Accelerating Green Financing with Emerging Technology: A Practical Guide to Emerging Technology, Green Digital Bonds and Country Readiness Mapping

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3rd Asia Finance Forum

Katherine Foster
CIO of the Sustainable Digital Finance Alliance

Digitisation of finance is a historic opportunity to align tomorrow's fintech-powered financial system with the Paris agreement and the green SDGs.

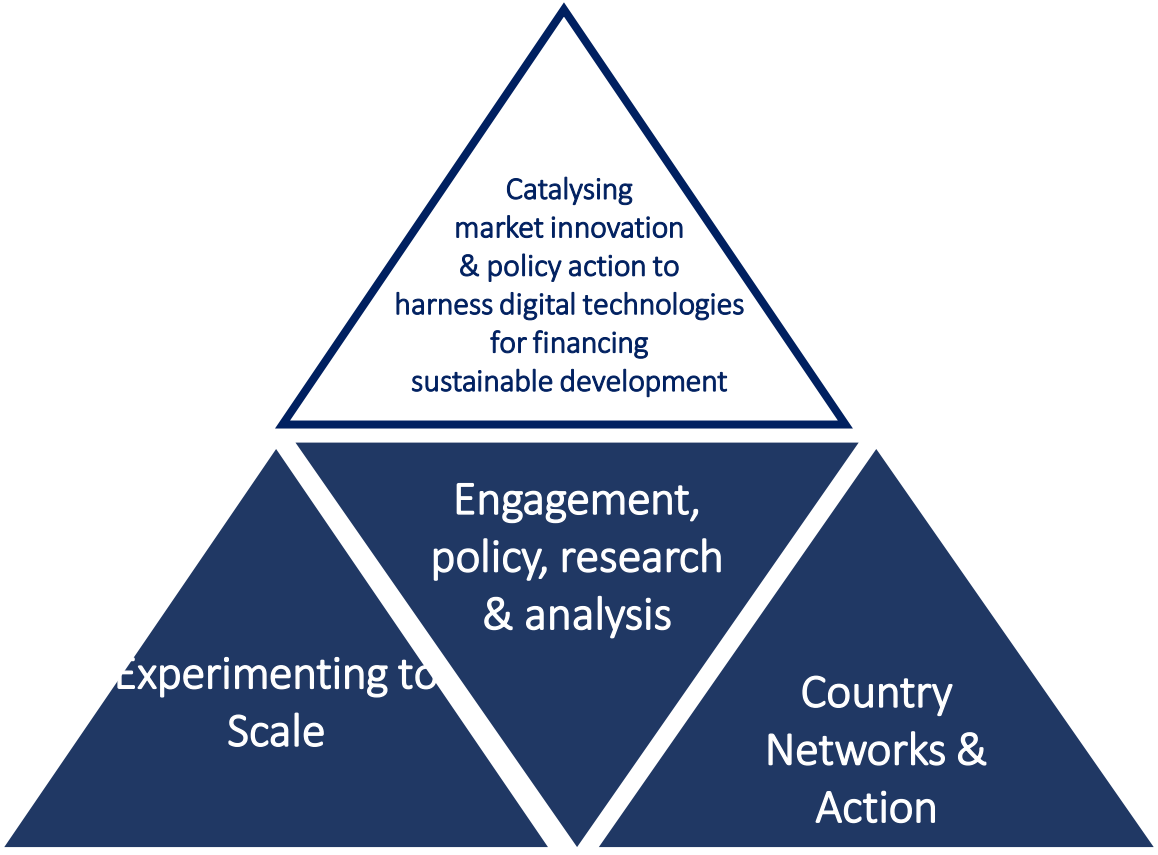
Session Overview

Sustainable Digital Finance Alliance

- Introduction to SDFA
- The evolution of green fintech
- Use cases
- Blockchain
- Digital green bonds
- Country Guide – Readiness Index

About The Sustainable Digital Finance Alliance

A not-for-profit co founded by UN Environment & Ant Financial at WEF 2017



International & national
Multi-stakeholder and cross-sectoral collaboration

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Practical Track Record

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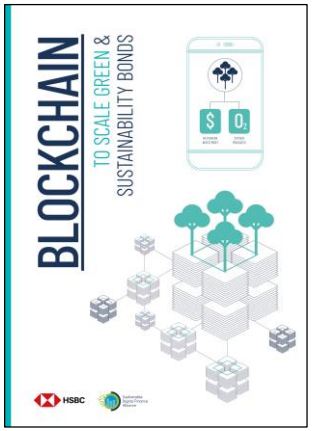

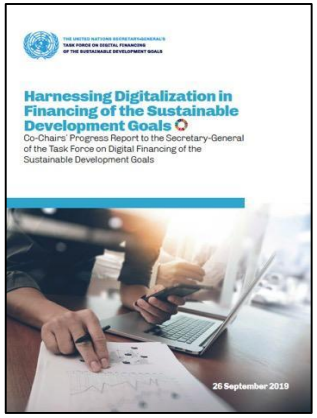

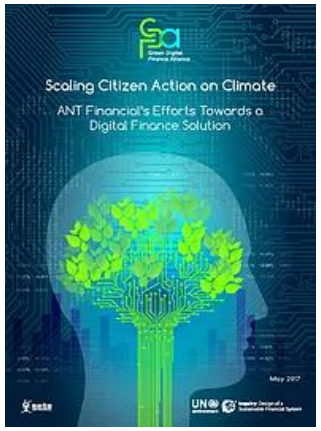

THE WORLD BANK

G20 ARGENTINA 2018

OECD

UNEP FINANCE INITIATIVE

Stockholm Green Digital Finance

MAVA FONDATION POUR LA NATURE

WORLD ECONOMIC FORUM

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

UNIVERSITY OF OXFORD

UNITED NATIONS

Transformative Change Needed In Economy

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2%

- **Only 5-10%** of bank loans are ‘green’ in countries where measured.
- **Less than 2%** of total bond issuance is made up of labelled green bonds.

US$7 trillion annually of peoples’ savings

US$300 trillions managed by financial and capital markets

US$12.5 trillion savings and private capital earn negative interest rates

The transition to
low-carbon and climate-resilient economies
that support the goals of the Paris Agreement requires at least

USD 60 trillion

in investments needed from now to 2050

Addressing the SDGs could unlock

USD 12 trillion

in business savings and revenue annually
and
create 380 million more jobs by 2030

Barriers to Sustainable Finance

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FINANCIAL ASSETS & ACTORS

Banking
US$135 trillion

Bonds
US$100 trillion

Equities
US$60 trillion

Investors
US$100 trillion

Insurance
US$29 trillion

BARRIERS TO SCALING SUSTAINABLE FINANCE

G20 Green Finance Study Group (2016)

