Kneat

How Electronic Validation Software Supports Environmental Sustainability in Validation

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Whitepaper

Executive Summary

As sustainability becomes a priority for regulators, investors, and consumers alike, companies in highly regulated industries are re-examining every aspect of their operations. Validation, once seen as a compliance necessity and little more, is now being recognized as an area where digital transformation can unlock significant environmental benefits.

By transitioning from paper-based to electronic validation, organizations reduce their reliance on paper, cut emissions across the document lifecycle, conserve water, and minimize waste. These benefits not only support global climate targets but also help companies demonstrate measurable progress against Environmental, Social, and Governance (ESG) commitments.

1. Reduction in Paper Use: Trees Saved, Ecosystems Preserved

Producing paper is resource intensive, requiring energy, water, and chemicals, while driving deforestation. Globally, the paper industry accounts for over 10% of forest loss,[1] with around 40% of commercially cut trees going into paper production.[2] This has cascading effects on ecosystems, biodiversity, and climate stability.

By moving validation processes onto Kneat Gx, companies dramatically reduce paper consumption.

▸ A medium-sized company processing 20,000 validation documents annually could save **four million sheets of paper**, equivalent to **480 trees** each year.[3]

▸ Across Kneat's user base, **20,000+ trees were saved in 2024,** with that number growing steadily as adoption expands. The environmental value extends beyond trees saved: conserved forests continue to absorb CO_2, protect soil health, and support biodiversity.

2. Lowering Carbon Footprint: From Manufacturing to Disposal

The lifecycle of paper — production, transport, storage, and disposal — carries a heavy carbon cost. Manufacturing one ton of paper generates about 2,000 pounds of CO_2, largely from fossil fuels,[4] while decomposing paper in landfills produces methane, a greenhouse gas 25 times more potent than CO_2.

Electronic validation reduces emissions by:

▸ **Eliminating storage warehouses**, and their associated energy for security and climate control.

▸ **Removing transport and printing needs**, cutting fuel consumption and related emissions.

▸ **Reducing travel through remote validation**, with Kneat projects often offsetting 0.5 tons of CO_2 per avoided domestic flight per person.[5]

Moreover, Kneat Gx is hosted on **Amazon Web Services (AWS)**, which in 2023[6] matched its electricity with 100% renewable energy — further lowering the footprint of digital validation.

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1   World Wildlife Fund. (n.d.). *Pulp and paper*. World Wildlife Fund. https://www.worldwildlife.org/industries/pulp-and-paper

2   World Wildlife Fund. (n.d.). *Pulp and paper*. World Wildlife Fund. https://www.worldwildlife.org/industries/pulp-and-paper

3   Based on an average validation document length of 20 pages, each document printed 10 times during its lifecycle, and one tree yielding 8,333 sheets of standard office paper (see Note on Estimates for methodology).

4   U.S. Environmental Protection Agency. (2022). Advancing sustainable materials management: Facts and figures report. U.S. EPA. https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling

5   Kneat. (2022). *The key to sustainable validation* [Whitepaper]. Kneat Solutions. https://kneat.com/resource/the-key-to-sustainable-validation/

6   Amazon Web Services. (2023). Sustainability at AWS. Amazon. https://sustainability.aboutamazon.com/environment/the-cloud

3. Water Conservation: A Hidden Benefit

The paper industry is also a significant water consumer. Producing one sheet of paper can require up to 13 litres of water, depending on the grade.[7] By eliminating paper-based validation, companies reduce demand on scarce freshwater resources, which are under increasing strain from climate change and industrial use.
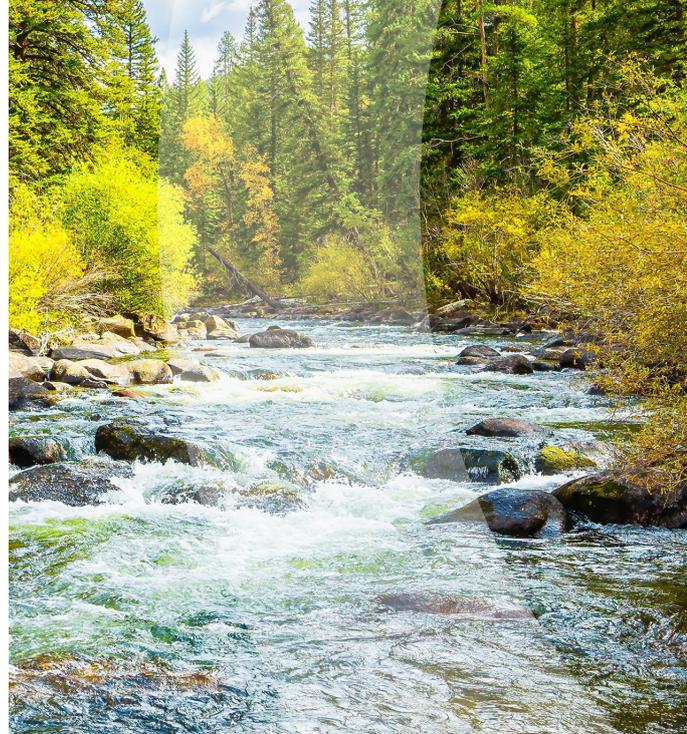
4. Waste Reduction and Simplified Disposal

Paper-based validation generates waste not only from documents but also from binders, toner cartridges, and secure shredding services. Electronic validation avoids these entirely:

- **Less landfill waste** from discarded files and printing supplies.
- **Reduced recycling and shredding costs,** which require energy and labor.

