



## ► Innovative Technologies for Sustainable Finance

Key Insights on Technology and Sustainability from TechSprint Roundtables

# Contents

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Introduction.....2

Outlook for Emerging Technology applications in Sustainable Finance

- Artificial Intelligence .....4
- Blockchain .....7
- Sensor Technologies.....10

Conclusion and Call for Action.....11

Appendix: Multidisciplinary High-Level Roundtable Participants.....15



## Introduction

In an era where technological advancements are reshaping industries at an unprecedented pace, the convergence of innovation and sustainability has emerged as a critical area of focus. This report explores the transformative potential of cutting-edge technologies such as artificial intelligence, blockchain, and sensor technologies as applied to sustainable finance. It outlines that artificial intelligence, blockchain, and sensor technologies can offer groundbreaking solutions to some of the pressing challenges in sustainable finance.

Artificial intelligence, with its advanced data analytics and machine learning capabilities, provides deep insights and predictive models that drive informed decision-making and optimize resource allocation. Blockchain, with its decentralized and immutable ledger, has the potential for enhanced traceability and efficiency of transactions with applications to sustainable finance. Sensor technologies and the internet-of-things facilitate continuous monitoring of environmental data, which supports proactive management of sustainability-related risks.



Application of Artificial  
Intelligence in Sustainable  
Finance



Application of Blockchain  
Technology in Sustainable  
Finance



Application of Sensor  
Technologies in  
Sustainable Finance

## Insights from Multidisciplinary Roundtables

The Bank for International Settlements, the Central Bank of the United Arab Emirates and COP28 UAE launched, in 2023, the COP28 UAE TechSprint, a global technology initiative to foster technological innovations in scaling sustainable finance and combating climate change. The campaign called for technology solutions in sustainable finance through the application of artificial intelligence, blockchain, and sensor technologies. The COP28 UAE TechSprint resulted in 15 shortlisted candidates, across each of the three innovative technologies.

One year on, in 2024, the COP28 UAE TechSprint organizers hosted a series of roundtables with the shortlisted candidates to assess progress, opportunities, hurdles, and enablers for the application of innovative technologies in sustainable finance. The Banco Central do Brasil, in its role as the host of the G20 TechSprint 2024 during Brazil's 2024 G20 presidency, participated in the roundtables. A series of three roundtables convened, each dedicated to the application of one of these technologies with key findings outlined in this report.

These roundtables complement the [G20 TechSprint 2024](#) organized by the BIS Innovation Hub and the Banco Central do Brasil on the application of technologies to sustainable finance. It provides a continuous global platform for innovators to develop and apply technology solutions. The G20 TechSprint 2024 focused on overcoming the barriers to scaling nature-based solutions (NbS), environmental, social and governance (ESG) data reporting and compliance, and accelerating progress towards sustainable development goals (SDGs).



# Application of Artificial Intelligence in Sustainable Finance

# Opportunities of artificial intelligence in sustainable finance

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Artificial intelligence (AI) is emerging as a powerful tool in the realm of sustainable finance. By leveraging its capabilities to analyse vast datasets, simulate complex scenarios, and automate processes, AI is enabling financial institutions and businesses to make sustainability decisions, processes, and reporting more data-driven, efficient, and accurate.

AI enhances sustainability risk assessments by analysing large amounts of weather data, climate projections, and business indicators. This aids financial institutions and businesses in identifying and managing climate-related risks more effectively. AI can determine climate hazards at greater granularity, specific geographic locations, and exposure types.

AI enhances the efficiency of sustainable finance by automating tasks related to tracking, interoperability, and sustainability reporting. This empowers financial institutions and businesses to make better-informed decisions. AI models are also utilized to detect anomalies in sustainability data, enhancing data integrity and rapid resolution of irregularities.

## Hurdles and enablers

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### Data quality and availability

One of the primary challenges facing AI's implementation in sustainable finance is the lack of access to high-quality, fit-for-purpose, and granular datasets to effectively train AI models. The transparency, interpretability, and efficacy of AI models in application to sustainable finance are directly dependent on the quality, consistency, availability, and granularity of data.

Addressing gaps in existing sustainability data, improving data availability, and enhancing the overall data quality will enable more sophisticated AI models in sustainable finance. Data has to be not only accessible and of high quality but also offer specific context and granularity that can be interpreted by AI models and applied to enhance sustainable finance decisions.

