



Green Thinking REVIEW

GTR 84

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Promoting Innovations and Best Practices
in Sustainable Building for A Flourishing Future

Maintenance Is Sustainability

*Sustainability Does Not End
at Handover*



Floreat Vita | *Let Life Flourish.*



Cover:

Designed to Last. Maintained to Perform: Designing Buildings That Can Continue to Work

A building is often judged at completion.

Does it look right?

Does it function?

Was it delivered on time?

Does it meet its performance targets?

But sustainability asks a longer question:

Will it still work well years from now?

That depends not only on what was built, but on whether the building can be cared for.

Maintenance outcomes begin at design stage.

A roof that cannot be safely inspected invites neglect. A service component hidden behind inaccessible finishes turns routine replacement into major disruption. A sophisticated control system may become useless if operators cannot understand it. A high-performance material may create future problems if replacement parts, skills, or suppliers are unavailable locally. This is why durability alone is not enough.

A building can be physically robust and still be difficult to maintain.

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Editor's Note:

Dear Green Thinkers,

The Day After Handover

There is always a moment when a building appears complete.

The contractor hands over the keys. The consultants sign off. Photographs are taken. People move in.

It feels like the end of the project.

But for the building, it is only the beginning.

From the next day onward, doors will open and close thousands of times. Roofs will

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face rain and heat. Pumps, lights, drains, finishes, seals, controls and moving parts will begin the long work of serving people.

Things will wear.

Some will need cleaning.

Some will need adjustment.

Some will need repair.

Eventually, some will need replacement.

This is not failure.

It is the normal life of a building.

The real sustainability question is therefore not only whether a building performs well when it is commissioned, but whether it can **continue to perform, be understood, maintained, repaired and adapted over time.**

That responsibility begins long before facility management.

Design determines whether services are accessible. Specifications influence whether replacement parts can be found. Detailing affects how buildings weather. Procurement influences durability. Handover determines whether knowledge is transferred or lost.

Maintenance is therefore not something that happens after design.

It is partly designed in.

GTR 84 explores this overlooked dimension of sustainability: the stewardship that begins when occupation starts.

Because handover does not conclude sustainability.

It transfers responsibility for keeping it alive.

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– The Editorial Team

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Good sustainable design therefore considers the whole life of the building: how it will be cleaned, serviced, repaired, replaced, adapted, and eventually renewed.

It asks practical questions early:

Can technicians reach what needs servicing?

Can damaged parts be replaced without destroying surrounding work?

Are drainage paths visible and accessible?

Are controls understandable?

Can local skills support the systems being specified?

These questions may appear ordinary, but they determine whether environmental performance survives occupation.

A neglected efficient system eventually becomes inefficient. A blocked drain can damage an otherwise well-designed roof. A failed seal can compromise comfort and durability. A building with no maintenance budget may slowly lose the very performance it was designed to deliver.

Maintenance is therefore not separate from sustainability.

It is how sustainability survives time. The best buildings are not those that never need care. They are those designed so that care is possible, practical, affordable, and expected.

GTR**Reflection**

A sustainable building must be capable of being cared for.

Design for performance. Maintain for continuity

Green Thinking Insights

A Sustainable Building Should Not Need Constant Rescue

👉 **Durability is environmental performance.**

A building that lasts longer avoids premature replacement, waste and repeated resource use.

👉 **Repairability preserves embodied value.**

When components can be repaired rather than discarded, more of the building's original material and energy investment is retained.

👉 **Maintenance access is a design decision.**

If something cannot be reached safely, it is less likely to be inspected, cleaned or repaired properly.



Designing for Care

Maintainability is not an afterthought. It is a design quality.

Here are eight practical ways to make long-term care easier:

1. Make Services Accessible

Equipment, valves, filters, controls, drains and service routes should be reachable for inspection, cleaning and replacement.

2. Design for Repair

Use assemblies that can be opened, repaired and reassembled without unnecessary damage to surrounding work.

3. Make High-Wear Parts Replaceable

Components that will wear out first should be easy to remove and renew.

4. Keep Controls Understandable

A system is not truly smart if operators cannot understand, adjust or troubleshoot it.

5. Specify for Local Serviceability

Consider whether technicians, spare parts, tools and replacement materials are reasonably available where the building will operate.

6. Detail for Durability

Roof edges, drainage, waterproofing, façades, joints and wet areas deserve particular attention because small failures can create large consequences.

7. Design Safe Maintenance Access

Roofs, façades, plant areas and service zones should be maintainable without improvised ladders, unsafe access or unnecessary disruption.

8. Keep the Building Record Alive

Drawings, manuals, warranties, alterations, maintenance history and replacement information should remain available throughout the building's life.

DESIGNING FOR CARE

Eight practical ways to make long-term building stewardship easier.



Maintainability is an innovation criterion.

Green Thinking Insight

Maintainability is an innovation criterion. The most sophisticated solution is not always the most sustainable. Sometimes the smarter building is simply the one that people can understand, reach, repair and keep working.

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Five Ways to Design for the Long Life

1. Ask Who Will Maintain It

Before choosing systems or materials, understand who will operate, clean, inspect and repair the building.

2. Design Access from the Beginning

Provide safe, practical access to roofs, drains, façades, plant rooms, filters, valves and other service points.

