Asset Tokenization

A Blockchain Solution to Financing Infrastructure in Emerging Markets and Developing Economies

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Fintech to Enable Development, Investment, Financial Inclusion, and Sustainability

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Sources: GFYCAT

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Infrastructure

Section 1

Infrastructure Gap In EMDEs

Infrastructure Finance Gap in EMDEs

ASIAN DEVELOPMENT BANK

"The infrastructure gap is as large as 5 percent of the representative countries' GDP "

McKinsey Global Institute

"The biggest infrastructure financing gaps are in Indonesia and Mexico, while Brazil, India, Saudi Arabia, and South Africa"

WORLD BANK

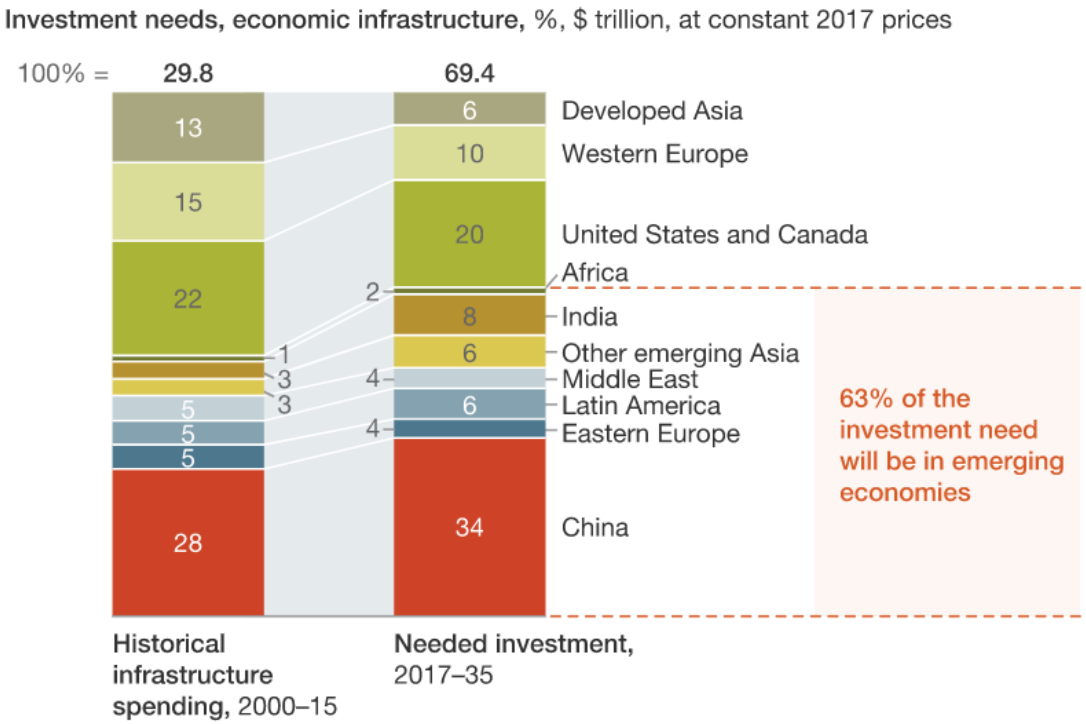
"EMDEs need to triple the current annual spending in infrastructure over the next decade "

OECD

"Only about one percent of institutional investor assets is allocated to direct infrastructure investments globally "

SUSTAINABLE DEVELOPMENT GOALS

"The demand for investment in infrastructure in EMDEs will only increase along with time to meet the United Nations' (UN) Sustainable Development Goals (SDG)"



Sources: IHS Global Insight; ITF; national statistics; McKinsey Global Institute analysis

