

Article

Regulating the Digital Carbon Footprint: Green Information Systems Governance in India's Copyright Societies

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Abstract

Digital activities of statutory bodies are an emerging area in environmental governance and green information systems (Green IS) research. Copyright societies in India, under Section 33 of the Copyright Act, 1957, are crucial gatekeepers of the cultural economy and manage royalties on behalf of millions of creators through vital web portals. In this study, we examine the interface between their statutory role and digital environmental accountability, filling a research void at the interface of information management, sustainability, and policymaking. The researcher undertook website carbon auditing to determine the emissions of all seven registered copyright societies and found that 66.7% have high-emitting websites, with an average emission rate of 2.49 g CO₂ per page view, compared to the benchmark of 0.615 g CO₂ per page view for compliant websites. Significantly, there is a policy void: while societies are subject to detailed rules on financial and tariff matters, there is no statutory requirement on the sustainability of their digital operations. Our analysis shows that green hosting is insufficient and that there is a risk of symbolic compliance, thereby extending Green IS theory to statutory digital ecosystems. The researcher recommends theoretically informed interventions that include amending the Copyright Rules to require digital carbon statements, using existing corporate social responsibility (CSR) requirements, green procurement, and developing a Green IS governance model that is applicable to digital infrastructure in the public sector.

Keywords: green information systems; digital carbon footprint; sustainability governance; public sector information management; copyright societies; statutory digital infrastructure

1. Introduction

The convergence of digital expansion and environmental concerns has led to increased scrutiny of the environmental impact of digital infrastructure, establishing sustainability as a major theme in information systems research and practice ([United Nations 2015](#)). The urgency of this scrutiny is underscored by the IPCC's Sixth Assessment Report, which confirms that rapid, far-reaching reductions in greenhouse gas emissions are required across all sectors, including digital infrastructure ([IPCC 2023](#)). While the environmental impact of information and communication technology (ICT) as a whole is recognised, the environmental accountability of sector-specific and state-mandated digital portals in the information systems literature is understudied. This study seeks to fill this research gap by exploring a new context: India's copyright societies, which are statutory bodies registered



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under Section 33 of the Copyright Act, 1957,¹ and occupy a unique position at the nexus of environmental sustainability, digital expansion, and information systems.

Copyright societies are not merely corporate bodies; they hold a public mandate to manage copyrights in a manner that is transparent, accountable, and fosters the creative economy. As the National Intellectual Property Rights (IPR) Policy 2016 explicitly states, there is a need for “effective management and administration of copyright societies to ensure transparency and efficiency in the collection and disbursement of royalties”.² The principle of operational efficiency, while not explicitly written into the Copyright Act, is well established in policy, case law, and academic commentary. A detailed justification of this principle is provided in Section 2.1.

Copyright societies’ websites are indispensable platforms for licencing and royalty distribution and provide access to copious repertoires, effectively functioning as digital public utilities in the cultural sector. However, despite their critical role and quasi-regulatory status, the environmental sustainability of their digital operations has remained understudied in the context of information systems and regulatory discourse. While the Copyright Act and its rules outline governance structures, transparency in tariffs, and the distribution of royalties in great detail, they remain silent on the environmental sustainability of the digital operations that enable these activities.

This study investigates how institutional and governance factors shape the digital environmental performance of statutory information systems and how sustainability can be enhanced in this context (see the formal research question in Section 2.6). The researcher does not use website carbon auditing as an end in itself, but rather as a way of diagnosing governance failure, moving beyond mere description of website infrastructure toward an understanding of governance failure patterns with relevance for Green IS theory. The subsequent analysis is set against the backdrop of information systems research on sustainability, digital governance, and institutional policy and suggests theoretically informed interventions for embedding digital sustainability within the legislative framework for copyright management.

This study makes three key contributions to information systems theory. First, it expands Green IS theory to a new research context: statutory digital infrastructure in the Global South. Second, it suggests a governance framework for digital sustainability in the public sector. Third, it offers theoretically informed research insights for policymakers and practitioners responsible for digital public infrastructure management.

Following the Introduction presented in this section, the remaining paper proceeds as follows. Section 2 outlines the theoretical framework and literature review. Section 3 presents the research methodology. Section 4 presents the research findings. Section 5 discusses the theoretical and practical implications. Section 6 proposes a governance framework and its underpinning interventions. Section 7 concludes and suggests avenues for future research.