3. Prefer Appropriate Durability

Choose materials and systems that suit the climate, intensity of use, available skills and realistic maintenance conditions.

4. Specify with Local Capability in Mind

Consider whether replacement parts, technicians, tools and materials will still be available when something eventually fails.

5. Plan Responsibility Before Handover

Define maintenance roles, records, budgets, inspection intervals and training before occupation begins.

GTR Reflection

Maintenance is not what happens when sustainability fails. It is one of the ways sustainability continues.

Green Thinkers' Challenge

Choose one building you know well and ask: What part of this building will be difficult to inspect, repair or replace five years from now? If the answer is obvious, the maintenance problem may already have been designed in.

Long life begins with foresight.

Resources for Further Study

Tools for Lifecycle Stewardship

READ

👉 ISO 41001 — Facility Management Systems

A useful framework for organising facility management so buildings continue to support operational and sustainability objectives.

Link: iso.org/standard/68021.html

👉 ISO 15686 — Service Life Planning

Provides a lifecycle framework covering design, construction, operation, maintenance, refurbishment, replacement and eventual reuse or disposal.

Link: iso.org/standard/45798.html

EXPLORE

👉 CIBSE Guide M — Maintenance Engineering and Management

Practical guidance for designers and facility managers on maintainability, commissioning, handover, operation, documentation and long-term performance.

Link: cibse.org/guidem

👉 RICS Lifecycle Costing

A practical guide to evaluating construction, operation, maintenance, replacement and other costs across an asset's life.

Link: rics.org/profession-standards/rics-standards-and-guidance/sector-standards/construction-standards/black-book/lifecycle-costing

Green Thinkers' Takeaway

The cost of a building does not end at construction. Neither does its sustainability.



Burkina Faso: Designed to Age Well - Gando Primary School



Image: Gando Primary School, Burkina Faso. Photo: Simeon Duchoud / Kéré Architecture.

The Gando Primary School in Burkina Faso offers a strong lesson in designing for long-term care.

Completed in 2001 by Francis Kéré with the community of Gando, the school was shaped by climate, local materials, available skills and the realities of future maintenance.

Clay, widely available in the region, was combined with cement to create robust compressed-earth bricks. Because earthen walls are vulnerable to heavy rain, generous roof overhangs protect them from weathering. A second roof layer is separated from the classroom ceiling, allowing hot air to escape naturally and reducing dependence on air-conditioning.

But perhaps the most important maintenance decision was social.

Local people participated directly in construction, combining traditional building knowledge with improved techniques. Kéré Architecture explicitly notes that this approach helped **simplify construction and future maintenance**. The skills developed during the original project were later reused when the school was expanded.

The lesson is not that low-tech buildings require no maintenance.

It is that care becomes easier when materials are familiar, climate is respected, components are understandable, and repair knowledge exists close to the building.

Nigeria Focus: Why Good Buildings Age Badly

When buildings deteriorate early, the explanation is often reduced to one phrase: "Poor maintenance culture." But that is usually too simple.

Buildings age within a system. Was maintenance access considered during design? Were materials appropriate for climate and intensity of use? Did procurement favour lowest initial cost over lifecycle value? Was workmanship adequate? Were operators trained? Are spare parts, technicians, records and maintenance funds available?

These questions reveal something deeper.

*Maintenance depends on an **ecology of responsibility** – designers, contractors, manufacturers, owners, facility managers, technicians, users, knowledge, materials and money working together.*

If one part of that ecology fails, even a good building can begin to perform badly.

The lesson is not that buildings in Nigeria cannot last. It is that long life must be intentionally supported.

Maintenance culture matters. But so do maintenance design, capability and funding



What If Every Building Had a Care Passport?

We service cars according to their maintenance history. Why do buildings worth millions often operate without one?

Imagine every building carrying a **Care Passport** from handover onward – a living record of what was installed, how it should be maintained, what has changed, and what will eventually need renewal.

It could contain:

- materials and systems used;
- maintenance intervals;
- warranties and manuals;
- replacement cycles;
- service history;
- alterations and upgrades;
- recurring performance problems;
- responsible persons;
- drawings and technical records;
- future adaptation opportunities.

The value would not be paperwork for its own sake. **It would be continuity.**

When facility managers change, knowledge would not disappear with them. When components fail, replacement decisions would be better informed. When the building is renovated, designers would understand what has already happened to it.

Over time, the passport could become part maintenance record, part lifecycle guide and part memory of the building itself.

The idea is simple: **Care should travel with the building.** Because buildings do not only need good beginnings.

They need good continuity.



A Question for Today:

Think about a building you use often.

Ask:

If something important failed tomorrow, would the people responsible know what to inspect, where to access it, how to repair it, and what it should be replaced with?

If not, the problem may not begin with maintenance. It may begin with design, documentation, or responsibility.

A sustainable building must be capable of being cared for.

GTR Closing Reflection:

The building is finished. Its stewardship has just begun.

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CARE IS PART OF DESIGN.

“

*Well-designed
buildings do not end
with completion;
they live, adapt and
continue to serve —
when we care for them.*

Floreant Vita | Let Life Flourish.

DESIGN
BUILD
OPERATE
MAINTAIN
FLOURISH



CARE
PRESERVES
VALUE



PEOPLE
PLACES
POSSIBILITIES
LONGER LIVES



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