Section 1

Infrastructure Gap In EMDEs

Conventional Infrastructure Financing Instruments

Modes		Infrastructure Finance Instruments		Market Vehicles
Asset Category	Instrument	Infrastructure Project	Corporate Balance Sheet/Other Entities	Capital Pool
Fixed Income	Bonds	Project Bonds	Corporate Bonds, Green Bonds	Bond Indices, Bond Funds, ETFs
		Municipal, Sub-sovereign bonds		
		Green Bonds, Sukuk	Subordinated Bonds	
	Loans	Direct/Co-Investment lending to infrastructure project, Syndicated Project Loans	Direct/Co-Investment lending to infrastructure corporate	Debt Funds (GPs)
			Syndicated Loans, Securitized Loans (ABS), CLOs	Loan Indices, Loan Funds
Mixed	Hybrid	Subordinated Loans/Bonds, Mezzanine Finance	Subordinated Bonds, Convertible Bonds, Preferred Stock	Mezzanine Debt Funds (GPs), Hybrid Debt Funds
Equity	Listed	YieldCos	Listed Infrastructure & utilities stocks, Closed-end Funds, REITs, IITs, MLPs	Listed Infrastructure Equity Funds, Indices, trusts, ETFs
	Unlisted	Direct/Co-Investment in infrastructure project equity, PPP	Direct/Co-Investment in infrastructure corporate equity	Unlisted Infrastructure Funds

Taxonomy of infrastructure financing instruments and vehicles

Limitations of Conventional Financing

- Cost of finances
- Cross-border risk
- Matching funding sources with financing
- Performance data integration

Sources: OECD (modified from Tian et al. 2020b)

Comparison of Conventional Infrastructure Financing and Asset Tokenization

	Direct government spending	Government, municipal, and sub-sovereign bonds	Commercial loan (senior or subordinated)	Listed equity funds	Unlisted direct equity investment and co-investment platforms	Asset Tokens
Pros	No payback obligation	Low borrowing costs High credit quality Tax-free	Reliable funding source Most applied	Direct access to the capital market	Direct ownership and management Higher return	Expanded investor pool Improved efficiency Reduced counterparty risks
Cons	Subject to political uncertainty Public deficits	Unattractive for investors due to low return rate Default risks Country risks	Highly Fragmented Multiple intermediaries High costs	High upfront and fixed fees High risks and volatilities	Limited liquidity Expertise required High upfront investment	Regulation uncertainty Technical Difficulties
Liquidity	*	***	*	***	*	***
Transaction Efficiency	**	*	**	*	*	***
Transparency	*	***	***	**	*	***
Private participation	*	***	***	***	**	***

