



CLIMATE | **LEDGER**
INITIATIVE

NAVIGATING BLOCKCHAIN AND CLIMATE ACTION

2019 State and Trends

4 December 2019

The 'Navigating Blockchain and Climate Action' report was prepared by an international team of authors with a diverse set of experiences and insights. It is a knowledge product of the Climate Ledger Initiative (CLI) published on an annual basis to track progress according to latest research and use cases supporting CLI's role as an international knowledge platform to accelerate climate action through blockchain based innovations.

The Climate Ledger Initiative

The mission of the Climate Ledger Initiative is to accelerate climate action in line with the Paris Climate Agreement and the Sustainable Development Goals (SDGs) through blockchain-based innovation applicable to climate change mitigation, adaptation, and finance.

The Climate Ledger Initiative has been initiated in early 2017 by Nick Beglinger of Cleantech21 and is jointly operated by INFRAS Consulting, Analysis & Research and the Gold Standard Foundation.

In 2019, the Climate Ledger Initiative is financially supported by the Government of Switzerland and by EIT's Climate-KIC. It maintains a platform of donors, partners and collaborators that it is constantly expanding.

For more information, in case of interest in partnerships and collaboration and for registering to our newsletter please visit <https://climateledger.org/>.

For the full report, visit: https://climateledger.org/resources/CLI_Report-2019-State-and-Trends.pdf

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The Climate Ledger Initiative's second edition of Navigating Blockchain and Climate Action

The mission of the Climate Ledger Initiative (CLI) is to accelerate climate action in line with the Paris Agreement and the Sustainable Development Goals (SDGs) through blockchain-based innovation applicable to climate change mitigation, adaptation, and finance. The initiative sits at the nexus of one of the world's most pressing problems, climate change, with one of the world's most promising technological innovations, blockchain and broader distributed ledger technology. CLI addresses policy and research questions and identifies specific innovation opportunities in the intersection of climate and blockchain. Since the publication of the first Navigating Blockchain and Climate Action Report in 2018, the work has greatly benefited from the discussions and input from participants in over 10 CLI workshops and events and from the support of partner use cases.

In this second edition, we take stock of current state and trends. The report highlights the emerging success stories and bottlenecks in using blockchain for climate action (Chapter 2) and provides a deep-dive into selected crunch issues regarding digitizing MRV (Chapter 3) and tries to make sense of it all in the conclusions.

We are grateful to the diverse range of authors and interview partners who have contributed their vision and real-world learnings. As the findings show, the technologies are developing fast and innovative business are being tested in tangible use phases.

We hope this edition helps practitioners and policymakers alike navigate the quickly evolving field, learn and get inspired from the different experiences in many countries for of using blockchain to achieve the goals of the Paris Agreement.

Summary and key findings

The emergence of the blockchain technology, or more generally Distributed Ledger Technology (DLT), introduces new and innovative form of decentralized database that enables a secure exchange and storage of data and digital assets, primarily designed for peer-to-peer transaction platforms. Blockchain holds the most potential to accelerate climate action in three main areas based on the unique needs of the Paris Agreement (see also CLI 2018 Navigating Report¹):

- Next-generation registries and tracking systems
- Digitizing Measuring, Reporting and Verification (MRV)
- Decentralized access to clean energy and finance

Blockchain technology has matured during the last 12 months since the first edition of this report. In 2019 blockchain has proven to be more than a passing fad, demonstrating that it can serve as a pragmatic solution to business problems across industries. The increasing diversification of use cases for blockchain and removal of key barriers to adoption suggest further signs of maturation, including for climate action.

The key insights from the report are summarized below.

Carbon pricing and interoperability of carbon markets

- Interoperability of emission reduction registries with other databases, such as for example GHG inventories, will be crucial to unleash global mitigation activities. Linking of databases will also be important to avoid double counting of reductions (eg, by automating corresponding adjustments).
- Interoperability is also the precondition to functionalities provided by the World Bank's Climate Warehouse which is a decentralized technology approach to connect climate markets systems and to offer access to international finance. Various real world mitigation activities, such as the generation of climate assets from renewable generation in Chile or the tokenized services provided by EcoRegistry in Colombia are already considering interaction with the Climate Warehouse.

¹ <https://www.climateledger.org>

- Combining carbon credits with carbon taxes is another trend that can be observed in various countries, in particular in Latin America. Linking these domestic carbon pricing mechanisms may be a promising use case for future blockchain protocols and eventually the first step towards a next generation of linked carbon markets.