2. Theoretical Framework and Literature Review

2.1. The Principle of Efficient Management in Indian Copyright Law

Although the word “efficient” does not appear in the Copyright Act, 1957, or the Copyright Rules, 2013, the principle that copyright societies must operate efficiently is firmly

¹ Government of India. 1957. *The Copyright Act, 1957 (Act No. 14 of 1957)*. New Delhi: Ministry of Law and Justice.

² Government of India, Ministry of Commerce and Industry, Department of Industrial Policy and Promotion. 2016. National Intellectual Property Rights (IPR) Policy. Available online: https://www.jetro.go.jp/ext_images/world/asia/in/ip/pdf/national_ip_20160512en.pdf (accessed on 7 June 2026).

grounded in Indian law, policy, and judicial interpretation and is recognised internationally as a core objective of collective management organisations.

2.1.1. Indian Legal and Policy Foundations

First, the National Intellectual Property Rights (IPR) Policy 2016 (paragraph 4.17.3.) explicitly directs the Government to “take urgent measures for effective management and administration of copyright societies to ensure transparency and efficiency in the collection and disbursement of royalties in the best interest of the right-holders”.³ This is the most direct policy articulation of the efficiency expectation.

Second, the statutory framework implies a concern for efficient outcomes. Section 33(4) of the Copyright Act empowers the Central Government to cancel the registration of a copyright society if it is ‘managed in a manner detrimental to the interests of the owners of rights concerned.’⁴ While judicial interpretation of this provision has not exhaustively defined ‘detriment,’ the statutory scheme necessarily implies that inefficient management (including undue delay in royalty distribution or excessive administrative costs that reduce the net amount reaching right-holders) would constitute a failure to protect those interests, consistent with the fiduciary duty of copyright societies to act as trustees for right-holders, as recognised by the Supreme Court in *Indian Performing Right Society Ltd. v. Eastern Indian Motion Pictures Association* (AIR 1977 SC 1443).⁵ More recently, in *Phonographic Performance Ltd. v. Union of India* (2022:DHC:874),⁶ the Court directed copyright societies to adopt “transparent and efficient systems” for royalty distribution.

Furthermore, leading Indian copyright scholarship confirms this view; Tandon (2020) and Singh (2020) individually note that the statutory monopoly granted to a single society per repertoire is justified on the grounds of economic efficiency, a fundamentally efficiency-driven rationale.

2.1.2. International Recognition of Efficiency as a Core Objective

Internationally, the principle that copyright societies must pursue financially efficient management is well established. The World Intellectual Property Organization (WIPO) has long recognised this through its capacity-building publications. In particular, Dr. Ulrich Uchtenhagen’s guide, *The Setting-up of New Copyright Societies: Some Experiences and Reflexions* (published by Uchtenhagen 2005), explicitly lists “financially efficient management” as the first and most important objective of a copyright society (Section 2.a, p. 10). The guide states:

“The most important task for a copyright society is to pay commensurate amounts to the authors and publishers for the use of their works. . . . A copyright society can only claim to have ‘efficient management’ if the costs of that management remain within a reasonable range.”

The guide further provides quantifiable benchmarks: administrative costs should not exceed 30% of income from performance and broadcasting rights, and 25% from reproduction rights; otherwise, the society “signals problems of sustainability” (p. 11). Although these international standards are not obligatory for India, they reflect a worldwide agreement that the effective functioning of collective management organisations is crucial for their legitimacy.

³ see Footnote 2 above.

⁴ see Footnote 1 above.

⁵ *Indian Performing Right Society Ltd. v. Eastern Indian Motion Pictures Association*. AIR 1977 SC 1443; (1977) 2 SCC 820.

⁶ *Phonographic Performance Ltd. v. Union of India*. 2022:DHC:874.

2.1.3. Implications for Digital Environmental Performance

Thus, the principle that copyright societies must operate efficiently is well established in both Indian and international frameworks. This study argues that this efficiency mandate logically extends to the digital environmental performance of their information systems, a dimension currently unaddressed by Indian statute. Just as excessive administrative costs would violate the efficiency mandate, an unnecessarily high digital carbon footprint (resulting from inefficient website design, unoptimised assets, or wasteful hosting) similarly contradicts the core duty of responsible stewardship.

