energy performance standards for buildings



Designed for Pakistan's climatic zones, and local building materials and practices



Rolling-Out

- ECBC is comprehensive & a relatively new topic for the building sector
- Involves technical calculations & interpretation of EE&C requirements for buildings
- Manual calculations & compliance verification are **time-consuming** and **difficult to standardise** across projects
- Institutional and technical capacity of building control authorities remain a key challenge



Solution!

Compliance Checking Tool for ECBC

- Developed in collaboration with University of Engineering and Technology (UET)
- Digital tool – a uniform solution to be applied by all building control authorities for standardised ECBC compliance



Link: <https://compliance.berc.pk/>

Key Features:

- Allows users to test different design scenarios by changing inputs
- Data input fields for all key parameters required by ECBC





Core Functionality & Inputs

- Data input fields for all key parameters required by ECBC
- Auto-calculates all the energy parameters; designed for ease of use
- User-friendly with database options
- It converts complex code requirements into a 10 to 15 minute workflow!

1. Project Details

Project Details

OWNER NAME	Laiba Liaquat Khan	PLOT NO.	House 28
STREET ADDRESS	Street 63, G-10/3	POSTAL CODE	44000
CODE	ECBC-2023	BUILDING TYPE	Single Family House (Residential)
STATE	Islamabad ICT	SELECT CITY..	Islamabad
PROJECT TYPE	New Construction	SPACE CONDITIONING	Semi-Conditioned
PROJECT DETAILS		COVERED AREA (Sq. ft)	5445

[+ Create Project](#)

2. Building Envelope

Roof Details

Name	Assembly-Thickness	R-Value	U-Value	Recommended U-Value	Status	Acti
Roof	Concrete / RCC Slab - 6" Reflective white - 0" Extruded PolyStyrene - 4"	24.006	0.042	0.039	92.3% COMPLIANT	✎

[Check Compliance](#) [Save](#) [Next](#)

3. Lighting System Details

Dashboard

PAGES

- Project
- Envelope
- Lightings**
- Int. Lighting
- Ext. Lighting
- Heating & Air Conditioning (HVAC)
- Appliances
- Water

+ Single Family House (Residential) Lighting

Interior Lighting ⓘ

	Fixture Type	Lamp Type	Total Lamps	Wattage Per Lamp (W)	Total Wattage (W)	Action
1	Ceiling Mounted Lights	1x4 LED Panel	6	30	180	/
2	Ceiling Mounted Lights	12" Circline LED	5	16	80	/
3	Wall Mounted Lights	Wall Sconce with B11 LED Bulbs	12	6	72	/

Check Compliance



Also covers 5. Appliances and 6. Water usage



4. HVAC System Details

Dashboard

PAGES

- Project
- Envelope
- Lightings
- Heating & Air Conditioning (HVAC)**
- Appliances
- Water
- Generate Report

+ HEATING & AIR CONDITIONING (HVAC)

HEATING & AIR CONDITIONING (HVAC) ⓘ

Equipment Name	Equipment Type	Cooling Capacity (Btu/h)	Power (W)	Efficiency (EER)	Standard
Electrically Operated Unitary Air Conditioners and Condensing Units	Air conditioners, air cooled	12000	1000	12.00	11.38





Outputs

- Building **Compliance Report** with all project data, system specifications, and ECBC benchmark comparisons
- Embeds a unique QR code on the **Compliance Certificate** for real-time verification and transparency.
- Compliance category (A–D) based on performance score.
- For all new buildings, certificate generation is compulsory

BERC Building Compliance Certificate
Buildings Energy Research Center

Certification Level: **B**
Certificate No.: C-IS-25 -451
Generated On: 08-Jul-2025

Property Information:

Owner Name:	Laiba Liaquat Khan	Plot No:	House 28
Street Address:	Street 63, G-10/3	City:	Islamabad
State:	Islamabad ICT	Postal Code :	44000
Building Type:	Single Family House (Residential)	Covered Area (ft) ² :	5445

Compliance Level:

90-100	A	
70-89	B	86 %
50-69	C	

[Downloadable Compliance Report and Certification](#)

Advantages

- Scenario Testing
- Modify design inputs
- Instantly see compliance %
- Compare alternatives



Supports informed design decisions early in the process



Impact

Trainings conducted all across Pakistan
- Over **2,400** professionals trained



Faster approvals

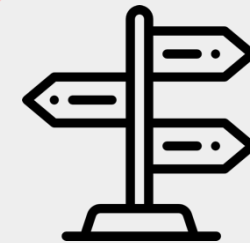


Reduces compliance effort while improving buildings' energy performance



The Need for It?

