An NZEB is characterized by exceptionally high energy efficiency, which distinguishes it in construction and architecture. NZEBs are designed to minimize energy demand through innovative design, energy-efficient materials, and technologies.

- An NZEB in Ghana has a carbon footprint that is 50% lower than that of a BAU.
- Electricity from solar panels supplied to the national grid avoids 860 ton CO₂ eq. emissions.
- The use stage’s impact primarily stems from solid waste production.
- Construction materials, particularly cement and steel, are the primary contributors to the carbon footprint of raw materials.

**Introduction**

The building sector is widely recognized for its significant environmental impact, particularly in terms of carbon emissions and resource consumption. Addressing this issue, the Life Cycle Assessment (LCA) emerges as a vital tool for quantifying the total environmental footprint of buildings. This study presents a detailed LCA of a Nearly Zero Energy Building (NZEB) in Accra, Ghana, highlighting how such assessments are essential in developing countries where urban development is rapid. By systematically identifying environmental hotspots throughout a building’s lifecycle, LCA facilitates targeted improvements in design and construction practices. This approach not only aids in significantly reducing carbon emissions but also supports the global push towards sustainable building practices and climate protection goals.

**Results**

**NZEB carbon footprint**

![Bar chart showing comparison between NZEB and BAU buildings](chart.png)

**Comparison Business-As-Usual (BAU) building**

- **Energy production (no solar)**
- **Energy consumption**
- **Construction materials (bricks, walls, PV)**
- **Windows**

<table>
<thead>
<tr>
<th>BAU</th>
<th>NZEB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy production (no solar)</td>
<td>3000</td>
</tr>
<tr>
<td>Energy consumption</td>
<td>2000</td>
</tr>
<tr>
<td>Construction materials (bricks, walls, PV)</td>
<td>1500</td>
</tr>
<tr>
<td>Windows</td>
<td>500</td>
</tr>
</tbody>
</table>

**Methods**

**System boundaries:**

- **UPSTREAM:** Raw materials input, Transport of raw materials
- **CORE:** Construction, Construction waste production
- **DOWNTREAM:** Maintenance, Use stage

**Functional unit:**

1 NZEB building with a useful life of 50 years

**Methods of analysis:**

IPCC 2021 GWP100 on SimaPro 9.5 software