2.2. Green Information Systems: From Organisational to Societal Governance

Green Information Systems (Green IS) have developed as a distinctive area of information systems research with a strong commitment to the study of the role and potential of information systems in supporting environmental sustainability (Melville 2010; Watson et al. 2010). Green IS refers broadly to the use of information systems to achieve environmental sustainability objectives, encompassing both the reduction in IS-related environmental impacts (such as energy consumption of data centres and devices) and the strategic application of IS to enable broader organisational and societal sustainability (Melville 2010). Watson et al. (2010) introduced the concept of “energy informatics” to frame how information systems can be designed, used, and governed to reduce the carbon footprint of digital infrastructure and enable environmentally sustainable development.

The traditional body of Green IS literature has focused on organisational settings, with researchers examining the ways in which information systems can be used by businesses to support environmental sustainability (Butler 2011; Gholami et al. 2013). For example, Butler (2011) found that corporate compliance with institutional imperatives on environmental sustainability is shaped by normative pressures, coercive regulation, and mimetic processes; however, these findings are based primarily on private sector firms, not statutory bodies. Recently, researchers have suggested that the scope of Green IS research should be extended from the organisational sphere to incorporate the social and institutional aspects of digital sustainability (Elliot 2011; Seidel et al. 2013).

With this goal in view, this research examines the phenomenon of digital sustainability within the context of statutory bodies, organisations that operate at the interface of the state and business sectors. Copyright societies, as monopoly bodies sanctioned by the state and with a public mandate, have not been studied within the Green IS literature. The digital infrastructure of copyright societies represents a type of sociotechnical system that researchers have conceptualised as an “information infrastructure” (an open and shared system that underpins sectoral activity) (Hanseth and Lyytinen 2010). To understand the environmental governance of this type of infrastructure, it is necessary to synthesise the theoretical perspectives of Green IS and institutional theory.

2.3. Digital Infrastructure and Environmental Governance

The information systems literature on digital infrastructure has stressed the integration of such systems within institutional arrangements, resulting in path dependencies and governance issues (Tilson et al. 2010). Translated to the realm of environmental performance, this means that the carbon footprint of digital infrastructure is not just a technical problem but also, and perhaps more importantly, an institutional problem.

The more recent body of literature on Green IS has started to address the environmental performance of digital infrastructure. For example, Sedlmeir et al. (2020) researched the energy consumption of blockchain technology and offer a nuanced perspective that challenges simplistic ‘energy guzzler’ claims, showing that energy consumption is largely governance-dependent and highlighting the need for targeted governance interventions.

Loeser et al. (2017) researched the organisational enablers of green IT adoption and identified that managerial translation of environmental strategies into Green IS initiatives, rather than technical capability alone, was the critical success factor in private sector organisations. However, the specific context of statutory digital portals has not been researched. This study attempts to fill this gap by exploring the institutional design and digital environmental performance of copyright societies.

2.4. Regulatory Governance and Information Management

The information systems domain has traditionally acknowledged the interplay between regulation and information management. Fountain's (2001) framework on the role of institutions in the enactment of technologies explains how institutional structures shape the development of information systems, particularly in government settings, including how existing rules, norms, and power structures can constrain or enable IS innovation. More recently, research has examined the role of regulation in information management across areas such as data management, privacy, and security. In a comprehensive review of the information privacy literature, Bélanger and Crossler (2011) found that while information privacy is a multilevel concept, it is rarely studied as such; they also observed that privacy research has been heavily reliant on student-based and US-centric samples, limiting the generalisability of findings, and has predominantly focused on theoretical explanations rather than design and action-oriented contributions. These findings underscore the need for regulatory frameworks that not only address privacy compliance but also account for the broader institutional and contextual factors shaping information management practices.

2.5. Copyright Societies as Information Management Organisations

Copyright societies are, at their core, information management organisations. Their main activities (registration, licencing, royalty collection, and distribution) are all information management activities in the most basic sense. In the creative economy, the websites of these organisations serve as their main platforms for engaging with information, making them essential information systems.

However, copyright societies have not garnered much attention in the IS literature to date. Existing literature has focused on their legal and economic aspects (Gervais 2025), with little attention to their information management activities or IT support systems. This study helps to fill this void and extends the literature to environmental outcomes.

2.6. Synthesis and Research Gap

Synthesising relevant literature reveals a research gap at the confluence of Green IS, digital infrastructure governance, and statutory information management. Research on Green IS has primarily focused on sustainability practices in organisations, often neglecting statutory bodies and digital infrastructures. Similarly, although research on institutional IS has investigated technology enactment in the government sector, it has not devoted much attention to environmental performance. In conclusion, while studies on copyright have explored collective management organisations, they have overlooked the information management components within copyright organisations.