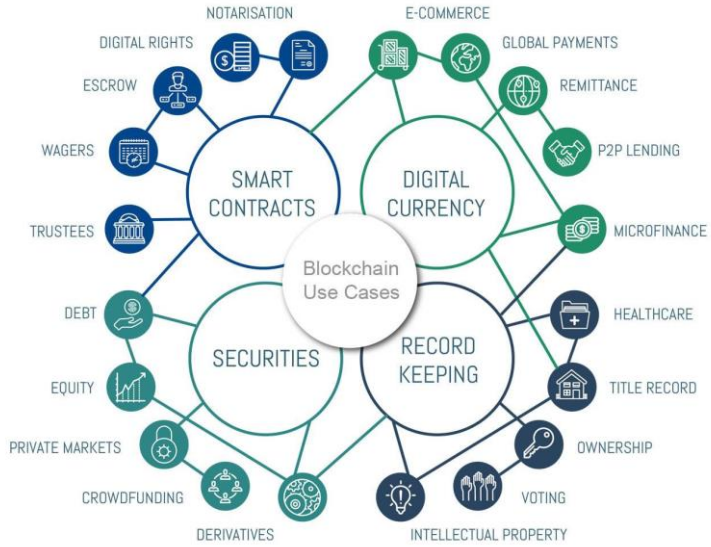
Section 2

Infrastructure Tokenization

Blockchain and Tokenization

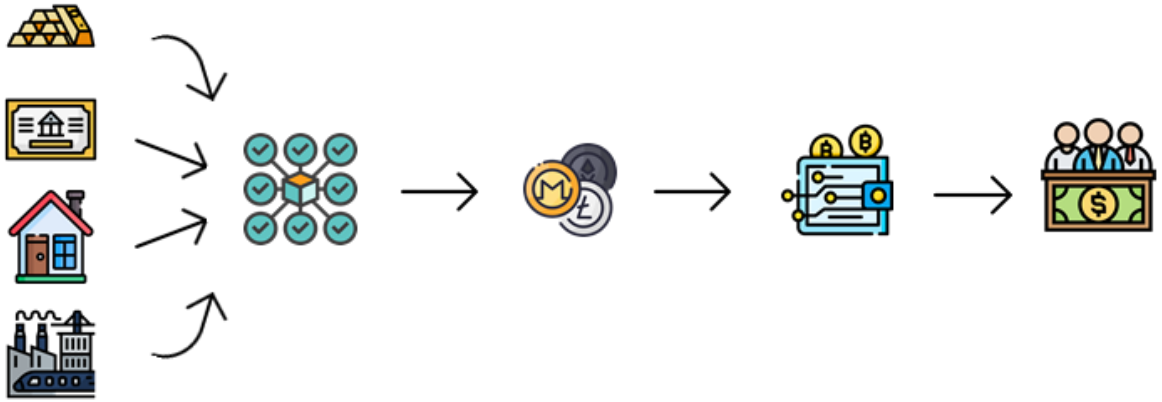
Blockchain

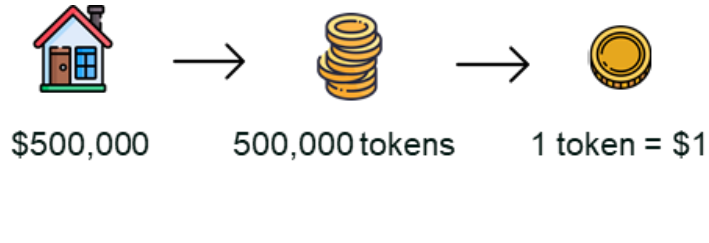
- Blockchain is a distributed, decentralized, public ledger.
- Key Features
  - Increased capability
  - Improved security
  - Immutability
  - Transparency
  - Faster settlement



Tokenization

- Allows for the conversion of the **services, economic value** and **ownership rights** derived from underlying assets in the off-chain real world into digital tokens ('access rights to value') on the blockchain.
- Enabled by self-executing and self-enforcing **smart contracts**, next-level transparency, liquidity, inclusivity and efficiency can be brought to EMDEs infrastructure finance.