Digitizing Measuring, Reporting and Verification

- Bottom-up development of technology and practices reveal a fragmented landscape but themes emerge around integration of different approaches and win/win scenarios where MRV is improved but analytics also lead to a positive impact on good project design.
- Key barriers to adoption include:
 - Finance – It's difficult to scale up a new technology as a lone proponent; public and private investment is needed.
 - Standards adoption – Standards need to adapt to make sure that they can allow for new approaches.

Choosing digital MRV approaches

- Data collection use cases are falling into three potential categories that should integrate and if done well can deliver major positive feedback benefits:
 - Access to existing data sets/data set aggregation to support projects at a larger scale
 - Direct capture of information at impact source
 - Remote sensing of data related to a specific project
- Combinations of the above allow for both reduced cost of access but also a shift towards real time monitoring of key issues which can:
 - Help identify and respond to problems quicker (eg, reacting to illegal logging in real time)
 - Increase value of assets (eg, by avoiding old vintages of carbon credits)

- Standards systems like Gold Standard or the UN CDM or in-house due diligence requirements such as within Green Climate Fund need to:
 - Keep flexible – Avoid prescribing a specific tech over another, rather allow for multiple approaches assessed against core principles.
 - Make sure not to leave anyone behind – Many users will be shut out if only new approaches are allowed due to capacity limitations.

Blockchain for corporate climate and sustainability

Supply chain action is a major driver to deliver on ambitious climate commitments. Blockchain has the potential to tackle pressing supply management issues and the new challenges posed by customers' growing expectations for transparency. Improved data management and traceability solutions combined with internet of things (IoT) and artificial intelligence can break down data silos, create significant business value and incentivize climate action at scale.

- Corporate uses of blockchain technology focus on supply chain management across three main themes: traceability, collaborative logistics and product information.
- The question of trust is at the center of a debate on public vs private blockchains. Some experts argue that private blockchains like Hyperledger provide insufficient decentralization for security and trust. On the other hand, private blockchains are usually faster and more efficient because they can circumvent the need for proof-of-work / proof-of-stake and the role of validators. Consortium blockchains allow for hybrid approaches that combine benefits from both.
- The field is very dynamic. The technology has developed incredibly fast over the last two years and issues like energy consumption are being solved faster than anticipated. The current issues with scaling likely have more to do with the maturity of the market than with the maturity of the technology, although scaling on a technical level is often still a challenge.

Decentralized access to clean energy and finance

- The increasing capabilities provided by digitalization, in particular blockchain and IoT, have triggered the next level of renewable energy management. IoT and blockchain technology already started to extend financing opportunities of renewable energy deployment as shown by use cases from Puerto Rico and Singapore in this report.
- Blockchain helps mobilize corporate demand and respective finance

- for renewable energy and opens new market segments that are currently not supported by domestic renewable energy certificate systems. With users paying each other directly, many traditional market roles may shift or disappear, including distribution system operators, retailers, suppliers, metering point operators and more.

Conclusions and outlook – It's all about governance

In 2019, we have seen a very fast development of blockchain and related technologies by start-ups but also by many large corporations eager to benefit from the new technologies in their supply chains, processes and sustainability systems. At the same time, not many of the multiple well-meaning climate related “XY-coins” that started in 2017 or 2018 seem to be particularly successful.

Many governments and regulation struggle to keep pace with the technical developments.

In 2019 it is still challenging to replace paper contracts by blockchain-based smart contracts, to pay through the blockchain for climate services and transactions, let alone to interact with governmental registries and databases.

Progress in governance and regulation is also too slow in climate negotiations. In late 2019, UNFCCC negotiators have still not agreed on the “rulebook” detailing the rules for the Paris Agreement’s market mechanisms under Article 6.

This underscores the need to inform and engage policymakers in co-shaping the future systems of blockchain based credits and value transfer. The Climate Ledger Initiative will continue to engage and bring together practitioners, technology proponents, government officials and researchers to overcome hurdles and allow full utilization of the potential of blockchain and related innovative technologies for urgently needed acceleration of climate action.

If you want to be part of this, [contact us](#);
we are happy to partner with you.

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Supported by the Swiss Agency for Development and Cooperation (SDC) and EIT Climate-KIC.



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This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under Horizon 2020, the EU Framework Programme for Research and Innovation.

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