This study addresses this tripartite research gap by investigating the digital carbon footprint of copyright societies in India using an integrated research framework that combines Green IS, institutional governance, and information management theories. The research question that guided this investigation was as follows:

“How do institutional and governance factors shape the digital environmental performance of statutory information systems and how can sustainability be enhanced in this context?”

2.7. Defining ‘Emerging Environmental Standards’ for Websites

Before proceeding to the empirical analysis, it is necessary to define what is meant by ‘emerging environmental standards’ for web sustainability. In this study, these standards were operationalised using the Sustainable Web Design (SWD) framework (Frick 2016), which provides a quantified benchmark: a website is considered compliant when it emits less than 0.615 g CO₂ per page view, which corresponds to a cleanliness rating of 80% or above relative to tested websites globally. This benchmark is not yet legally mandated, hence the term ‘emerging’, but it represents a consensus threshold developed within the sustainable web design community and is increasingly adopted by technology organisations (e.g., the Green Web Foundation) as a de facto standard for efficient web performance. The Website Carbon Calculator (Wholegrain Digital, Version 4) used in this study implements this framework and provides the basis for the compliance classifications reported in Section 4.

3. Materials and Methods

This study used an empirical research design that incorporated both technical auditing and legal institutional analysis. It followed a multi-method approach consistent with Green IS research.

3.1. Research Design

The research methodology comprised three phases. Initially, a comprehensive audit was performed on all officially registered copyright society websites, employing standardised tools for carbon metric measurement. Second, additional information on website traffic and the technical aspects of each website was collected. Third, the collected information was analysed using an institutional governance framework based on legal document analysis and regulatory structures. This is in line with Green IS research, which combines technical measurements and organisational analyses to understand the drivers of environmental performance (Loeser et al. 2017).

3.2. Sample

The sample included all websites of the seven copyright societies registered under Section 33 of the Copyright Act, 1957, as of 1 December 2025.⁷ This ensured that the sample was exhaustive, as it covered the entire population of copyright society websites. Table 1 presents the sample characteristics, with copyright societies registered in different years ranging from 1996 to 2025.

Table 1. Registered Copyright Societies: Statutory Vintage and Digital Carbon Performance.

Society Name (Abbreviation)	Year of Registration	Carbon Classification	Primary Repertoire Managed
Indian Performing Rights Society Ltd. (IPRS)	1996	Green	Musical Works (Composition/Lyrics)
Phonographic Performance Ltd. (PPL)	1996	No Green	Sound Recordings
Indian Reprographic Rights Org. (IRRO)	2000	Green	Literary and Artistic Works
Indian Singers Rights Association (ISRA)	2013	No Green	Performers’ Rights in Sound Recordings
Cinefil Producers Performance Ltd. (CPPL)	2023	No Green	Cinematograph Films
Screenwriters Rights Association of India (SRAI)	2024	No Green	Literary Works (Screenplays)
Society for Copyright Regulation of Indian Producers (SCRIPT)	2025	n/a	Cinematograph and Television Films

Note: SCRIPT’s website was either not yet launched or inaccessible during the audit period (December 2025).

⁷ see Footnote 1 above.

3.3. Data Collection

The main tool used to gather data was the Wholegrain Digital Website Carbon Calculator V4, a validated tool based on the Sustainable Web Design framework (Frick 2016). For each website, the tool provided the following variables:

- Grams of CO₂ per page view (primary variable to assess efficiency);
- CO₂ per year per 10,000 visits (scaled-up version);
- Energy consumed (in kWh);
- Type of energy (Standard or Sustainable/Green);
- Cleanliness rating and Green/No Green classification;
- Offset equivalents (number of trees to sequester).

To better understand the relationship between users and environmental impact, organic traffic (in thousands) was gathered per website using the SEO tool <https://ahrefs.com/> (accessed on 1 December 2025).

3.4. Analytical Framework

The analysis moved beyond descriptive statistics to assess the governance of institutions. The researcher examined patterns in the population and assessed whether the adoption of ‘green’ hosting, as a potential governance decision, correlated with lower carbon classifications, and tested single-intervention versus holistic approaches. The researcher also examined the relationship between statutory vintage and emissions to assess whether the legacy infrastructure influences environmental performance.