### Technical infrastructure

The prevalence of legacy systems in many large organizations presents a notable hurdle to fast deployment of and connectivity to AI-enhanced solutions. The critical challenge lies in linking disparate data sources together. Integration of fast-evolving AI tools within a robust IT ecosystem is essential for AI to function effectively and provide robust and relevant insights.

The integration challenge between emerging and established IT systems often requires investment in infrastructure upgrades, and adopting energy-efficient infrastructure. Developing a clear roadmap for digital transformation, allocating dedicated resources for infrastructure upgrades, and fostering a culture of innovation can help overcome these barriers.

## Privacy and security

AI systems often require access to vast amounts of data, which can raise additional privacy and security challenges. This wealth of sensitive information can make AI systems attractive targets for cyberattacks, data breaches and information theft. These raise notable data privacy and security concerns among organizations implementing AI systems and wider stakeholders.

These issues underscore the need for robust security measures and careful algorithm design. Establishing clear governance frameworks and accountability mechanisms is essential for proactively addressing potential privacy and security challenges associated with AI systems. Moreover, organizations need to ensure an ethical and transparent application of AI systems.

## Insight from roundtables

Supervised learning has been considered by multidisciplinary experts as most suitable for AI and ML applications to sustainable finance due to its ability to leverage structured labelled data for more accurate predictions and decision-making (Figure 1). In addition, deep learning methods have the capacity to handle complex relationships within structured and unstructured data

### Which AI and ML techniques are most suitable for sustainable finance technology projects?

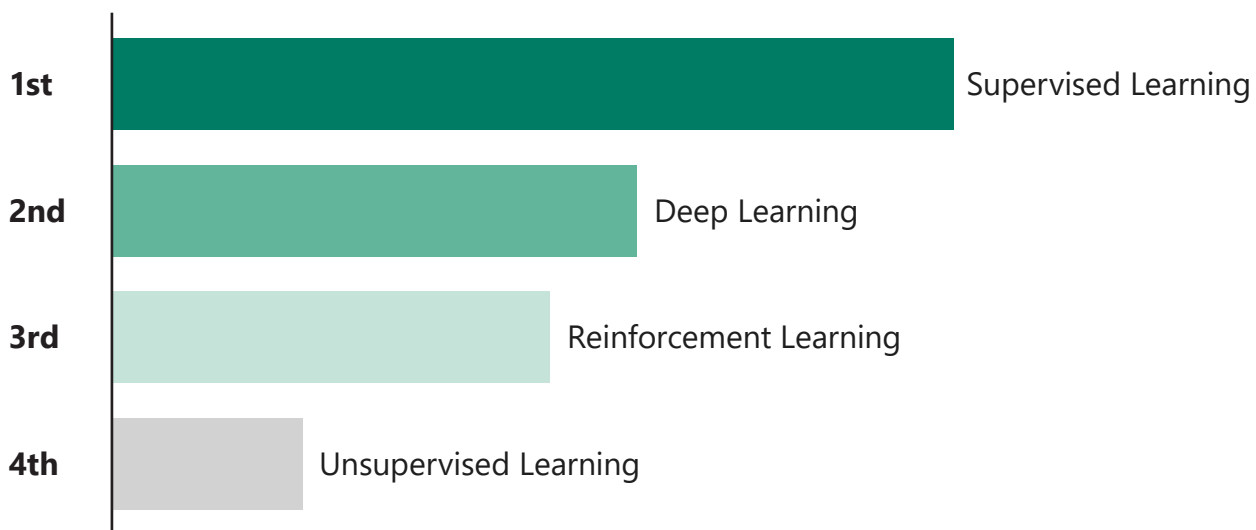


Figure 1. Artificial Intelligence Techniques Suitability for Sustainable Finance



# Application of Blockchain Technology in Sustainable Finance

# Opportunities of blockchain technology in sustainable finance

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Blockchain technology is gaining traction in sustainable finance with applications in enhancing transparency, traceability, and efficiency in financial transactions. By leveraging decentralized ledgers, blockchain enables secure and immutable recording of sustainability data, facilitating tracking of carbon credits, green bonds, and other sustainable assets.

