

# Green Fintech: Global and Indian Perspectives, Challenges, and Opportunities

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## Abstract

The emergence of Green Fintech marks a critical evolution in the intersection of finance, technology, and sustainability. Globally, it enables carbon tracking, climate-friendly investments, and ESG integration, while supporting inclusive growth through digital platforms. In India, Green Fintech has enormous potential due to its robust digital public infrastructure and growing green finance sector. However, the country faces significant challenges including greenwashing, inconsistent ESG standards, regulatory gaps, and rural exclusion. This paper examines the global and Indian Green Fintech landscape, highlights India's key challenges, explores opportunities, and analyses case studies that showcase how fintech innovations can accelerate climate-positive financial flows.

**Keywords:** Green Fintech, Sustainable Finance, ESG, Blockchain, Artificial Intelligence

## 1. Introduction

Financial technology (Fintech) has transformed global finance by embedding digital solutions into payments, lending, and investment. At the same time, sustainability has become an urgent priority under the Paris Agreement and the UN Sustainable Development Goals (SDGs). Green Fintech integrates these two domains by aligning financial innovation with climate and sustainability objectives.

Globally, Green Fintech contributes to climate action through green bonds, tokenized carbon credits, and ESG-driven investment tools. For India, with its ambitious Net-Zero 2070 target and leading digital infrastructure (UPI, Aadhaar, Jan Dhan Yojana), Green Fintech offers a path to scale inclusive and sustainable finance.

## 2. Global Green Fintech Landscape

### 2.1 Europe

Europe has become the global leader in sustainable finance. The **European Union's Green Deal (2019)** sets out a roadmap for climate neutrality by 2050, with fintech playing a pivotal role. The **European Green Digital Finance Alliance (EGDFA)** integrates blockchain and AI into green bond issuance and ESG investment platforms. Nordic countries, advancing toward cashless societies, demonstrate how digital payments inherently reduce the environmental footprint of finance.

### 2.2 China

China's model highlights **state-driven Green Fintech**. Ant Group's **Ant Forest** has gamified eco-friendly behaviour, attracting over 600 million users and planting more than 100 million trees. China is also piloting a **Digital Yuan (CBDC)** with potential carbon-tracking features, aiming to integrate sustainability directly into its monetary system.

## 2.3 United States

The US showcases market-driven innovation. Startups like Aspiration promote carbon-neutral banking, while robot-advisors such as Betterment design ESG portfolios. Major banks are adopting fintech-enabled climate stress testing and ESG data analytics to meet investor demand for sustainable transparency.

## 2.4 Emerging Economies (Africa and Latin America)

In **Kenya**, M-Pesa has evolved into a platform for solar microfinance, providing rural households with pay-as-you-go clean energy solutions. In **Brazil**, fintech firms experiment with carbon-offsetting debit cards and blockchain-enabled reforestation credits. These regions highlight how Green Fintech can merge sustainability with financial inclusion.

# 3. Indian Green Fintech Landscape

## 3.1 Regulatory Framework

- **Reserve Bank of India (RBI):** 2023 reports emphasize sustainable lending and climate risk assessment.
- **Securities and Exchange Board of India (SEBI):** mandates **Business Responsibility and Sustainability Reporting (BRSR)** for top 1,000 companies, pushing ESG integration into fintech products.
- **International Financial Services Centres Authority (IFSCA):** promotes green bond listings at GIFT City.

## 3.2 Digital Public Infrastructure

India's fintech boom rests on its **Digital Public Infrastructure**:

- **Aadhaar:** biometric ID enabling financial access.
- **Jan Dhan Yojana:** bank accounts for inclusion.
- **UPI:** the world's fastest-growing payment system, crossing **10.5 billion monthly transactions in 2023**.

This infrastructure not only lowers transaction costs but also supports sustainability by reducing reliance on cash and enabling digital incentives for eco-friendly behaviour.

## 3.3 Startups and Innovation

- **Oorjan:** financing rooftop solar projects.
- **Urja:** microloans for clean energy adoption in rural India.
- **SustVest:** fractional renewable energy investments.
- **ESG Tech India:** AI-based ESG scoring tools.

## 3.4 Green Bonds

India has become a leading green bond issuer among emerging economies, with **USD 20+ billion** cumulative issuances by 2023. Pilots using blockchain are underway to ensure transparent fund allocation.

## 4. Challenges in India

1. **Low Investor Awareness:** Many retail investors are unfamiliar with ESG products, limiting demand for green fintech solutions.
2. **Greenwashing:** Startups and funds sometimes exaggerate environmental benefits. The lack of independent verification mechanisms worsens this risk.
3. **Digital Divide:** Rural and semi-urban populations still face barriers in internet access and digital literacy, excluding them from green fintech adoption.
4. **Regulatory Gaps:** India lacks clear rules on carbon credit trading, tokenized green assets, and blockchain-driven ESG platforms.
5. **Data Standardization Issues:** ESG reporting remains fragmented, making AI and fintech-based analysis inconsistent.

## 5. Opportunities

- **CBDCs with Carbon Tracking:** India's digital rupee can incorporate sustainability reporting.
- **Tokenized Green Assets:** Allow retail investors to own fractional stakes in solar or wind projects.
- **AI-driven ESG Analytics:** Provide transparency for investors and regulators.
- **Green Insurance:** Mobile fintech can provide crop and climate risk insurance to farmers.
- **Financial Inclusion:** Extending digital green finance to rural households can align climate justice with inclusion.
- **Global Leadership:** India can position itself as a hub for Green Fintech innovation in emerging markets.

## 6. Case Studies

### 6.1 Ant Forest (China)

Gamifies eco-friendly actions such as walking and online payments. By 2021, had engaged over 600 million users and planted 100 million trees.

### 6.2 European Green Digital Finance Alliance (Europe)

Facilitates tokenized green bonds and AI-based ESG platforms across EU states.

### 6.3 Aspiration (USA)

A neobank that offers carbon-neutral debit cards and "Plant Your Change" programs, where purchases are rounded up to fund tree planting.

### 6.4 UPI and SEBI's ESG Norms (India)

UPI reduces paper-based banking and enables eco-incentives. SEBI's BRSR mandate ensures listed companies disclose sustainability practices.

### 6.5 Oorjan (India)

Provides rooftop solar financing using digital platforms, supporting urban renewable energy adoption.

## 7. Conclusion

Green Fintech illustrates how financial innovation can align with environmental sustainability. Globally, it has facilitated carbon tracking, inclusive green microfinance, and ESG investment. India, with its fintech ecosystem and Net-Zero 2070 commitment, has the opportunity to lead the global Green Fintech movement. However, addressing challenges such as greenwashing, regulatory clarity, and rural inclusion is crucial. Strengthening policy, encouraging innovation, and fostering awareness will ensure Green Fintech drives sustainable development.

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