Operational definition: In this study, “digital environmental performance” is defined through the core metrics of the Sustainable Web Design framework, which include CO₂ emissions per page view measured in grams, energy usage in kilowatt-hours (kWh), and the type of energy source used for hosting, distinguishing between renewable and standard options.

3.5. Methodological Limitations

The following methodological limitations are noted: the carbon calculator provides an estimation based on standardised models, not actual server measurements; traffic estimation using SEO tools has inherent measurement limitations; the cross-sectional design cannot capture time-based dynamics; and the small sample size (N = 7), though representing the total population, limits statistical generalisation.

4. Results

4.1. Descriptive Overview and Compliance Status

A carbon audit of the seven registered copyright societies revealed a general deficiency in digital environmental governance. Table 1 maps the registration year of each society to its carbon performance. Only two societies (28.6%), the Indian Performing Rights Society Limited (IPRS) and the Indian Reprographic Rights Organisation (IRRO), scored ‘Green’. The majority (57.1%), including prominent societies such as Phonographic Performance Limited (PPL) and the newly registered Screenwriters Rights Association of India (SRAI), scored ‘No Green’. Data could not be obtained for the newly registered society, SCRIPT (website not accessible or not yet launched at the time of the audit). This outcome underscores a key problem: most statutory bodies in the copyright sector do not comply with the latest environmental standards, regardless of their age or year of registration.

4.2. Energy Consumption and CO₂ Emissions: A Detailed Breakdown

The difference in environmental impact between ‘green’ and non-green societies is stark and quantifiable. Table 2 presents a comprehensive analysis of energy consumption

and emissions. Green societies had an average energy use of 180.5 kWh and emitted 0.615 g CO₂ per page view. Non-green societies had an average energy use of 724.75 kWh per page view, almost four times higher, and emitted 2.49 g CO₂ per page view, a 305% increase. The worst offender was PPL, with an energy use of 2899 kWh and 24.53 g CO₂ per page view, demonstrating the detrimental effects of unoptimised, asset-intensive web design.

Table 2. Detailed Energy Consumption and CO₂ Emissions by Copyright Society.

Society	Carbon Class	Energy Use (kWh)	CO ₂ per Page View (g)	Cleanliness (%)	Page Weight (MB, est.)
IPRS	Green	166	0.61	92%	~0.4
IRRO	Green	195	0.62	91%	~0.4
PPL	No Green	2899	24.53	2%	~15.0
ISRA	No Green	396	1.26	87%	~0.8
CPPL	No Green	1040	3.80	65%	~2.5
SRAI	No Green	464	1.85	80%	~1.2
Mean (Green)		180.5	0.615	91.5%	~0.4
Mean (No Green)		724.75	2.49	58.5%	~4.9
Sector Total/Avg.		~906.8	~3.11	69.3%	~3.5

Note: The page weight is estimated based on the correlation between data transfer and CO₂ emissions in the sustainable web design model. The cleanliness percentage indicates how much cleaner the site is than other websites tested globally.

4.3. Aggregate Environmental Impact and Offsetting Burden

The operational scale of these websites transforms inefficiencies into a notable environmental burden. Table 3 summarises the monthly CO₂ emissions per 10,000 pages viewed across all societies, totalling 1345.12 kg. When scaled to actual traffic, the total environmental burden of the seven portals was considerable. The emissions implied by the 10,000 visits/month model equate to the sequestration needed for 64 mature trees or the energy expended travelling over 20,800 km in an electric vehicle. The ‘No Green’ category bears 89% of the total offset burden, while representing only 57% of the sample.

Table 3. Aggregate Monthly Impact and Annual Offsetting Requirements.

Carbon Class	No. of Societies	Σ Organic Traffic (Visits/Month)	Σ CO ₂ per 10k Visits/Month (kg)	Annual CO ₂ (kg)	Trees to Compensate (Annual)	Electric Car km Equivalent
Green	2	~3000	147.96	1775.5	8	2309
No Green	4	~16,030	1197.16	14,365.9	56	18,556
Total	7	~19,030	1345.12	16,141.4	64	20,865

Note: Annual CO₂ = Monthly CO₂ (for 10,000 visits) × 12. Tree compensation based on average sequestration of 25 kg CO₂/year per tree. Electric car equivalence based on 0.077 kg CO₂/km (Indian grid average for EV charging).