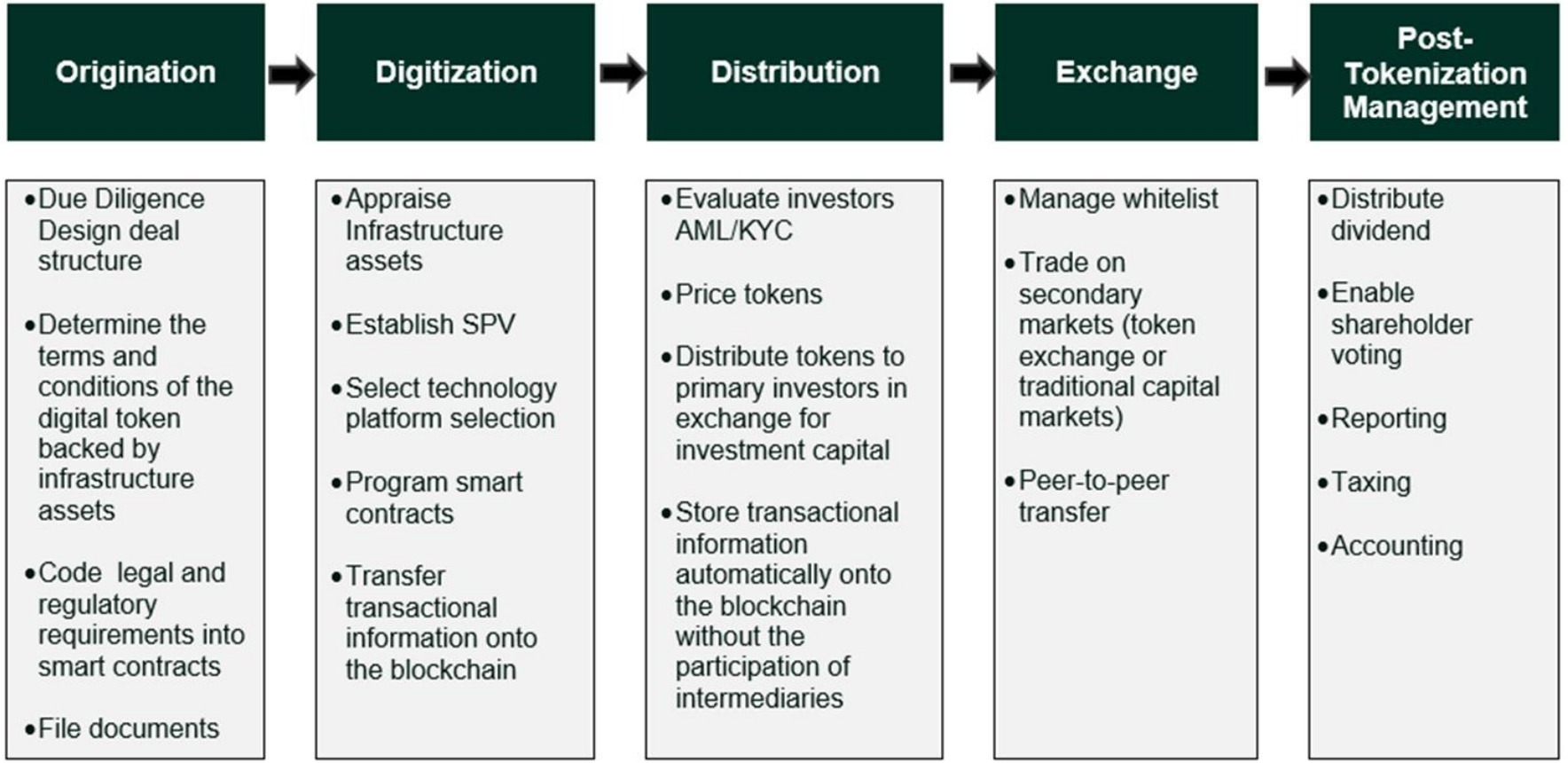


Sources: Peter Bergstrom

Section 2

Infrastructure Tokenization

Tokenizing Infrastructure Assets



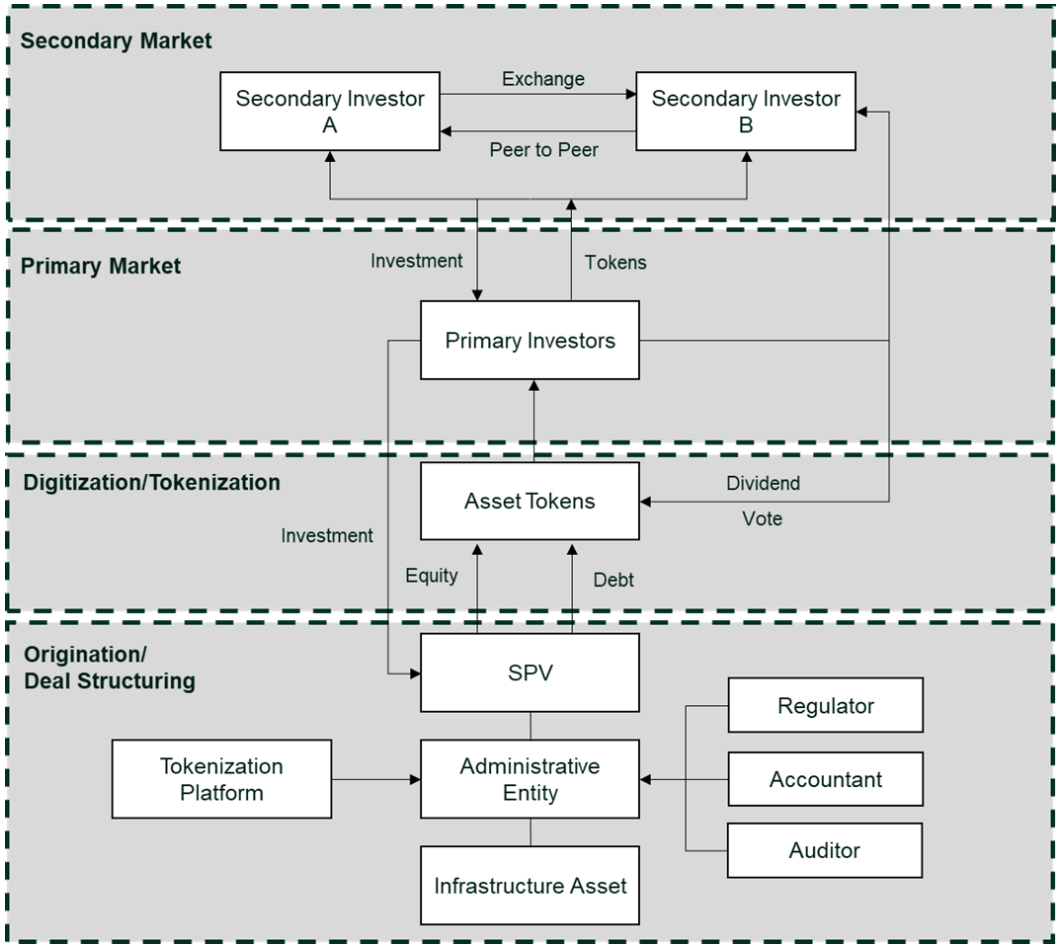
Procedures of tokenizing infrastructure assets

Section 2

Infrastructure Tokenization

Financing Structure of Tokenized Infrastructure Assets

Infrastructure asset tokenization refers to the process of tokenizing **ownership interests, services, or performance metrics** of the underlying infrastructure asset.



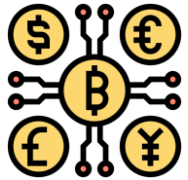
Transactional Flowchart of Infrastructure Asset Tokenization

Section 2

Infrastructure Tokenization

Value Proposition to EMDEs:

Simplified and Transparent Financing Process for Infrastructure Assets

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
						
Underlying assets	Asset valuation	Regulation and policy compliance	Tokenization planform selection	Tokens Issuance	P2P transfer and secondary trading	Custody services and corporate action

Section 3

EMDEs Infrastructure Tokenization

Public Finance, Private Finance and Asset Tokenization

EMDEs Government

Administration

- Self-enforced administrative requirements and regulatory policies programmed into smart contracts
- Automatic accounting and taxation
- Real-time data tracking
- Social audit
- Participation of communities

Finance

- Reducing unreconciled funds
- Frictionless intergovernmental transfers
- Lower transaction costs
- Shorter settlement time

Private Entities

Inclusivity

- Participation of small-scale institutional investors and retail investors
- International investors
- Small projects and SME
- Global investment opportunities
- Community shareholders

Finance

- Secondary trading
- Peer-to-peer transfers
- Lower transaction costs
- Shorter settlement time
- Immutable data recording
- Global markets
- 24/7 exchange

Section 3

EMDEs Infrastructure Tokenization

Challenges

Regulation

- Gaps between the novel asset classes and business models created through tokenization and the existing regulatory framework.
- Smart contracts are still not recognized as legal contracts in most jurisdictions
- Bans on cryptocurrency trading in China, India, Bolivia, and Ecuador.
- EMDEs governments are moving slowly to regulate the tokenized market.
- Missing alignment of international regulations and cross-border transaction rules.
- Stringent rules diminish benefits brough by tokenization.