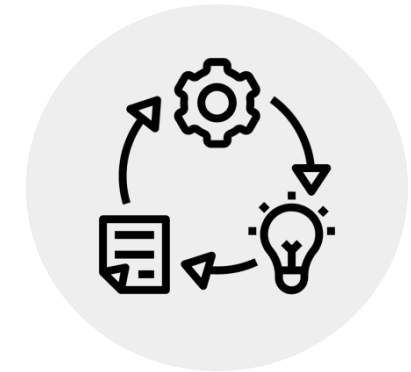
- What if you're not aiming for compliance?
- What if you just want to achieve energy savings?
- Building Load calculations can feel too technical and overwhelming!



Solution!

Building Load Calculation Tool

Comprehensive solution for assessing energy performance in buildings



Link:
https://www.rlf.berc.pk/createProject_v1.php

NEECA

Dashboard
Project
Logout

Project Details | Floor Plan | Walls Materials | Windows | Roof Materials | Ventilation | **Lighting** | Appliances

Results | Projected Case

Lighting Inputs

BULBS Add Light

Select Fixture Type	Wattage	Hours of use/day	Days of use/month	Number of Bulbs	Action
--Select Type Of Bulb--	Bulb Watt	hrs of use/day	Days of use/m	Number of bulbs	Refresh

STRIP AND TUBE LIGHTS Add Light

BERC
Buildings Energy Research Center

Core Functionality



Assess building energy performance



Identify energy-saving opportunities



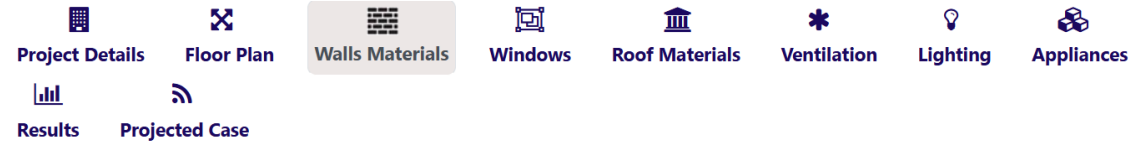
Reduce operational costs



- Given high electricity tariffs, lowering energy consumption can generate substantial cost savings.



Inputs



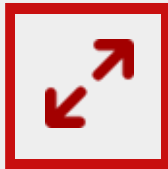
Walls Materials ⓘ

Walls Core Material	Thickness (in)	Walls Inner Finishing	Thickness (in)
--Select Core Material--	0	--Select Inner Finishing--	0
Walls Outer Finishing	Thickness (in)	Walls Insulation	Thickness (in)
--Select Outer Finishing--	0	--Select Insulation--	0
Wall R-Value (m ² C°/W)	ECBC Wall R-Value (m ² C°/W)	Wall U-Value (W/m ² .C°)	ECBC Wall U-Value (W/m ² .C°)
0.42	1.7545	2.38	0.57

[Calculate](#)



Location to determine the climatic zone



Building size & orientation



Materials & HVAC systems



Appliances & lighting



Outputs

- Calculates heating and cooling loads based on location, size, orientation, materials, and appliances
- Shows monthly load breakdown for heating, cooling, lighting, and appliances

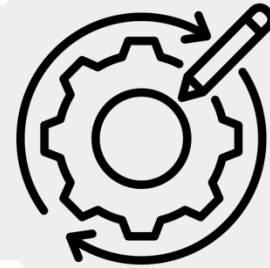
Provides a complete picture of energy demand



Month	Heating Load (kWh)	Cooling Load (kWh)	Lighting Load (kWh)	Appliances Load (kWh)
January	464	0	1.3	306
February	345	0	1.3	306
March	242	0	1.3	306
April	0	691	1.3	392.4
May	0	939	1.3	392.4
June	0	1168	1.3	392.4
July	0	1213	1.3	392.4
August	0	1143	1.3	392.4
September	0	967	1.3	392.4
October	168	0	1.3	306
November	283	0	1.3	306
December	399	0	1.3	306