Cost-effectively internalizing environmental externalities

Asymmetric information & search costs

Maturity mismatch

Lack of clarity

Inadequate analytical capabilities and data

Power of Digital Finance

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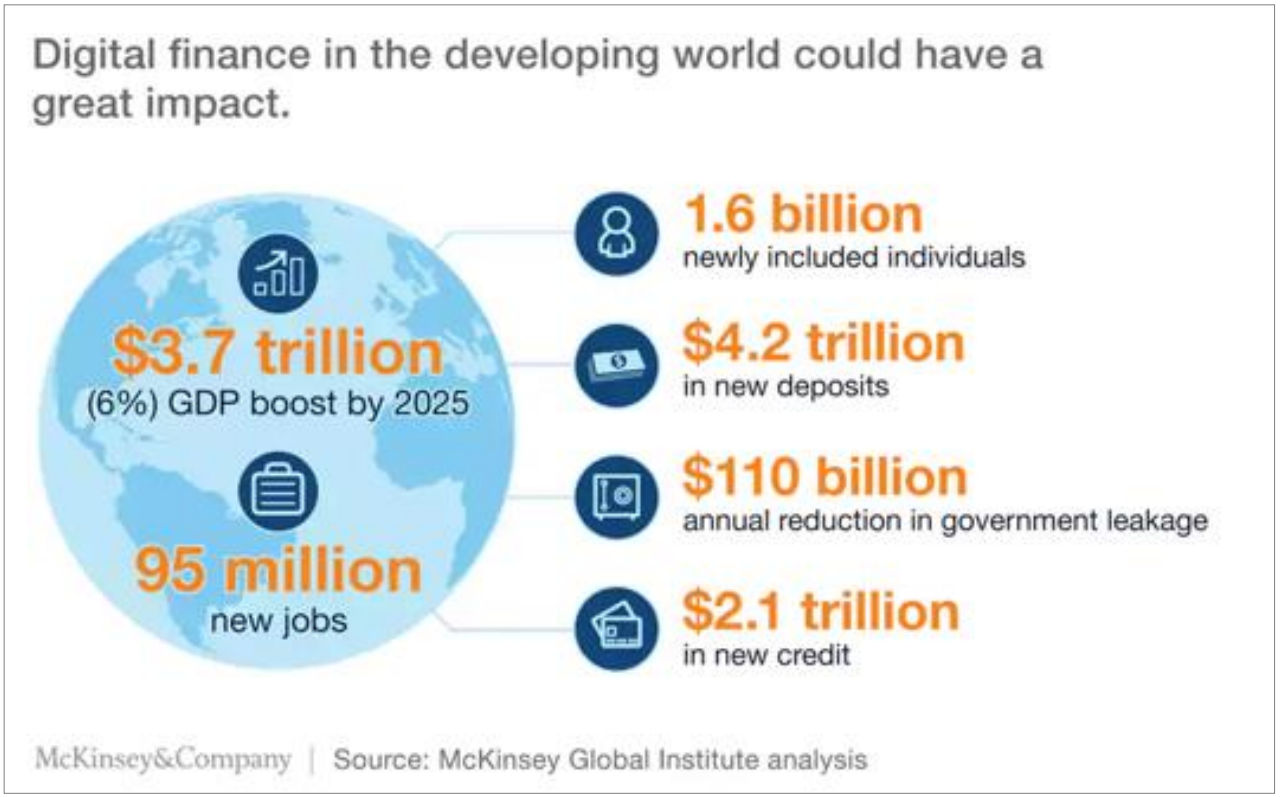
- **BIG DATA** – Improves risk valuation & information
- **AI & AUTOMATION** – Reduces cost
- **MOBILE** – Increases inclusion & business innovation
- **BLOCKCHAIN** – Improves transparency & integrity
- **INTERNET OF THINGS** – Integrate 'financial' and 'real' economies

OPPORTUNITY AND RISK



"Innovations in financial technologies offer the greatest hope for aligning the world's financial systems with the urgent twin objectives of sustainable development and deepening financial inclusion."

Dr. Patrick Njoroge, Governor, Central Bank of Kenya

Emerging Tech and Fintech Capacities

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1. Better metrics
    - Automated green scoring
    - Automated carbon data from the real economy

2. Green capital markets
    - Use of Proceed and proof of impact reportng from the underying green asset
    - Smart Contracts for speed and costs savings
    - Can make everyone a green asset owner

3. Incentivise carbon light lifestyle

Use Cases: Ant Forest Gcash Forest and GoGreen

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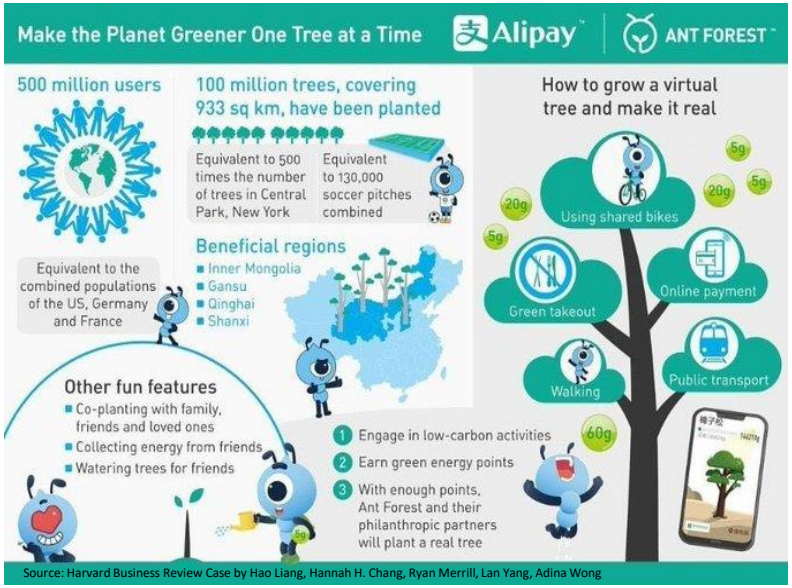
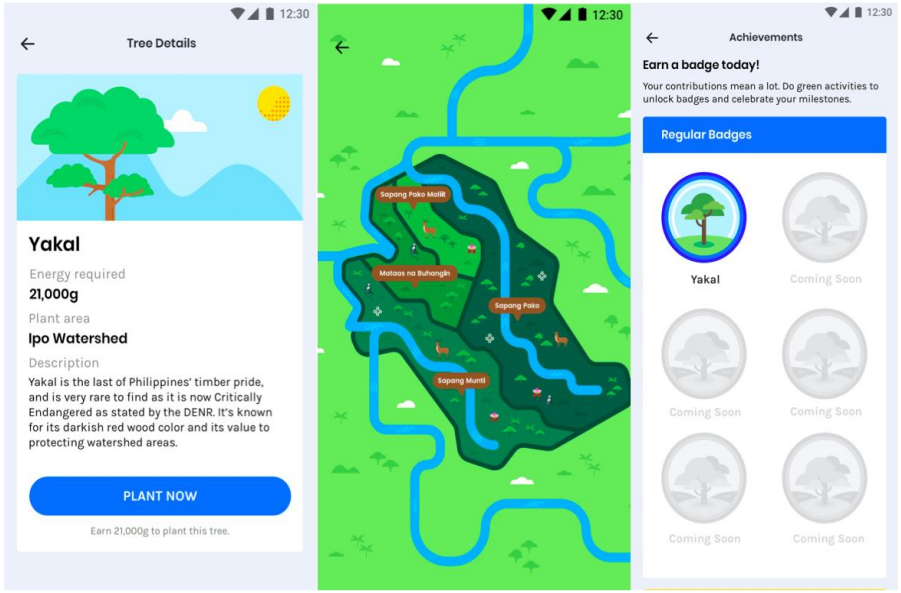
Fintech for Carbon Light Lifestyles and Market Action

gogreen

Ant Forest



GCash Forest



https://youtu.be/ZHHlWUPoppM

https://www.youtube.com/watch?v=U6bPb2ySd3Y

Use Case: ING Bank

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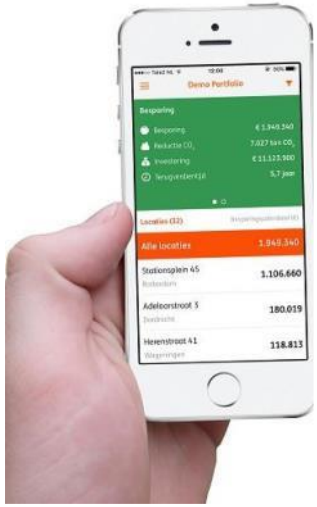
Better Metrics: through big data, AI and mobile technology reduce search costs of environmental performance information, promoting green commercial real estate loans.