Blockchain supports the tokenization of assets, allowing for the creation of digital tokens representing real-world assets like carbon credits, with a potential for streamlining investments in sustainable projects. Blockchain's smart contracts can streamline compliance and reporting processes, reduce administrative burdens, and ensure data integrity.

Blockchain technology can also play a crucial role in supply chain management by providing end-to-end traceability of products and verifiability of their environmental impact across the value chains. This may help businesses and consumers make more informed decisions, promoting green and sustainable practices across industries and their supply chains.

## Hurdles and enablers

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### Integrity and accountability

Integrity is a fundamental principle in carbon markets, ensuring that carbon credits represent genuine emissions reductions that are fair and transparent. Blockchain technology has been utilized in carbon market solutions with the potential to enhance transparency, traceability, and efficiency. To achieve this, it is essential to establish robust governance frameworks.

Prioritizing integrity and transparency can encourage broader participation and investment in carbon markets. Collaboration among stakeholders is crucial to develop and implement best practices that uphold the highest standards of integrity. These efforts can enable credible and trustworthy carbon market solutions supporting the overall goal of reducing emissions.

### Scalability and technical infrastructure

Scalability remains a critical challenge for blockchain technology in sustainable finance. As the volume of transactions increases, ensuring the network's ability to handle large-scale operations efficiently is vital. Without scalable solutions, the adoption of blockchain in sustainable finance could be limited by performance bottlenecks.

Infrastructure upgrades and developing more scalable blockchain solutions are necessary to support the growing supply and demand for sustainable finance. Integrating technical infrastructure, including sensor technologies, IoT devices, and AI, can enhance the capabilities of blockchain systems and improve data accuracy and reliability.



## Interoperability of solutions

One of the challenges for blockchain in sustainable finance is ensuring the interoperability of different solutions, including carbon credit platforms. Without interoperability, blockchain’s ability to scale sustainable finance and enhance transparency, traceability, and efficiency across different platforms could be hindered.

Establishing interoperable frameworks across financial and carbon credit solutions can facilitate cross-platform transactions, enhance market credibility, and support broader adoption. In addition, the effectiveness and interoperability of solutions depend on the accuracy and quality of input records entered at the source.

## Insight from roundtables

Hybrid public and permissioned blockchains were deemed most suitable for sustainable finance due to their balance of transparency and control (Figure 2). They combine public blockchain openness with permissioned blockchain governance. Consortium permissioned blockchains also received support for fostering broader collaboration

**What type of blockchain is most suitable, in the context of your operations/experience, for scaling the impact of blockchain in sustainable finance?**