Technology

- The blockchain system is capable of offering higher levels of data security, while applications of blockchain could be vulnerable to cyber-attacks.
- Actors in tokenized markets bear risks like malicious attacks (51% attack).
- The scalability dilemma impedes the development of tokenization.
- A lack of available digital infrastructure, or insufficient investment in adequate information and communication technology (ICT) infrastructure are among the biggest barriers faced by EMDEs in adopting blockchain and tokenization.

Section 3

EMDEs Infrastructure Tokenization

Case Studies

Pilot scale implementation by private sector and multi-lateral institutions

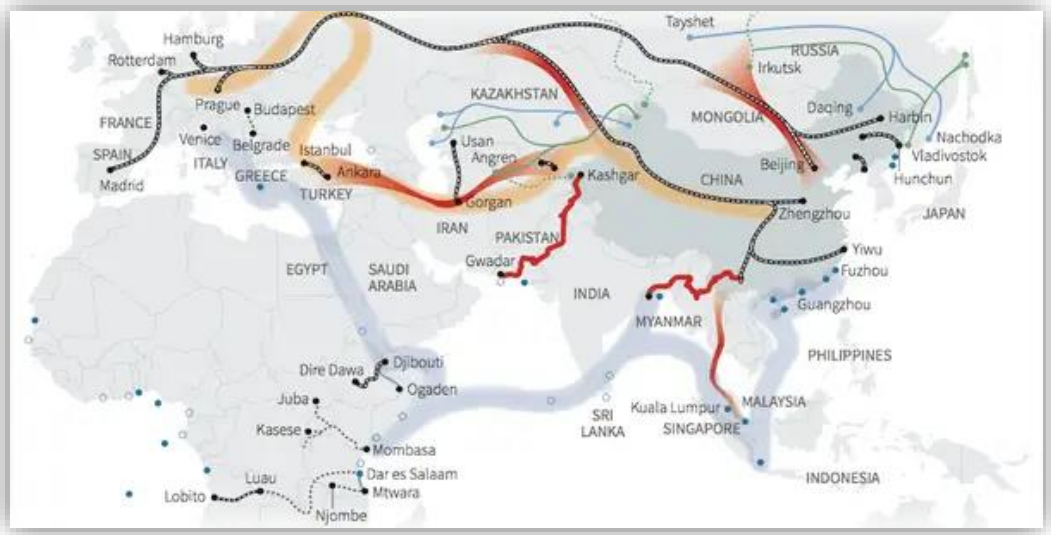
Highlight - Hydro-electric power plant
- Belt and Road Initiative

Issues:
Financial analysis indicates the internal rate of return (IRR) of the project is barely over 5%, which is lower than the 10% benchmark for EMDE infrastructure investment. Through conventional financing, the project can't be built.

Process:
Through tokenization, $150 million was raised in exchange for tokens worth $300 million, which can be redeemed for future energy consumption. The 50% discount incented local businesses and individuals to participate in the project.

Key participants:
- Government
- Project developer
- Technology and finance partners
- Local businesses (SMEs)
- Surrounding residents

Outcome:
Core members of the surrounding communities, such as local businesses and residents, who benefits the most from this project, were provided an opportunity to participate and invest in the plant. More importantly, with sufficient funding, this project survived and was able serve the community.