1. **ING REF Sustainable App**

Modelling client's real estate portfolio in energy saving measures, including return on investment, payback period and CO2 reduction. 60% of client's real estate assets (19,000 assets) are online.

2. **100% financing sustainable improvements**

Sustainable buildings improve the risk/return profile. Differentiating financing policy: 5% higher LTV on sustainable buildings and 100% financing of sustainable improvements.

3. **0,5% discount ING 'green bank'**

Government recognized 'ING green bank' loan at 0,5% discount.

4. **Business Case optimisation**

Advising on government regulations and subsidies, optimizing the business case for profitable sustainable investments. Over 250 projects analyzed and over 100 projects completed.

5. **Recognition**

EPC certification with successful sustainability labeling A, B or C certificate. Over 9,500 labels identified.

Source: ING Bank

Use Case: M-Kopa

Unleashing New Capital: Mobile technology and IoT unlocking new sustainable business models, making the deployment of capital into off-grid companies commercially viable.

600,000
homes connected to affordable solar power as of January 2018.

US$450 million
projected savings of current customers of over the next four years.

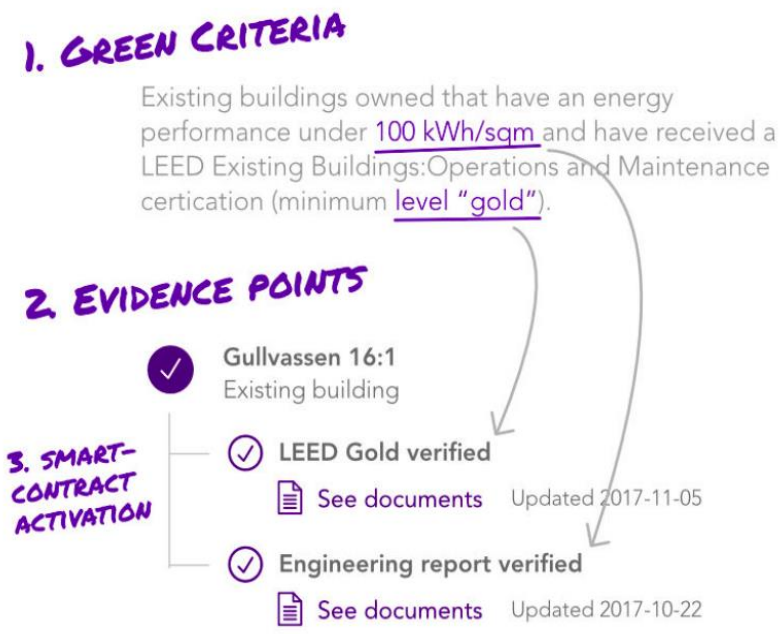
75 million
hours of kerosene-free lighting per month

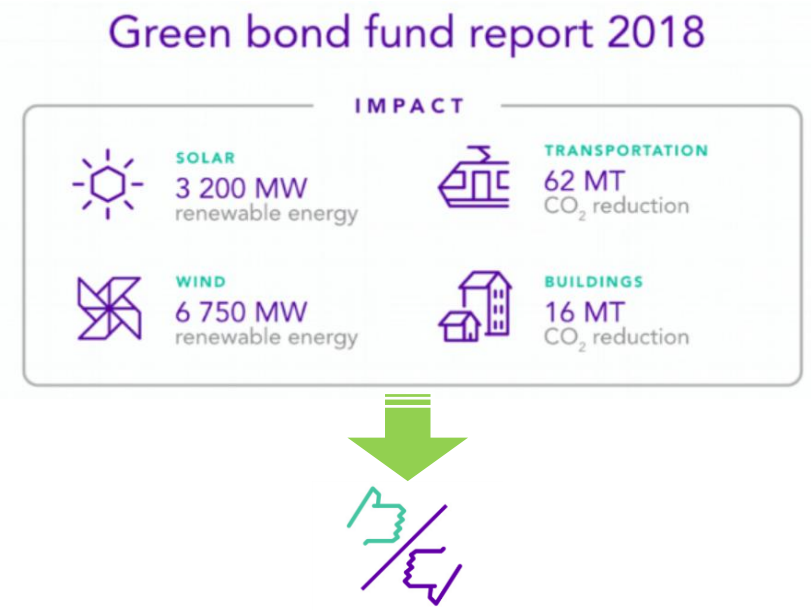
Source: M-Kopa

Use Case: Green Asset Wallet

Lowering the costs of validating green investments through blockchain and the Internet of Things.

Validation → Impact



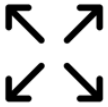


Source: Stockholm Green Finance

Use Case: Convergence Finance

ACCESS TO INTEL

Proprietary blended data and analysis that can only be found at Convergence.



BROADEN NETWORKS

Networking events and capacity building sessions for members to connect with key stakeholders in the market.

EASE DEALMAKING

Members can quickly filter and find credible and high quality deals and connect with investors across sectors and regions.

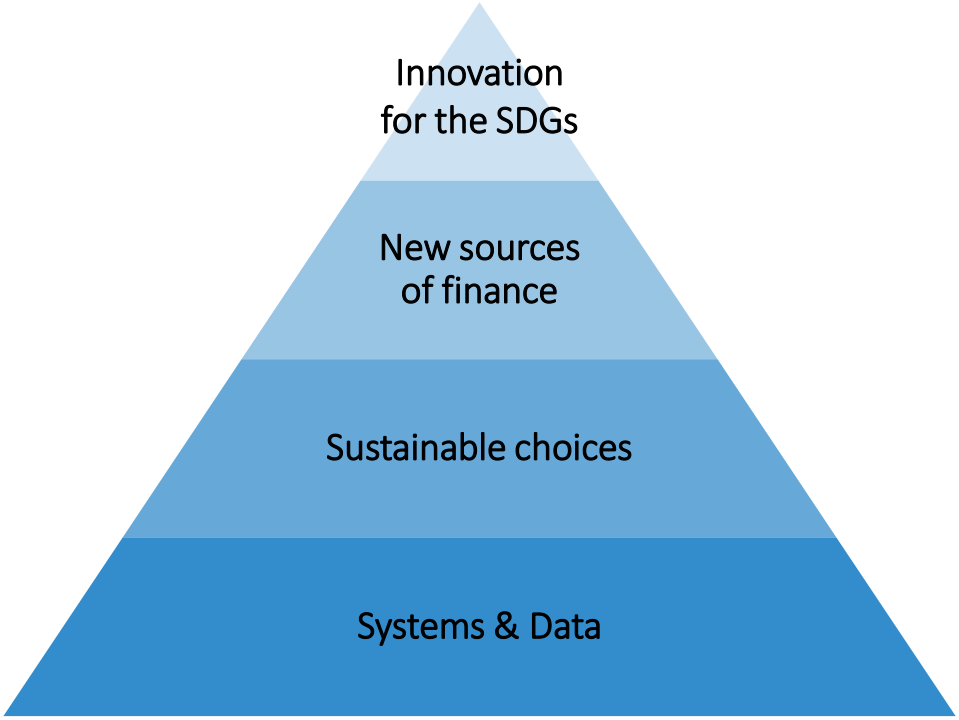
MARKET ACCELERATION

Grant funding for the design of catalytic blended finance vehicles that aim to attract private capital to global development at scale.