This aligns companies with circular economy principles by minimizing waste streams and reducing resource demand.

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7   International Water Association. (2019). Water use in the pulp and paper industry. IWA Publishing. https://iwa-network.org

5. Demonstrating Corporate Social Responsibility (CSR) and Meeting ESG Standards

Investors, regulators, and consumers increasingly evaluate companies on their ESG performance. Digital validation offers a tangible way to demonstrate commitment to reducing environmental impact.

By reducing emissions, conserving natural resources, and adopting modern digital systems, organizations strengthen their ESG position, improve transparency, and enhance stakeholder trust. These efforts align directly with the **UN Sustainable Development Goals**:

▸ **Goal 12:** Responsible Consumption and Production – through reduced waste and efficient resource use.[8]

▸ **Goal 13:** Climate Action – by lowering emissions from paper and travel.[9]

6. Supporting Global Climate Goals with Digital Transformation

Life sciences companies face intense scrutiny of their climate impact, with the sector's carbon footprint surpassing even the automotive industry by 54%.[10] To comply with the Paris Agreement, the industry must reduce emissions by nearly 60% by 2025.[11]

Digital transformation, including adoption of electronic validation, is one of the most effective levers available:

▸ **Deloitte projects digitalization could cut manufacturing carbon emissions by 7% by 2030.**[12]

▸ Kneat customers report not only environmental gains but also **cycle-time reductions of up to 100%** and **cost savings of 35%.**[13]

This dual benefit — sustainability and operational efficiency — underscores why digital validation is both a compliance necessity and a strategic advantage.

8   United Nations. (n.d.). Sustainable Development Goal 12: Responsible consumption and production. United Nations. https://sdgs.un.org/goals/goal12

9   United Nations. (n.d.). Sustainable Development Goal 13: Climate action. United Nations. https://sdgs.un.org/goals/goal13

10   Belkhir, L. (2019, March 20). Big Pharma emits more greenhouse gases than the automotive industry. The Conversation. https://theconversation.com/big-pharma-emits-more-greenhouse-gases-than-the-automotive-industry-115285

11   Belkhir, L. (2019, March 20). Big Pharma emits more greenhouse gases than the automotive industry. The Conversation. https://theconversation.com/big-pharma-emits-more-greenhouse-gases-than-the-automotive-industry-115285

12   Deloitte. (2023). Tech for impact: Unlocking sustainability through digitalization. Deloitte. https://www.deloitte.com/content/dam/assets-zone2/uk/en/docs/industries/technology-media-telecommunications/2023/deloitte-uk-tech-for-impact.pdf

13   Kneat. (n.d.). Case studies. Kneat Solutions. https://kneat.com/resources/?resource-type%5B%5D=case-study#filter

Conclusion: Going Paperless for a Greener Future with Kneat Gx

Electronic validation software offers regulated industries a proven path to sustainability. By adopting Kneat Gx, organizations reduce reliance on paper, conserve natural resources, cut emissions, and eliminate waste — all while enhancing efficiency, reducing costs, and accelerating time to market.

For investors, this represents not only an environmental benefit but also a marker of responsible governance and long-term resilience. By prioritizing digital validation, companies demonstrate leadership in ESG performance and contribute to a healthier planet — delivering measurable value for both stakeholders and society.

Note on Estimates: Figures provided are based on industry sources and reasonable averages (e.g., one tree producing 8,333 sheets of white copy paper). Actual results vary depending on tree type, production processes, and company usage. While exact numbers may differ, the broader value-chain impact of reduced paper use — cutting emissions at every stage from logging to disposal — remains clear.

About the Author

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Sean Daffy leads Kneat's Cloud Engineering function, where he is responsible for the delivery, management, and optimization of the company's cloud-hosted infrastructure. With deep expertise in software engineering and SaaS delivery, Sean has direct oversight of the energy consumption and carbon output of Kneat's hosting operations.

His role gives him a unique perspective on the environmental impact of digital validation. By integrating sustainability considerations into product delivery and infrastructure design, Sean ensures that Kneat Gx not only helps customers meet regulatory and operational requirements, but also supports their Environmental, Social, and Governance (ESG) goals.

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Talk to Us

Digitalize validation, your way with the validation platform trusted by the world's leading life sciences companies. Start your validation revolution by speaking to our experts.

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