

FROM GREEN ENERGY TO GREEN COMPUTING: THE STRATEGIC ROLE OF CMAs IN CARBON-NEUTRAL INFRASTRUCTURE

Abstract

The transition to eco-computing and carbon-neutral infrastructure is no longer only a technology challenge. It is increasingly a business, cost, risk and governance challenge. Organisations are investing in renewable energy, energy-efficient data centres, advanced cooling, green buildings and low-carbon supply chains. Yet the credibility of these investments ultimately depends on the quality of the data used to measure their environmental impact.

Business Responsibility and Sustainability Reporting (BRSR) has moved sustainability information closer to the discipline traditionally associated with financial reporting. With BRSR Core assurance extending to the top listed entities from FY 2026-27, the reliability, traceability and control of ESG data have become increasingly important.

This article argues that the next generation of ESG risk may not be “greenwashing by intent” but “greenwashing by data” — inaccurate or unsupported environmental information created through fragmented systems, manual interventions and weak validation. CMAs are well positioned to address this risk through cost measurement, reconciliation and internal controls.

“The value of green investment is only as strong as the credibility of the data used to demonstrate its impact — and the CMA can be the professional who ensures that credibility.”



CMA Himanshu Dhar

Corporate Professional

Pune

himangshudhar1969@gmail.com

From Green Investment to Green Accountability

Companies are increasingly sourcing renewable power through rooftop solar, open-access

arrangements, power purchase agreements and other green electricity instruments. At the same time, investments are being made in energy-efficient computing infrastructure, modern data centres, efficient cooling systems and low-carbon facilities.

The business question, however, is changing. It is no longer sufficient to ask: “How much renewable energy have we purchased?” The more important questions are: Where did it originate? Has it been counted correctly? What is its lifecycle cost? What evidence supports the claim? Does the disclosed number reconcile with operational records?

These questions sit naturally within the CMA’s traditional discipline of measurement and verification.

Eco-Computing: Where Technology Meets Cost Management

Computing infrastructure consumes energy not

only through servers and storage but also through cooling, power conditioning, backup systems and supporting facilities. Therefore, eco-computing cannot be reduced to buying more energy-efficient hardware.

A mature eco-computing strategy should examine lifecycle cost across energy consumption, cooling efficiency, server utilisation, hardware life, embodied carbon, e-waste, software efficiency and renewable-energy sourcing.

This creates an important role for the CMA. A decision between grid power bidding, rooftop solar, open-access renewable energy or a power purchase arrangement should not be evaluated only on tariff per kWh. Lifecycle cost, capital commitment, reliability, carbon impact and disclosure implications matter. Similarly, an efficient cooling system should be evaluated as a business case: incremental investment versus carbon reduction, energy savings, maintenance, useful life and payback.

This is where eco-computing becomes a management-accounting issue and priority is changing to look at carbon reductions as a primary imperative today.

The Hidden Risk: Greenwashing by Data

Greenwashing is normally associated with deliberate exaggeration of environmental performance. There is another, less visible risk. Greenwashing can also arise because the underlying data is weak. Consider a large organisation in multiple geography's where ESG information moves through the following chain:

Plant / Data Centre → Engineering / IT → Finance → Sustainability → Corporate ESG → Annual Report.

Each hand-shake creates risk and silos makes the challenge more complicated. There is still a tendency in many organisations to treat sustainability and ESG reporting as a relatively casual, part-time activity. This approach is becoming increasingly risky as the volume, complexity and scrutiny of ESG information grow. More importantly, very few organisations are viewing this as an organisational-structure and accountability issue.

In many cases, ESG responsibility is assigned as

one additional responsibility to an individual who already has several other priorities. Sustainability reporting then becomes a “shared” or part-time activity rather than a clearly owned organisational function. This creates a structural vulnerability: when responsibility is shared, accountability can become diffused. The individual may coordinate the information, but may not have the authority, resources, systems or organisational influence required to ensure its completeness, accuracy and timely validation.

The issue, therefore, is not simply whether an organisation has an ESG policy or reporting process. The more fundamental question is whether ESG has a clearly defined place in the organisation structure, with dedicated ownership, defined accountability, appropriate authority and independent challenge. Without this, ESG can remain a reporting exercise rather than becoming an embedded management discipline.