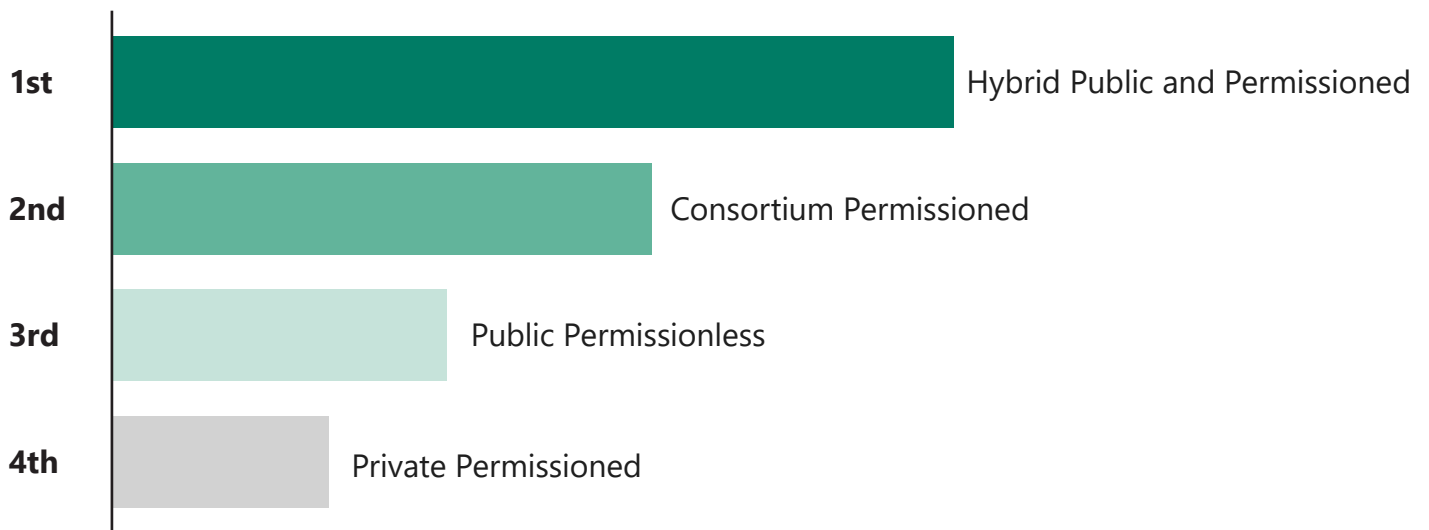


Figure 2. Blockchain Types suitability for sustainable finance



# Application of Sensor Technologies in Sustainable Finance

# Opportunities of sensor technologies in sustainable finance

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Sensor technologies and internet-of-things (IoT) enable greater availability and quality of sustainability-related data, which are essential for the growth of sustainable finance. These technologies enable precise monitoring of environmental parameters, enhancing the accuracy and efficiency of decision-making processes and reporting in sustainable finance.

Sensors and IoT devices facilitate detailed tracking of emissions, energy usage, and resource consumption. This granular data helps financial institutions and businesses identify areas for improvement and implement targeted sustainability measures. The ability to continuously monitor and track environmental data supports proactive management of sustainability risks.

Furthermore, sensor technologies, IoT devices, and digital twins can support the verification of carbon credits and other sustainability metrics required for informed decision-making in sustainable finance. By enabling data availability and transparency, sensor technologies and IoT build trust among stakeholders and enhance the credibility of sustainability processes.

## Hurdles and enablers

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### Scalability and deployment of sensor devices

As sensors are hardware devices, their deployment at scale and integration into IoT systems can be challenging. Implementing sensor devices and IoT solutions on a large scale requires investment and associated deployment costs in infrastructure, devices, and maintenance, which can be an initial barrier for many organizations.

Scalable and cost-effective sensor devices and IoT solutions and leveraging cloud computing and edge computing technologies can help facilitate deployment. Additionally, developing modular and flexible IoT systems that can be easily expanded or adapted can enhance scalability and make large-scale deployments more feasible.

### Data privacy and security

Sensor technologies collect vast amounts of data, raising concerns about data privacy and security. The potential for cyberattacks and data breaches poses significant risks to organizations and their stakeholders. Ensuring the security of IoT devices and data is crucial, especially in large-scale deployments.

Implementing robust cybersecurity and establishing clear data governance are essential to mitigate these risks. Ensuring that data collection and processing comply with privacy regulations and ethical standards remains essential to build trust and promote the responsible use of IoT and sensor technologies.

## Data interoperability and standardization

One of the key challenges in implementing IoT and sensor technologies in sustainable finance is ensuring data interoperability and standardization. The lack of uniform data structure can lead to fragmented sensor data feeds and IoT solutions with incompatible datasets, hindering effective data analysis and decision-making required to scale climate action.

To address these issues, it is crucial to develop robust data management frameworks and foster steps towards standardization of data protocols. Collaborative efforts among industry stakeholders to develop common frameworks can enhance data interoperability, making it easier to integrate and analyze data from diverse sensors and IoT devices.

## Insight from roundtables

Both remote sensing and onsite environmental monitoring sensors are crucial for scaling sustainable finance. They provide comprehensive data feeds for sustainable finance essential for tracking environmental metrics, verifying agreed sustainability commitments, and ensuring compliance with sustainability standards (Figure 3).