Advantages

- Load profile visualization
- Users can clearly see performance improvements

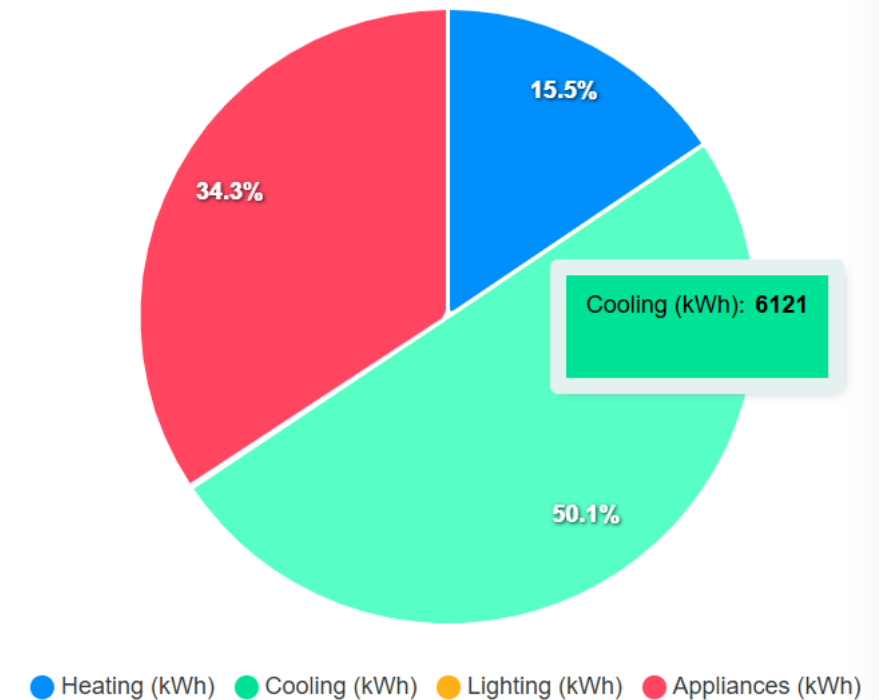


Simplifies the design process of buildings with lower energy usage for:

- Architects
- Builders
- engineers
- homeowners

Base Case (kWh)	
Total Load	12228
Heating Load	1901
Cooling Load	6121
Lighting Load	15.6
Appliances	4190.4