A meter reading may be incomplete. A renewable-energy certificate may be mapped to the wrong facility. A spreadsheet formula may be incorrect. A datapoint maybe not have a proper audit trail. A conversion from kWh to GJ or tCO₂e may be applied inconsistently across different locations. The same environmental benefit may be counted twice. The black energy maybe reported as green due to incorrect interpretation of the purchase agreement

None of these errors necessarily involves an intention to mislead, on many occasions it is a change management concern. Yet once the resulting number enters an Annual Report, it becomes a corporate representation to investors and other stakeholders.

This is what I would describe as “greenwashing by data”.

The governance response therefore cannot be limited to sustainability teams. It requires finance discipline, control ownership and independent challenge.

BRSR: Moving ESG Towards Financial-Grade Discipline

SEBI's BRSR framework has progressively brought quantifiable sustainability information into mainstream corporate reporting. BRSR Core

introduced assurance requirements through a glide path that reaches the top listed entities in FY 2026-27. This development has an important implication: ESG information is no longer simply a communication exercise. It is becoming controlled corporate information.

The CMA's traditional questions — Is it complete? Is it accurate? Is it supported? Has it been reconciled? Has the variance been explained? Who reviewed it? — become equally relevant to sustainability information.

The challenge is to build a robust ESG control environment before assurance begins.

CMA as ESG Controller

CMA can bring a familiar financial-control mindset to sustainability information. A practical ESG control framework can be built around six questions:

- ⊙ Source — Where did the number originate?
- ⊙ Evidence — What document, meter, contract or system record supports it?
- ⊙ Calculation — What methodology and conversion factors were used?
- ⊙ Validation — Has the data been independently checked or reconciled?
- ⊙ Ownership — Who is accountable for the number?
- ⊙ Disclosure — Does the final reported number reconcile with the underlying records?

This approach converts ESG reporting from a periodic data-collection exercise into a controlled management process. CMA's can also apply variance analysis to sustainability metrics. A sudden improvement in energy intensity or emissions may deserve the same analytical attention that Finance gives to an unusual cost movement.

Learning from Manufacturing: The Value of Reconciliation

The manufacturing environment provides a useful illustration.

A multi-plant organisation may consume grid electricity, generate renewable power, use backup diesel generation and procure renewable energy through contractual instruments. For sustainability

reporting, these sources must be correctly classified, measured and reconciled.

The CMA can ask:

- ⊙ Do meter readings reconcile with energy invoices?
- ⊙ Does renewable generation reconcile with the plant's operating records?
- ⊙ Are certificates correctly mapped and not duplicated?
- ⊙ Are reporting-period cut-offs consistent?
- ⊙ Are conversion factors applied consistently?
- ⊙ Can every material number be traced back to source evidence?

The same discipline applies to carbon data across the supply chain. For an automobile manufacturer, the environmental footprint does not end at the factory gate. Steel, aluminium, rubber, plastics, logistics and purchased components can materially influence the value-chain footprint. The CMA can link operational quantities, procurement data, cost information and sustainability metrics.

Spending few decades in the Automobile Industry, let me explain with a multi-plant automobile manufacturer potential risks & complexity, where each plant independently procures renewable energy through different solar power agreements. While all plants report renewable-energy consumption for ESG disclosures, contract terms, energy shortfalls, evidence requirements and settlement mechanisms differ significantly (lack of standardization).

During review, CMA identify that one plant reports the entire contracted quantity as renewable energy despite incomplete supporting evidence, while another plant faces recurring supplier shortfalls resulting in financial penalties. A third plant may classify similar energy differently because of varying interpretations of contractual terms.

Rather than merely checking the final ESG disclosure, the CMA needs to establish an end-to-end reconciliation:

Contracted Renewable Energy → Actual Supply → Plant Consumption → Supporting Evidence → Financial Settlement → ESG Disclosure

This enables identification of three key risks:

- ⊙ **Data Risk:** renewable-energy claims not fully

supported by evidence.

- ⊙ **Contractual Risk:** contracted renewable-energy benefits not actually received.
- ⊙ **Commercial Risk:** inconsistent treatment of supplier shortfalls across plants.

The CMA can create value by:

- ⊙ Reconciling meter data, invoices, contractual commitments and reported ESG figures;
- ⊙ Investigating unexplained variances and recurring shortfalls;
- ⊙ Establishing common definitions;
- ⊙ Analyse penalties and contract performance across plants; and
- ⊙ Recommend standardised contract clauses during renewal cycles.