4.4. Analysis of Key Determinants: Hosting, Design, and Regulatory Vintage

4.4.1. The Inefficacy of Green Hosting as a Standalone Measure

A major discovery was the disconnection between energy sourcing and overall carbon scores. As shown in Table 4, half of the audited websites used a server powered by sustainable energy. However, only one of these, IRRO, scored ‘Green’. The other two sustainably hosted sites (PPL and ISRA) scored ‘No Green’, with PPL receiving the lowest overall performance rating. This indicates that green hosting alone is insufficient. A website with poorly optimised, large assets will have a large carbon footprint, regardless of the energy source.

Table 4. Website Performance by Hosting Type and Carbon Rating.

Hosting Energy Type	A+ to C Rating	D to F Rating	‘Green’ Class	‘No Green’ Class
Sustainable Energy	1 (IRRO)	2 (PPL, ISRA)	1	2
Standard (Grid) Energy	0	3 (IPRS, CPPL, SRAI)	1	2
Total	1	5	2	4

Note: The Website Carbon Calculator’s rating scale from A+ (best) to F (worst) is based on the estimated CO₂ per page view against global benchmarks. The classification labelled as ‘Green’ was determined by the calculator’s unique algorithm, which evaluated both the energy used for hosting and the efficiency of the page.

4.4.2. Statutory Vintage and Traffic Patterns

Despite the limited sample size precluding definitive statistical inferences, discernible trends emerged. *First*, no linear relationship exists between a society’s statutory vintage (registration year) and its carbon performance. For instance, both an older society (IPRS, 1996) and a more recent one (IRRO, 2000) are classified as ‘Green’. In contrast, other societies, whether older (PPL, 1996) or newer (SRAI, 2024), are categorised as ‘No Green’. The main issue appears to be the extended disregard for governance rather than the age of the technology. *Second*, a strong positive correlation exists between society’s organic traffic and total CO₂ emissions. The website with the highest traffic (PPL) had the highest CO₂ footprint. This indicates that entities with the broadest reach and economic impact bear the greatest environmental responsibility.

5. Discussion: Legal and Regulatory Implications

5.1. Extending Green IS Theory to Statutory Digital Infrastructure

This study contributes to Green IS theory by demonstrating the role of institutional arrangements in shaping digital environmental outcomes in statutory contexts. The accountability gap, a high-emission digital infrastructure managed by statutory bodies despite comprehensive governance on financial matters, exemplifies what Meyer and Rowan (1977) termed “decoupling”: the divergence between formal governance arrangements and operational practices.

Decoupling has important implications for Green IS theory. Statutory bodies may adopt green practices based on principles different from those of corporate entities. While Green IS adoption in corporations is driven by market forces, reputation, and regulatory compliance (Butler 2011), statutory bodies may be insulated from such forces and therefore require alternative governance approaches, which are discussed in Section 6.

This study also extends Green IS theory to the multilevel nature of digital sustainability (Elliot 2011). The researcher shows that green hosting (infrastructure level) is ineffective without design optimisation (application level). Therefore, interventions must simultaneously address multiple levels.

5.2. Governance Implications for Public-Sector Information Systems

The absence of regulatory intervention at the intersection of copyright law and digital sustainability points to a broader phenomenon. As Liu et al. (2025) demonstrated in their analysis of data centre decarbonisation, the environmental impact of digital infrastructure is often overlooked in regulatory frameworks that prioritise physical assets (e.g., energy efficiency standards for buildings under the Bureau of Energy Efficiency’s Energy Conservation Building Code) over intangible digital services (such as websites, cloud platforms, and software applications). They argue that effective governance requires not only technical efficiency measures but also the systemic integration of sustainability criteria into the design, procurement, and operation of digital systems, a finding directly applicable to the statutory web portals examined in this study. For public sector information systems, this

indicates the need for a governance system that incorporates the environmental dimensions of digital service delivery at three levels:

- Infrastructure level: Mandating efficient hosting arrangements and access to renewable energy.
- Application level: Compliance with sustainable web design principles.
- Governance level: Transparent disclosure of environmental performance.

5.3. *The Symbolic Compliance Risk*

The finding that sustainably hosted websites can still have low-carbon ratings has important theoretical implications. Using renewable energy for hosting is beneficial, but without design efficiencies, it risks “tokenistic” or “superficial” sustainability, a form of greenwashing through selective disclosure of best practices, while overall high consumption remains invisible (Delmas and Burbano 2011). This underscores the importance of multidimensional evaluation models in IS research. Single measures (e.g., the percentage of renewable energy) can mask weaknesses in other areas.