Source: Convergence.finance

Digital Finance enabling new sources of finance

Digital for Sustainable Finance and Innovation



Smart city programme: transformations through IoT

Sarvajal: digital finance to serve poor communities clean water

EcoFinance: loan applications via SMS or online

ING Bank: mobile to identify energy improvements

Origins: automates parts of bond issuance

Barriers to Scaling Sustainable Digital Finance

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CORE BARRIERS

- **Limited understanding** about the potential of digital finance to enhance sustainable finance
- **Silos** between stakeholder groups and development agendas
- **Little international cooperation** (regulatory
- **Standards and Governance**
- **Incentivization** of Innovation and solutions

SPECIFIC BARRIERS

- **Regulatory:** Over and under regulation (reactionary) and no international coherence
- **Technology:** Costs, risks and robustness
- **Data:** weak infrastructure, robustness, value and adoption
- **Business Models:** Weak and uncompetitive to scale (incentives)
- **Environmental:** Harmful effects of the digital life cycle

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Blockchain 101

Blockchain

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Common Database

Accessibility

Cryptography

Security
Public & Private Keys

Peer-to-Peer network

Transparency & Accountability

Blockchain

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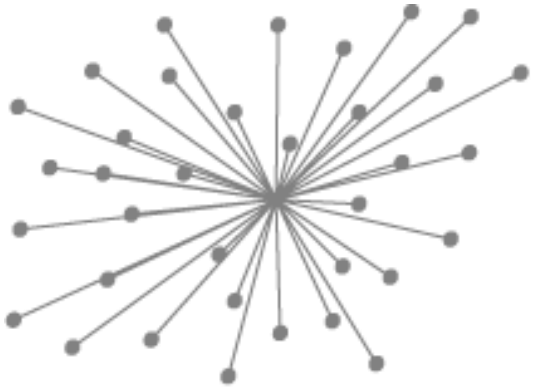
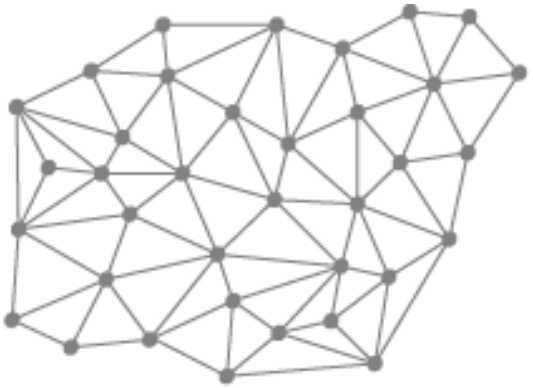


centralised

decentralised



distributed

Rather than a centralized or even decentralized system...

Blockchain

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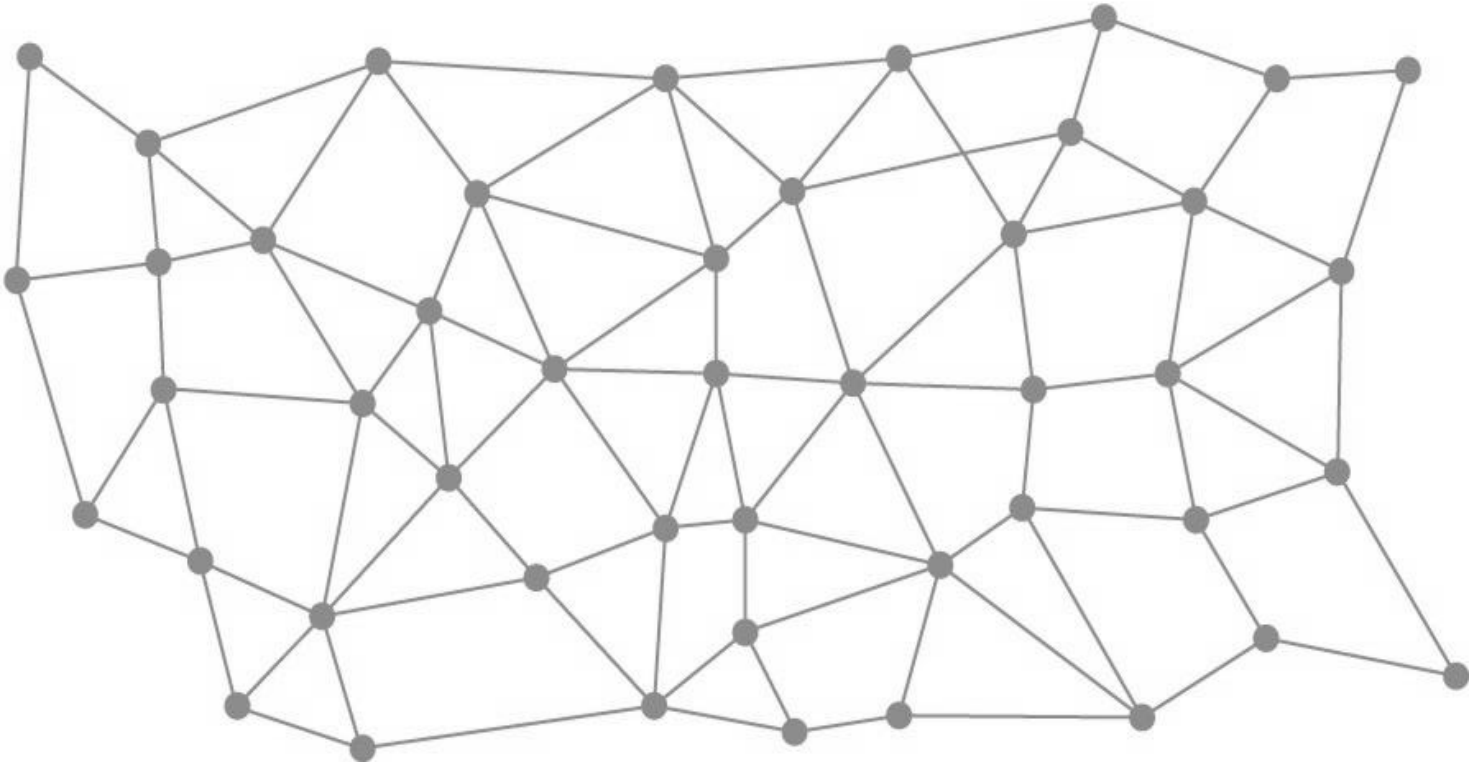
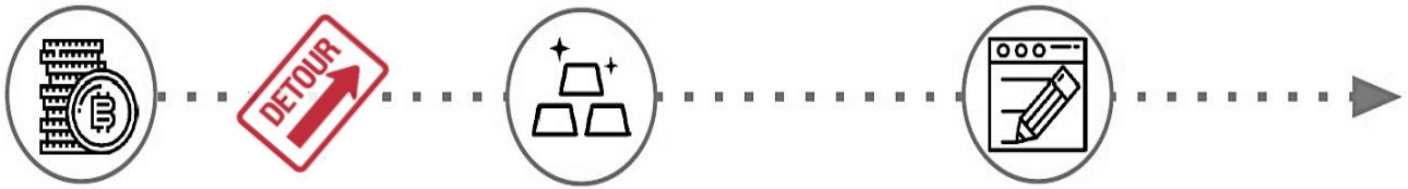