The same approach can be applied to other ESG metrics. Examples include reconciling energy consumption with invoices and production volumes, verifying emission-conversion factors used across plants, validating supplier-provided ESG data, identifying duplicate environmental benefits, investigating abnormal improvements in energy intensity, and verifying e-waste disposal through recycler certificates and asset records.

By joining the dots ESG data, contracts, operations, cost and risk, the CMA moves beyond compliance and reporting. The role evolves from validating sustainability data to improving business decisions, strengthening disclosure credibility and identifying commercial opportunities. This is where the CMA becomes a true Value Architect rather than merely a reporter.

Embodied Carbon: From Environmental Metric to Cost Decision

One of the important developments in carbon-neutral infrastructure is the move from operational emissions towards lifecycle thinking.

A piece of IT equipment may consume less electricity during operation but have significant embodied carbon associated with manufacturing, transportation and disposal. The CMA therefore needs to look beyond purchase price. A lifecycle evaluation can consider:

Purchase cost + energy cost + maintenance cost + utilisation + expected life + disposal/recovery value + environmental impact.

The lowest purchase price is not necessarily the lowest lifecycle cost, and the newest technology is not automatically the most sustainable option. The CMA's role is to make this trade-off visible.

Circular Computing and E-Waste

Eco-computing also creates an important circular-economy question: What happens when technology reaches the end of its useful life? Servers, storage devices, networking equipment, batteries and other electronic assets contain materials that have economic as well as environmental value.

A robust control framework should track asset ownership, physical movement and disposal, data sanitisation, authorised recyclers, recovery certificates, sale/scrap proceeds, environmental compliance and reconciliation between asset records and disposed equipment. This is a natural extension of asset accounting and internal-control disciplines.

The CMA can help ensure that the organisation does not recognise the environmental benefit of “recycling” without adequate evidence of what actually happened to the asset.

Technology: From Annual Reporting to Continuous ESG Monitoring

The future of ESG control should not depend on spreadsheets assembled at year-end.

Organisations should progressively move towards:

- ⊙ Automated meter feeds
- ⊙ ERP and sustainability-platform integration
- ⊙ Digital evidence repositories
- ⊙ Automated reconciliations
- ⊙ Exception-based dashboards
- ⊙ Controlled master data
- ⊙ AI-assisted anomaly detection

Technology should not eliminate human judgement; it should direct professional attention towards exceptions. If energy consumption falls sharply while production remains unchanged, the system should trigger an investigation rather than

simply celebrate the improvement. Process mining tools can identify exceptions, but the CMA's role is to analyse, coursecorrect, and challenge unusual numbers.

The Strategic CMA: From Cost Accountant to Sustainability Value Architect

The CMA of the future will need to connect four dimensions:

- ⊙ Cost — What does the sustainability initiative cost?
- ⊙ Carbon — What impact does it create or avoid?
- ⊙ Control — Can the organisation prove the outcome?
- ⊙ Commercial value — Does the investment improve resilience, efficiency or competitiveness?

For automakers, decisions involve renewable electricity, lowcarbon materials, EVs & supplychain decarbonisation. For technology firms, they involve

cooling, server utilisation, renewable power & software efficiency

In either case, the CMA can become the bridge between Finance, Operations, Technology, Sustainability and Audit.

A Five-Level Maturity Model for ESG Data may be deployed

Organisations can assess their ESG data maturity through five levels:

Level 1 — Manual: Data collected through spreadsheets and emails.

Level 2 — Controlled: Defined data owners, documentation and review.

Level 3 — Reconciled: ESG information reconciled with operational and financial records.

Level 4 — Integrated: ERP, meters, sustainability systems and evidence repositories are connected.

Level 5 — Predictive: Analytics and AI identify anomalies and support management decisions before reporting deadlines.