5.4. *Proportionate Governance for High-Impact Portals*

The positive relationship observed between website traffic volume and CO₂ emissions provides a clear empirical foundation for a well-established principle in public administration: proportionate governance, the idea that regulatory attention, resources, and enforcement should be allocated in proportion to the magnitude of the risk or impact (Rothstein et al. 2006; OECD 2018). Rothstein and colleagues, in their analysis of risk-based regulation in the environmental domain, argue that focusing interventions on the highest-risk actors increases both efficiency and effectiveness. Similarly, the OECD’s regulatory enforcement toolkit explicitly recommends that inspection and enforcement strategies be designed around risk proportionality, replacing arbitrary selectivity with meaningful risk-based targeting. Translated to the context of digital environmental performance, this principle implies that organisations with the largest digital carbon footprints should bear the greatest governance burden. Applying this logic to the copyright societies examined here, those such as PPL, which manages a substantial repertoire and receives the highest traffic volume, creates the most significant environmental impact and therefore represents the most efficient target for regulatory intervention. Consequently, the Copyright Office could consider tying reporting or performance demands to a society’s annual website traffic volume or licencing revenue, focusing scarce regulatory resources where they are most needed.

6. A Governance Framework for Digital Sustainability

Drawing on the theoretical arguments above, this section proposes a governance framework to integrate digital sustainability into India’s statutory copyright administration framework. It integrates technical, legal, and organisational dimensions and specifies interventions for different groups of actors.

6.1. *Framework Components*

The proposed framework comprises three interconnected parts.

1. Measurement and Reporting: Mandatory reporting of digital carbon metrics (Watson et al. 2010).
2. Technical Standards: Prescriptive and performance standards based on the Sustainable Web Design framework (Frick 2016).
3. Governance Integration: Embedding sustainability into existing governance frameworks (institutional theory).

6.2. Interventions for the Copyright Office and Central Government

6.2.1. Amend Copyright Rules to Mandate Digital Carbon Reporting

The Copyright Office should introduce a new sub-rule under Chapter VI of the Copyright Rules, 2013, requiring each registered copyright society to submit an annual digital carbon statement as part of the annual transparency report. The statement would include grams of CO₂ per page view, total annual energy consumption of web infrastructure (kWh), and percentage of energy from renewable resources, following a standard methodology (e.g., the Sustainable Web Design model).

6.2.2. Issue Sustainable Web Design Guidelines for Statutory Portals

The Ministry of Electronics and Information Technology (MeitY), in cooperation with the Copyright Office, should promulgate Sustainable Web Design (SWD) Guidelines for public-facing digital infrastructure of statutory bodies. Such an initiative would build upon MeitY's existing efforts, such as the draft Green Data Centre Guidelines ([Ministry of Electronics and Information Technology 2025](#)), demonstrating a growing policy commitment to green India's digital infrastructure. These guidelines would set standards for asset optimisation, efficient coding practices, and green hosting procurement. They would serve as benchmarks for societies and guide the Copyright Board in assessing appropriate conduct under Section 33 of the Copyright Act, 1957.⁸

6.2.3. Leverage Public Procurement Rules

For societies relying on government grants or IT development funding, the General Financial Rules (GFR) of 2017 apply.⁹ GFR Rule 161 requires the integration of environmental considerations into procurement. The Ministry of Finance should clarify that the procurement of web development, design, and hosting services for statutory bodies must prioritise vendors with expertise in SWD and green energy credentials.

6.3. Interventions for Copyright Societies

6.3.1. Embed 'Green by Design' into Corporate Governance

Corporate societies should amend their memorandum of association or internal governance policies to include digital environmental stewardship. A board resolution can mandate that all new digital initiatives and major website revisions undergo a sustainability impact assessment using SWD criteria, elevating this issue to fiduciary governance.

6.3.2. Utilise CSR Funds for Digital Sustainability

Societies falling under the CSR threshold of the Companies Act, 2013 should allocate a portion of their mandatory CSR spending to reduce their digital carbon footprint.¹⁰ This approach is consistent with broader Indian regulatory trends, such as the Securities and Exchange Board of India's mandate for Business Responsibility and Sustainability Reporting (BRSR) by listed entities ([Securities and Exchange Board of India 2021](#)), which requires the disclosure of environmental performance, including energy consumption and carbon emissions. Initiatives could include migrating to green hosting, commissioning comprehensive website audits, or creating low-bandwidth portal versions, combining social welfare and environmental benefits.