We have a distributed network ...of connected nodes (tables)
Analogy for Blockchain where nodes are computers / servers

Evolution of Blockchain Protocols

ICOs
Initial Coin Offerings
Fundraising



Digital Currencies

Store and transact value (money)

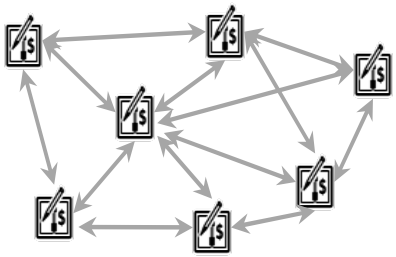
No Infrastructure Link &
Unreliable Store of Value

Digital Assets

Represent and transact other assets (physical or digital)

Smart Contracts

Describe and execute complex business logic



Blockchain SDG Applications…

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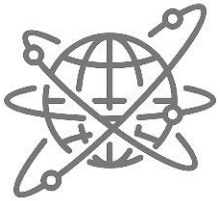
Agriculture

$2.4 Trillion



Trade Finance

$18 Trillion

Internet of Things
Smart Cities

$14.4 trillion

Promisses of REVOLUTION and IMPACT

Fraud

$3.7 trillion

FinTech

$4.7 trillion

Sharing Economy

$335 billion

But these estimates make massive assumptions and are caught in our innovation paradigm

Evolution of Blockchain Protocols: Post ICO

Digital Currencies

Store and transact value (money)

1800+ in 2018

White paper Bitcoin – A Peer to Peer Electronic Cash System 2009 "Satoshi Nakamoto" Fist code 2009

No link to infrastructure & Unreliable store of value

Digital Assets

Represent and transact other assets (physical or digital)

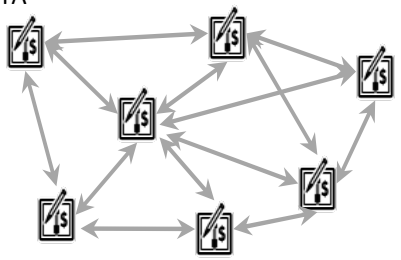
Security Tokens

GIS
Satellite
Biometrics
Sensors
MRV

Smart Contracts

Describe and execute complex business logic

Trust is built on verified DATA



StableCoins

Capacity and opportunity to support a wide range of industry applications

Blockchain is a *tamper-proof, immutable, transparent* distributed ledger, *accessible to every partner*, with no single-point-of-failure.

But there is no **ONE** Blockchain

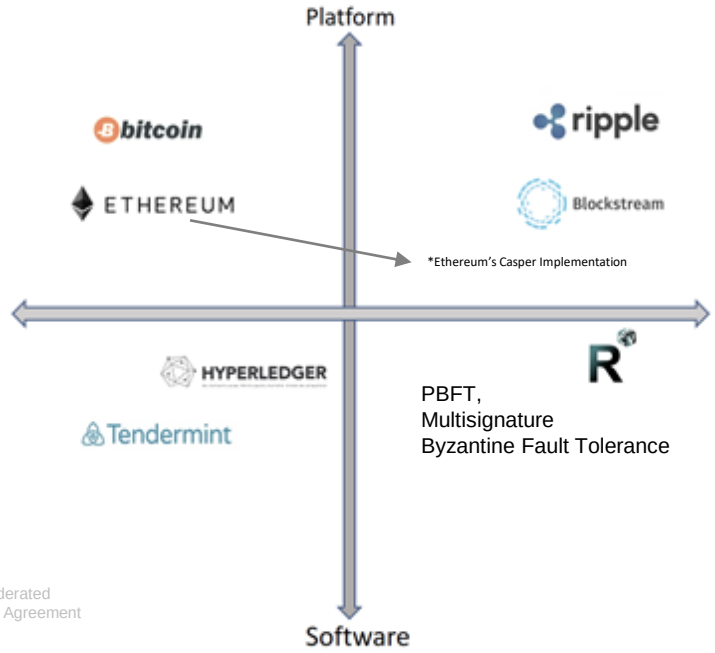
No ONE Blockchain...

Over 90 Blockchain Platforms and growing.

Open - Public

PoW

PoS - DPoS
PoI - PoC



Anybody can create an account and view and access the blockchain

Permissionless

Rules about who can read and transact – not open for everyone to use.

Permissioned

These operate under different rules of access

It is all about **permissions**.

Each has advantages and disadvantages (security, flexibility, energy efficiency, etc.) But still evolving …

Closed - Private

The Attributes Remain Valid

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Common Database	Cryptography	Peer-to-Peer network
		
Accessibility	Security Public & Private Keys	Transparency & Accountability

Underlying attributes are still valid:

Adoption Rate Technologies Sustainable Digital Finance

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	Automation	Data	Inclusive choices	Business innovation	SDG economy
Machine Learning/AI	High adoption	Prevalent	Prevalent	Early adoption	Early adoption
Big data		Prevalent	Prevalent	Prevalent	Prevalent
Mobile		Prevalent	High adoption	High adoption	High adoption
Blockchain	Nascent	Nascent	Nascent	Nascent	Nascent
IoT		Nascent		Nascent	Nascent

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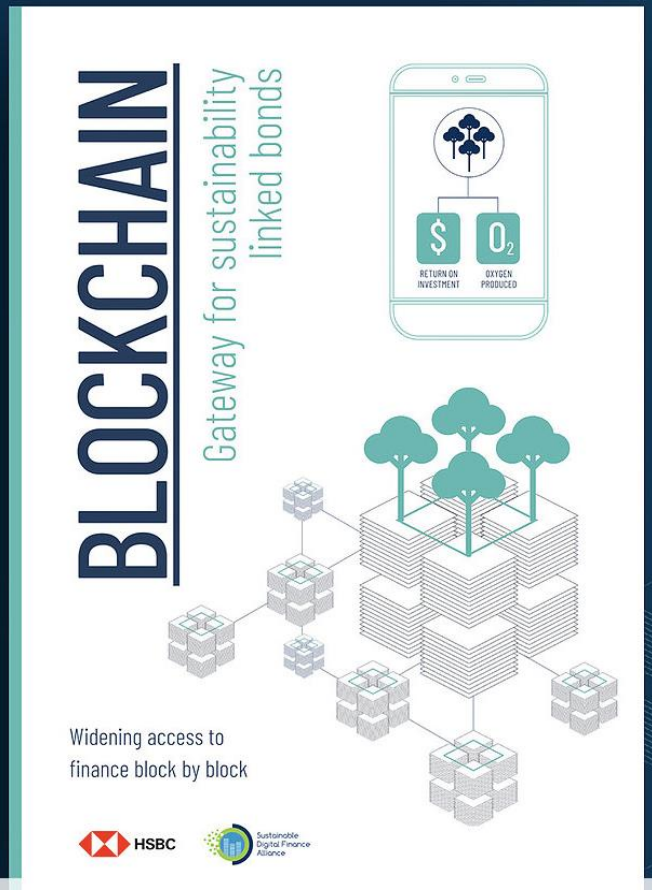