Level	Observable Criteria	Evidence	Typical Conclusion
1. Manual	Spreadsheet-based collection, no clear ownership, inconsistent definitions, manual consolidation, year-end reporting	Multiple spreadsheet versions, emails, missing documentation, limited audit trail	ESG data exists but the process is largely uncontrolled and person-dependent.
2. Controlled	Defined owners, standard templates, documented methodology, maker-checker reviews, evidence retention	Ownership matrix, SOPs, approvals, review logs, supporting documents	Basic governance and controls exist, but reporting remains highly manual.
3. Reconciled	ESG metrics reconciled with operational and financial records; variance analysis performed	Meter readings, invoices, production records, asset registers, reconciliation files	ESG information is traceable, reconciled and subject to management review.
4. Integrated	ERP integration, automated feeds, common master data, automated validations and dashboards	System interfaces, automated reconciliations, exception reports, data lineage documentation	ESG controls are increasingly automated and managed through exceptions.
5. Predictive	AI/analytics identify anomalies, risks and future reporting issues before period-end	Predictive dashboards, anomaly alerts, management action logs, trend analytics	ESG data supports proactive decision-making and risk management.

Evaluate each plant against ownership, traceability, controls, reconciliation, automation, and analytics. Consolidate plant scores (weighted by ESG impact/revenue) to determine enterprise maturity.

Average Score	Enterprise Rating
1.0 - 1.9	Manual
2.0 - 2.9	Controlled
3.0 - 3.9	Reconciled
4.0 - 4.4	Integrated
4.5 - 5.0	Predictive

The strategic objective should be to move from Level 1 to Level 5 progressively. The CMA can play a central role in defining the controls and metrics required at each stage.

Conclusion

Carbon neutrality will not be achieved merely by purchasing renewable energy or installing efficient technology. It requires organisations to understand the full economic and environmental lifecycle of their decisions — and to demonstrate that the

resulting claims are credible.

The greatest ESG risk of the future may not always be deliberate greenwashing. It may be uncontrolled green data: fragmented, manually assembled, poorly reconciled and difficult to defend.

This creates a significant opportunity for CMAs.

The CMA can extend traditional expertise in costing, budgeting, variance analysis, reconciliation and internal controls into the sustainability domain. The role can evolve from measuring the cost of sustainability to measuring its economic value, controlling its information quality and challenging the credibility of its outcomes.

The CMA of tomorrow will not merely measure the cost of sustainability. The CMA will help measure the credibility of sustainability itself.

The umami of sustainability lies in the numbers: discover how CMAs can connect carbon, cost, controls and contracts to create smarter business decisions

In a world where every unit of energy, every tonne of carbon and every ESG metric increasingly carries financial, regulatory and reputational consequences, that credibility may become one of the organisation's most valuable assets. **MA**

References

1. Securities and Exchange Board of India (SEBI), "BRSR Core – Framework for assurance and ESG disclosures for value chain", Circular No. SEBI/HO/CFD/CFD-SEC-2/P/CIR/2023/122, 12 July 2023.
2. SEBI, "Balanced Framework for ESG Disclosures, Ratings and Investing", 2024.
3. SEBI, Industry Standards on Reporting of BRSR Core
4. Greenhouse Gas Protocol, Scope 2 Guidance.
5. ISO 14040, Environmental Management — Life Cycle Assessment — Principles and Framework.

HOLIDAY HOME AT PURI & NEW DIGHA

NEW DIGHA (WEST BENGAL)
(TWO A.C. ROOMS)

**HOTEL SURFRIDE &
RESTAURANT PVT. LTD.**
NEW TOWNSHIP
NEW DIGHA
PURBA MIDNAPORE
**THE BEACH IS JUST ONE
MINUTE WALK**

PER ROOM PER DAY
₹1,200/- , ₹1,400/-
CHECK OUT 09:30 A.M.

PURI (ORISSA)
(FOUR ROOMS)

HARIN GUEST HOUSE
NEW MARINE DRIVE ROAD
BESIDE BIRLA GUEST HOUSE
PURI
**SEA IS VISIBLE FROM THE
BALCONY**
**THE BEACH IS JUST ONE
MINUTE WALK**

PER ROOM PER DAY
₹700/- , ₹800/-
CHECK OUT 5:00 MORNING

The Institute of Cost Accountants of India Employees' Co-operative Credit Society Ltd. has its Two AC Rooms at New Digha (other facilities like Swimming Pool) and Four Non AC Rooms in Puri for Employees, Students and Members of The Institute of Cost Accountants of India and others. Rooms are well furnished with attached bath, Generator and Cable line facilities. Kitchen facilities are available only at Puri.

For details Contact:

The Institute of Cost Accountants of India Employees' Co-operative Credit Society Ltd.

12, Sudder Street, Kolkata - 700 016

Phone: 033 4036-4753, 4036-4731, 4036-4763