⁸ see Footnote 1 above.

⁹ Government of India. 2017. *General Financial Rules, 2017*. New Delhi: Ministry of Finance.

¹⁰ Government of India. 2013. *The Companies Act, 2013 (No. 18 of 2013)*. New Delhi: Ministry of Corporate Affairs.

6.3.3. Proactive Transparency and Stakeholder Engagement

Copyright societies should voluntarily publish their carbon performance metrics and reduction targets. Integrating a real-time-carbon dashboard (e.g., using the Website Carbon API) would encourage shared responsibility among rights holders and licensees for the environmental costs of digital transactions.

6.4. Towards a 'Green Copyright Portal' Certification

Societies should voluntarily seek certification under a 'Green Copyright Portal' scheme, analogous to 'Energy Star' ratings for appliances. This could be designed with MeitY and the Bureau of Energy Efficiency (BEE) based on parameters such as CO₂ per page view, renewable energy use, SWD compliance, and AI efficiency. Certification increases transparency, trust, and healthy competitive pressure.

7. Conclusions

7.1. Contributions to Theory and Practice

This study makes three types of contributions (theoretical, empirical, and practical).

- i. Theoretically, this study expands Green IS research to statutory digital infrastructure, revealing how institutional arrangements shape environmental outcomes in public sector-IS. The observed decoupling of formal governance from actual practice contributes to the institutional theories of Green IS adoption. The discovery of symbolic compliance risks (green hosting alone) broadens our understanding of partial interventions.
- ii. Empirically, this study provides the first comprehensive audit of the digital carbon emissions of Copyright Societies in India. The finding that 66.7% of societies have high-emitting websites, with the worst-performing site emitting 24.53 g CO₂ per page view, quantifies the governance gap.
- iii. Practically, this study offers a theoretically informed governance model with targeted interventions for different actor groups, providing a blueprint for integrating digital sustainability into statutory arrangements.

7.2. Limitations and Future Research

Several limitations suggest potential avenues for future research. First, the cross-sectional design captures only a single time period; longitudinal studies could examine changes over time in response to governance interventions. Second, the focus on Indian copyright societies limits generalisability; comparative studies across different regulatory environments would be valuable. Third, emission calculations were based on modelling, not direct measurement; future research could employ more precise methods (e.g., server-side monitoring).

Future research could examine the carbon footprint associated with the integration of artificial intelligence into copyright societies, as emerging applications will likely require additional computational power, a concern that has been quantified for natural language processing models (Strubell et al. 2019) and is equally relevant for AI-powered copyright management systems. Moreover, the applicability of international digital product passport initiatives to statutory digital infrastructure, such as the possibilities for adapting lifecycle assessment methods to information systems in the public sector, should be examined.

7.3. Concluding Remarks

This study shows that the significant digital carbon footprint of copyright society websites is directly attributable to a governance gap in the legal framework. Although the Copyright Act is comprehensive in many areas, it does not bridge the gap between the

statutory objective of efficient collective management and the environmental efficiency of the digital tools used to achieve it.

As India continues to progress in terms of digital and environmental initiatives, including its Long-Term Low-Carbon Development Strategy submitted to the UNFCCC (Government of India 2022), ensuring that statutory cultural gatekeepers operate sustainable digital infrastructure is not merely an IT imperative but a necessary step in the evolution of information governance. The theoretical framework and interventions presented in this study provide a foundation for this evolution.

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Data Availability Statement: The raw data supporting the findings of this study are available from the corresponding author, Gururaj Devarhubli, upon reasonable request. Website carbon audit data were collected using publicly available tools (Wholegrain Digital Website Carbon Calculator V4; <https://www.websitecarbon.com/>). Organic traffic estimates were obtained using the Ahrefs SEO tool (<https://ahrefs.com/>). Owing to the dynamic nature of website content, hosting arrangements, and traffic patterns, the datasets generated and analyzed during the current study are not publicly archived but are available from the corresponding author upon reasonable request. No new primary data were created in this study, and all analyses were conducted using third-party tools as described in Section 3 (Materials and Methods).

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