Base Case Load Monthly Breakdown



Advantages



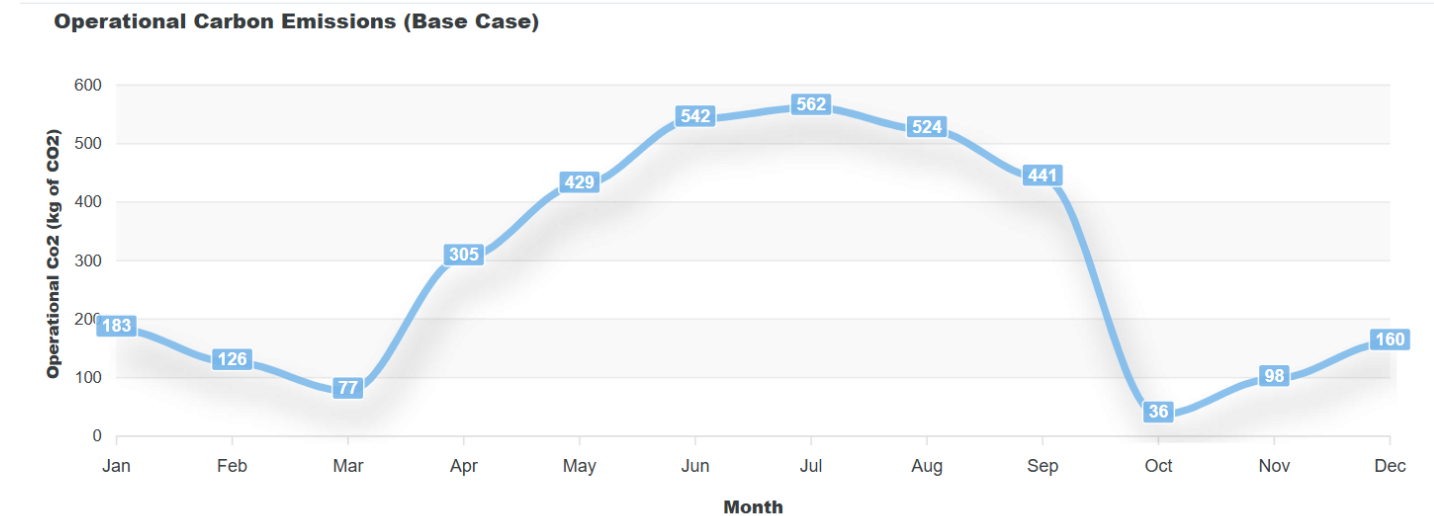
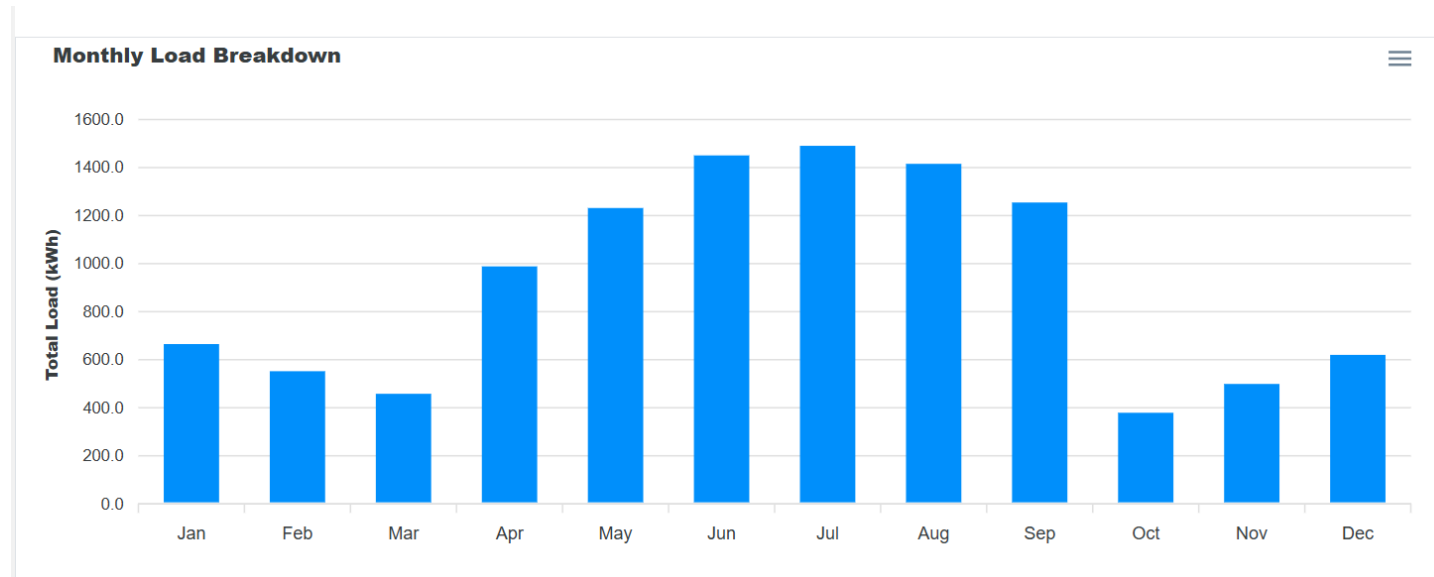
Monthly operational carbon emissions



Load comparison across scenarios



Links energy performance with environmental impact

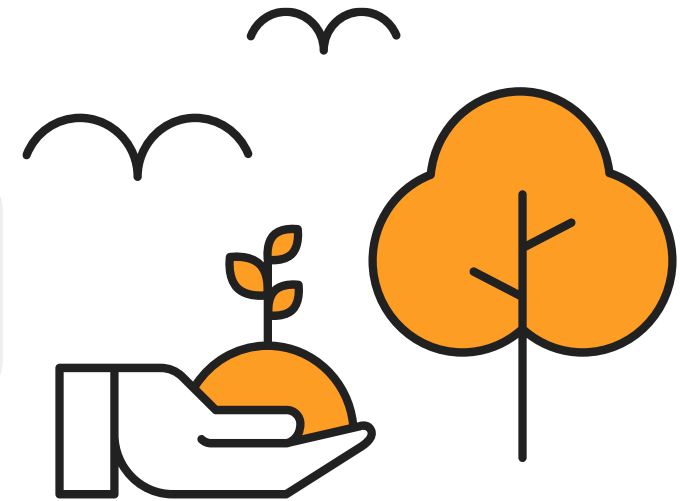


How the Tools Work Together?

Load Tool → design optimisation
ECBC Tool → compliance verification

Both promote EE&C in Buildings!

Thank you for your attention!



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