"The most impactful benefits that will allow scaling are yet to be realised"

Digital Green Bonds

Blockchain Potential For Scaling Climate And Green SDG Innovation

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- Leverage the investments needed for SDGs
- Green Bonds growing rapidly but still only 2% of bond market
- Disproportionate need for investment in developing economies, where it's hard to establish trust
- Growing corporate and consumer awareness of climate and sustainability challenges; growing desire to engage
- Can capitalise on greater transparency and market potential
- Opportunities presented by blockchain for Green Bonds

1. structuring, issuance and distribution
2. transfer of ownership, payment and settlement;
3. reporting on Use of Proceeds and Proof of Impact.

Region	Green bond markets	Issuers	Amount issued (USDbn)	Change 2017-18
Africa	4	1	2	↓
Asia-Pacific	18	222	120	↑
Europe	22	193	190	↑
Supranationals	-	1	66	↑
Latin America	7	24	7	↓
North America	3	167	137	↓

Note: Cumulative data as of 31 December 2018

Blockchain Slashes the Cost of Bonds

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- Banks are using Smart Contracts to realise efficiencies in issuance and reduce the number of parties in bond issuance

	SUSTAINABLE BOND	STRUCTURED GREEN BOND
VALUE:	$110 MILLION	EUR 35 MILLION
ORGANISATION:	World Bank and CBA	BBVA
PROCESSES:	Structuring and Issuance	Issuance, Registration
BLOCKCHAIN:	Private Permissioned version of Ethereum blockchain	Hyperledger Fabric (bid process) Ethereum testnet

Green Bonds with Blockchain

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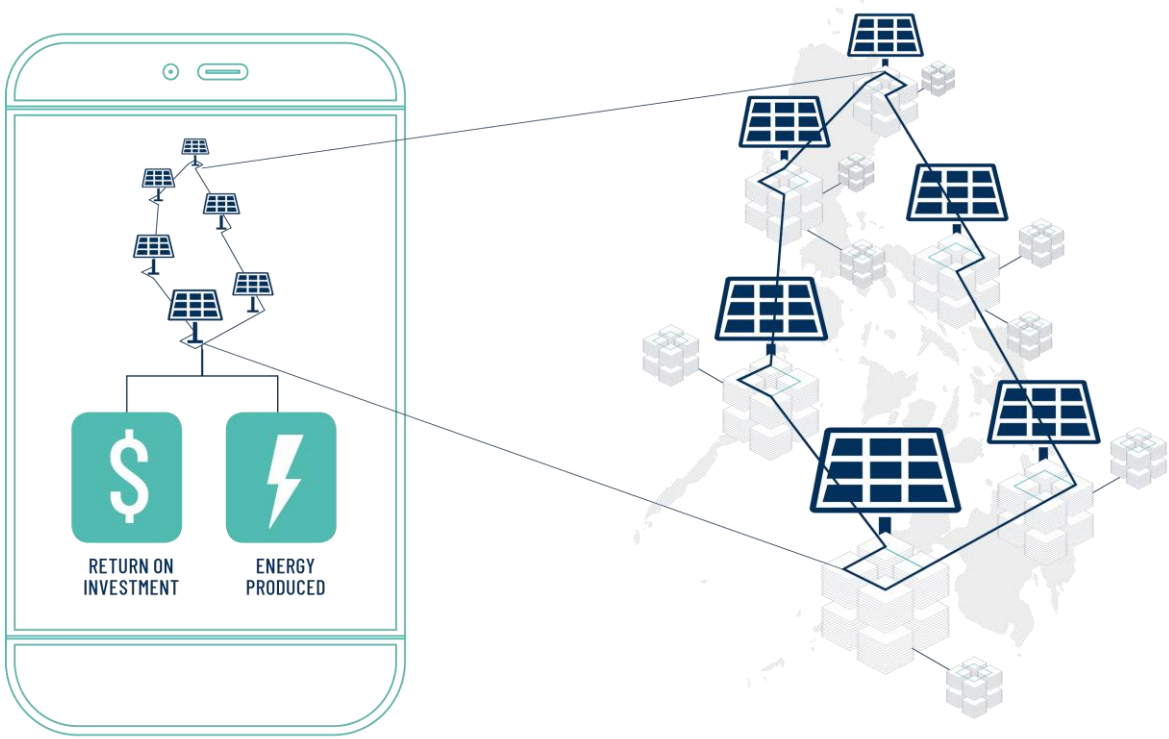
Integrating IoT and AI for green asset performance

- Real-time Proof of Impact data
- Automated Use of Proceeds reporting



Security Tokens are opening out green bond markets

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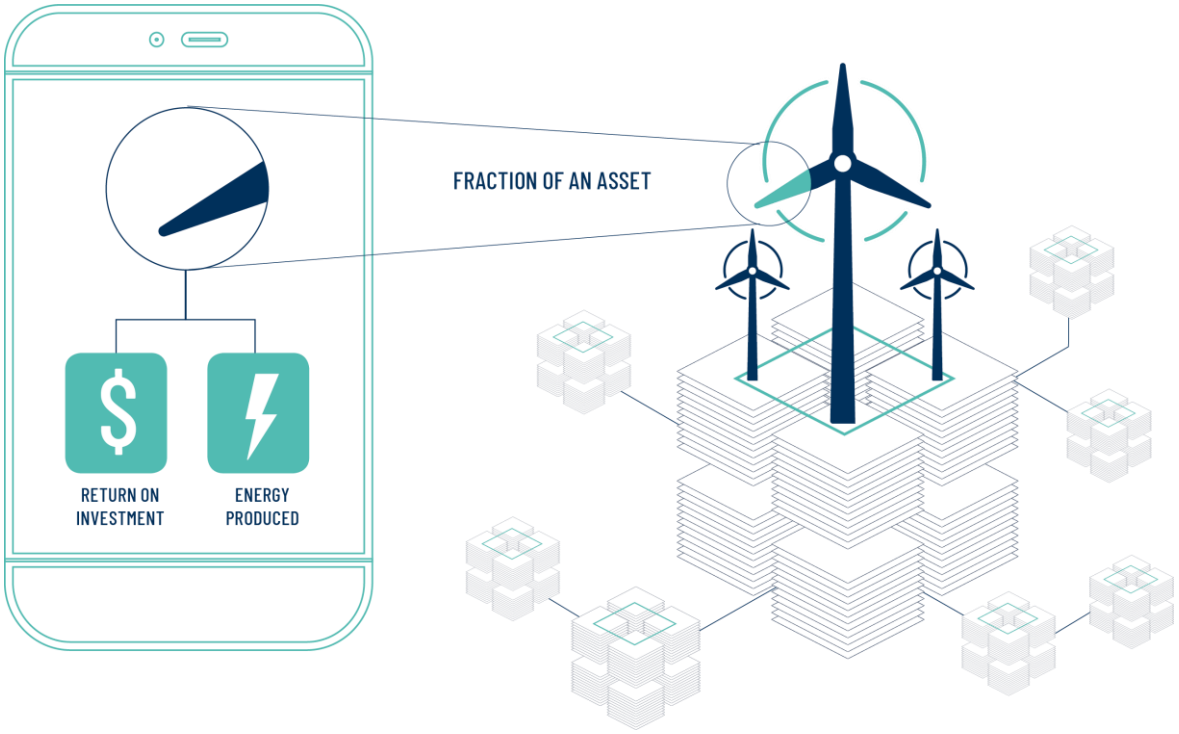
- Issuing Security Tokens for fractionalising assets
- Opens out issuance
- Same cost for any number of units
- Offered over exchanges
- Anyone can afford them