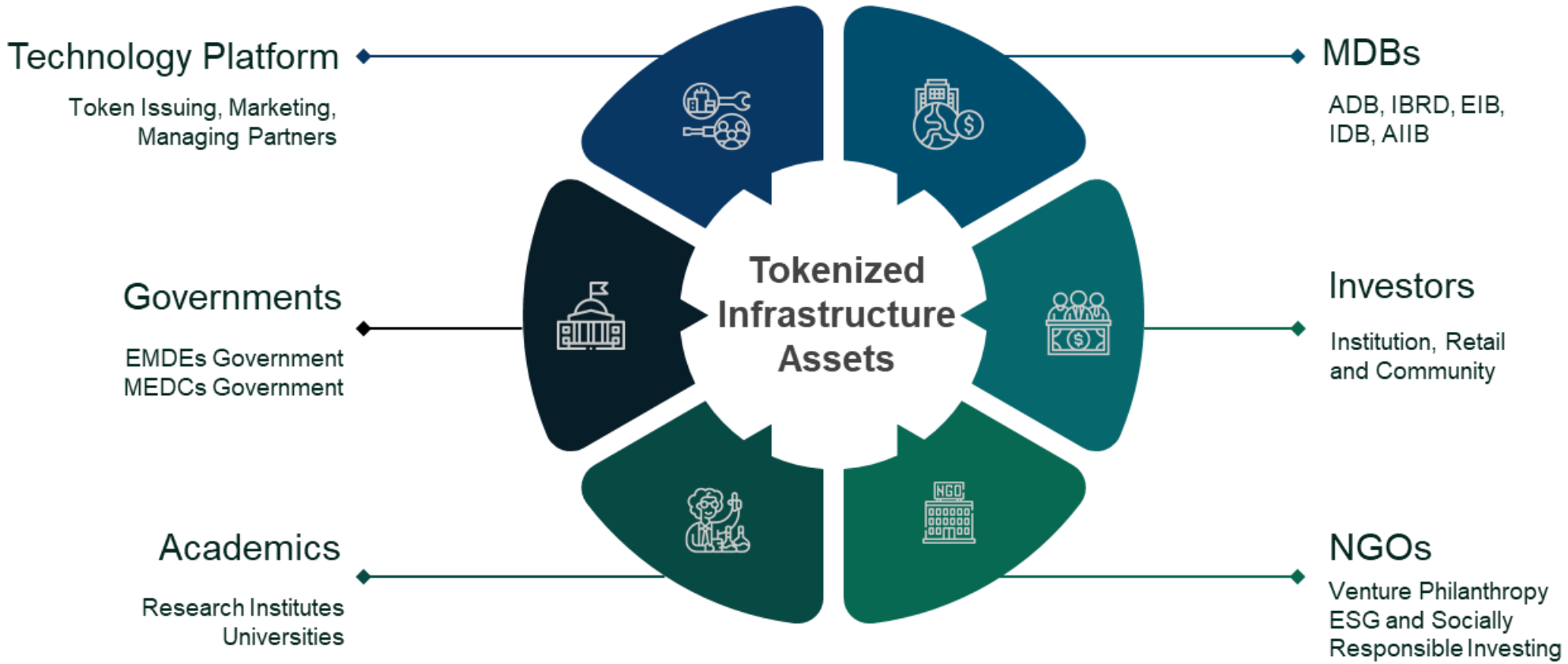


Sources: Business Insider; Balkan Green Energy News

Section 3

EMDEs Infrastructure Tokenization

Innovation and Collaboration



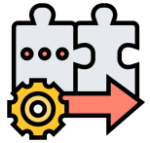
Section 3

EMDEs Infrastructure Tokenization

Innovation and Collaboration

Reducing poverty and increasing accessibility

Social equity and stability



Integration of SMEs

Reducing geographic divide

Knowledge sharing

Sources: Revised from GIH

Section 4

Implications for Policymakers

Legislation, Regulation and Education

- Update the legal system and regulation to ensure new participants, products, services, and risks brought by tokenization.
- Recognize the legal status of asset-backed tokens and smart contracts.
- Modernize tax legislation to take on board changes raised by tokenized assets.
- Establish a global standardized legal and regulatory system across jurisdictions.
- Form hybrid globalized governance and reporting system.
- Initiate a working group to develop a process for test ‘low hanging fruit’ applications.
- Support and provide an appropriate platform to raise awareness of the value-added characteristics and limitations associated with the innovative technology to educate participants of a future tokenized market.
- Work with academics and industry practitioners to establish an open-access toolbox complied with case studies, lessons learned, and other educational materials.

A glimpse into the future

Sources: Deloitte