### What type of IoT or sensor technologies are most suitable for scaling the impact of sustainable finance?

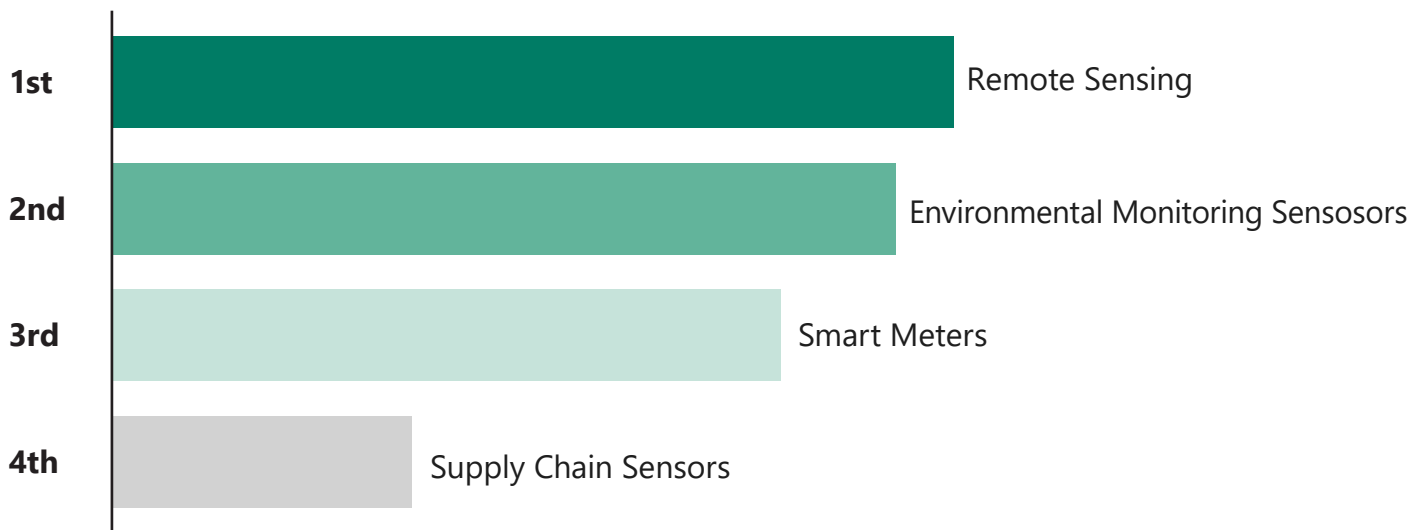


Figure 3. IoT & Sensor Technologies Types suitability for sustainable finance



# Conclusion and Call for Action

## Conclusion

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This report emphasizes the pivotal role of advanced technologies and multidisciplinary innovations in developing future-proof technology solutions to accelerate sustainable finance and global climate action. Advanced technologies offer a broader pathway to scaling climate finance, unlocking innovative approaches, and accelerating green transition and adaptation to climate change.

The roundtables underscored the critical role that advanced technologies play in transforming sustainable finance. The insights shared by the multidisciplinary experts highlighted significant progress and opportunities, while also taking stock of perceived challenges that remain. With the right enablers to overcome these hurdles, advanced technologies offer a rapid upside for sustainability.

While progress has been made, significant identified opportunities and challenges remain to reach the full potential of innovative technologies in enabling climate finance and climate action. To bridge these gaps, the report calls for further action to incorporate scaling sustainable finance through advancing innovative technologies and their enablers in the global agenda for climate finance.

The [G20 TechSprint 2024](#) under the auspices of the BIS Innovation Hub and the Banco Central do Brasil adds further insight into the progress of these novel technologies to overcome the barriers to scaling nature-based solutions (NbS), environmental, social and governance (ESG) data reporting and compliance, and accelerating progress towards sustainable development goals (SDGs).





## Appendix: Multidisciplinary High-Level Roundtable Participants

# Organizations



Bank of International Settlements Innovation Hub



مصرف الإمارات العربية المتحدة المركزي  
CENTRAL BANK OF THE U.A.E.

Central Bank of UAE



Banco Central do Brasil



Emirates Institute of Finance































COP28 UAE





# Technology and sustainability innovators\*

	<b>Ahya</b>	
	<b>Intensel</b>	
	<b>ESGpedia</b>	
	<b>UReg</b>	
	<b>Carbonbase</b>	
	<b>Fevertokens</b>	
	<b>Triangle</b>	
	<b>Trustwise</b>	
	<b>Zero13</b>	
	<b>6th grain</b>	
	<b>AllInfra</b>	
	<b>Evercomm</b>	
	<b>mistEO</b>	
	<b>OpenEarth</b>	

\*Participants to the High-Level Roundtable comprised of the senior leadership of the finalists of the COP28 UAE TechSprit.



The roundtables were facilitated by the Central Bank of the United Arab Emirates and Kearney to assess the progress and evolution of innovative technologies in sustainable finance.



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