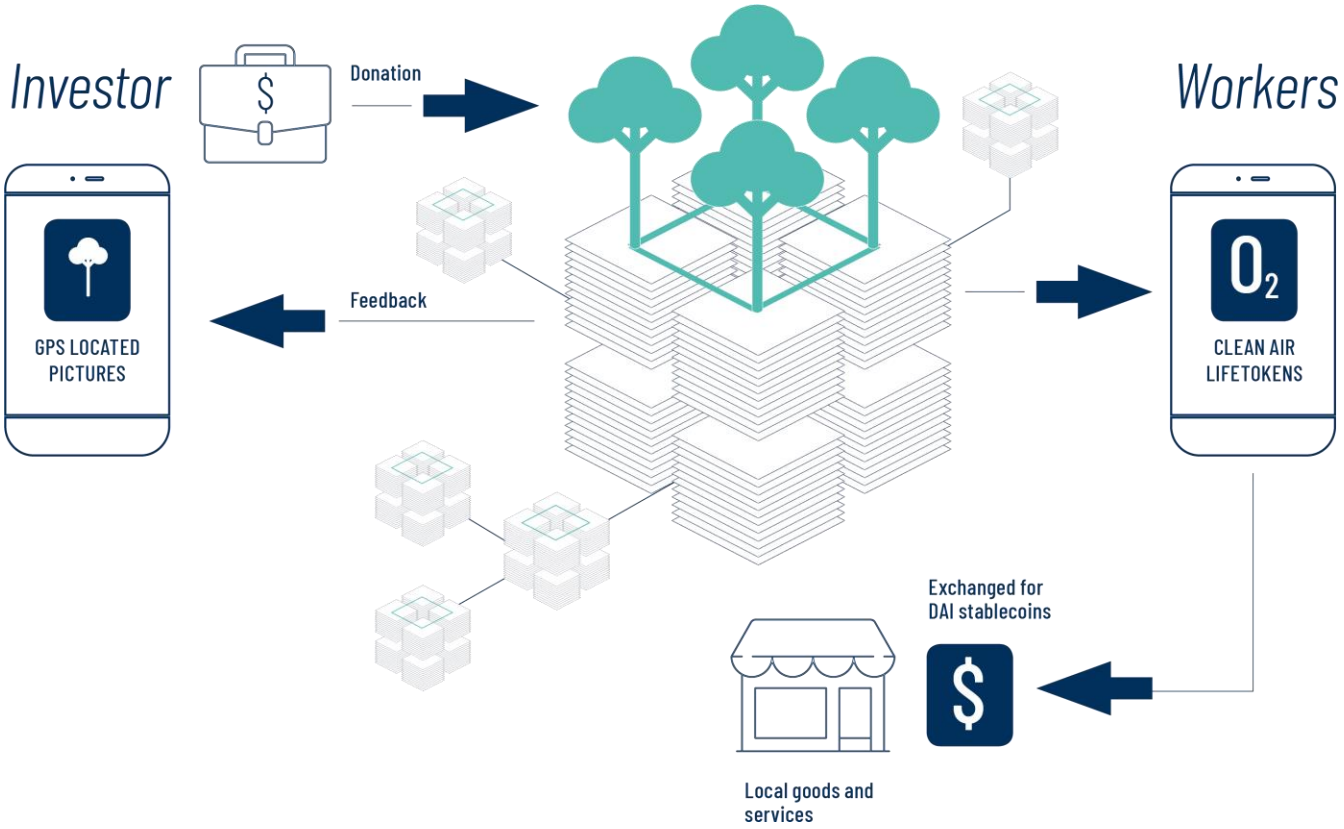
Making every citizen a green asset owner

Proof of Impact and Use of Proceeds

- **Witness Proof** data tokens for real-time Proof of Impact

Examples

- CedarCoin shows tree being planted
- TreeCoin based on Oxygen production
- FishCoin rewards with mobile airtime
- Solara Solar microgrids measure photons
- BLOC issuing tokens as RECs according to sensor data per energy produced
- World Bank Carbon Markets Pilot per UNFCC verified data



Sustainable projects are using blockchain combined with Internet of Things (IoT) to give real-time *Proof of Impact* feedback with blockchain **Witness Proof** data tokens

Blockchain is A New Bond Toolbox

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Blockchain Technology	Process	Benefit	Risks/Barriers
Security Token	Issuance	Standardised Regulatory transparency Can issue any number in small units/low cost	Multiple processes still required for compliance Legal review needed
Security Token	Bidding process	Full transparency Automated bidding and closing	Listing still on traditional listings platforms
Security Token	Distribution	Straight through transfer of ownership Resilient, immutable	Regulations are uneven but maturing rapidly
Crypto-currency	Investment	Asset class that may accrue value Fully distributed	Volatility Lack of consensus on asset class Anonymised wallet holders
Stablecoin	Payment, Settlement	Straight through transfer of ownership Instant settlement, reduced risk	Inherits risk of issuing organisation Lack of consensus on asset class
Asset/Data token	Distribution of Assets Reporting Registration	Straight through transfer of ownership Audit trail	Lack of consensus on asset class

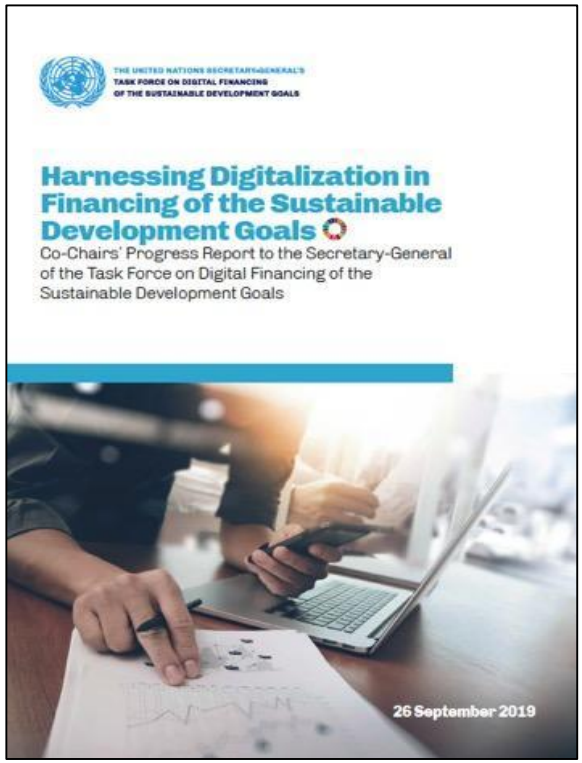
- Potential for market and business model disruption
- Immediate benefits to collaborative efforts by banks
- Establishing credibility for Use of Proceeds and Proof of Impact opens out new markets
- Green Bonds Digitisation using blockchain can accelerate scaling of the Green Bond market
- Mathematical blockchain consensus minimises energy use and maximises transaction throughput

- Partnerships and collaboration are key - across technologies, and across institutions

State of regulatory readiness for Automated Green Bonds

- Maturity of research
- Defined legal frameworks for Security Tokens
- Green investment potential

Readiness Index



The UN Secretary General's Task Force for Digital Financing of the SDGs will publish its final report and recommendations in early 2020

SDFA Is piloting Readiness Index to measure progress at global and country level after the Task Force

Selected key test countries will be highlighted at the launch

Addressing The Barriers:

A readiness index for measuring progress in sustainable digital finance worldwide was a key recommendation by the UN SG's Task Force Interim Report.

SDFA was appointed the lead partner in developing the index.

The aim is to make knowledge about emerging practices in sustainable digital finance transparent and available to all.

It creates a race to the top by enabling best practice replication, adaptation and improvement.

Building a ”Sustainable Digital Finance readiness” benchkmark

DATA SET # 1: STATE OF REGULATORY AND POLICY LANDSCAPE SHAPING GREEN AND SUSTAINABLE DIGITAL FINANCE

DATA SET # 2: STATE OF EXISTING GREEN AND SUSTAINABLE FINTECH LANDSCAPE

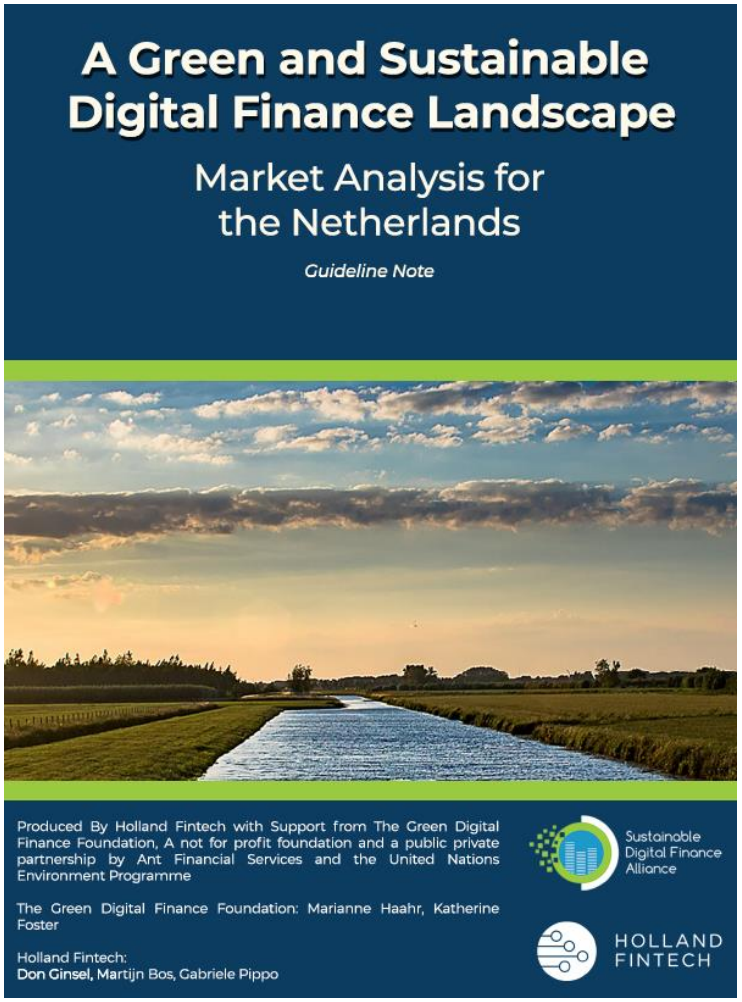
DATA SET # 3: MAPPING EXISTING DEPLOYMENT OF GREEN AND SUSTAINABLE DIGITAL FINANCE BY FINANCIAL SERVICE INSTITUTIONS AND CAPITAL MARKETS

OPPORTUNITIES – READINESS INDEX – IDENTIFYING POTENTIALS TO SCALE GREEN DIGITAL FINANCE - DRAWING A GREEN AND SUSTAINABLE DIGITAL FINANCE FUTURE

Web tool – Prototype

https://xd.adobe.com/view/2dca7332-0332-46e8-658c-dac4ea0361a1-5bfb/?fullscreen&hints=off


8 DECENT WORK AND ECONOMIC GROWTH
4 QUALITY EDUCATION
10 REDUCED INEQUALITIES
7 AFFORDABLE AND CLEAN ENERGY
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
5 GENDER EQUALITY
1 NO POVERTY
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
17 PARTNERSHIPS FOR THE GOALS
3 GOOD HEALTH AND WELL-BEING
2 ZERO HUNGER
15 LIFE ON LAND
6 CLEAN WATER AND SANITATION
14 LIFE BELOW WATER



Key Findings

1. Limited degree of policy integration
2. Incumbents are national sustainable digital champions
3. Fintech innovation on green challenges is limited
4. Circular economy solutions are the most mature
5. Platforms with a sustainable mission are growing fastest

Index Global Roll-Out

Prototype Test
Feasibility Determined

The Netherlands
October 2019
Zurich and Ghana
November 2019

Additional
Demonstrators
System Verification

Additional Countries
and Data Partners

Global Index Launch
Q2 2020

Publication &
Platform

Global Scaling

Operations-Ready
Deployment.
Governance, &
Management

The Sustainable Digital Finance Readiness Index

Put Your Country on the Global Map

xd.adobe.com/view/2dca7332-0332-46e8-658c-dac4ea0361a1-5bfb/?fullscreen&hints=off

Survey

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1. Are SDG and Climate commitments in place at country level?

2. Are there key regulations and policies advancing:
   a) digital finance and innovation?
   b) green sustainable development and climate innovation?
   c) linked digital finance and SDG or climate innovation?

3. Does your organization or company directly operate or support:
   a) digital finance and innovation?
   b) green sustainable development and climate innovation?
   c) linked digital finance and SDG or climate innovation?

4. What initiatives or businesses are operating or delivering in your ecosystem to deliver:
   a) digital finance and innovation?
   b) green sustainable development and climate innovation?
   c) linked digital finance and SDG or climate innovation?

5. What barriers to scaling do any of these face?
   a) Financing
   b) Regulation
   c) Social-cultural

Questions

- *Is the nexus between digital finance and sustainable finance important for your region or country?*
- *If it's important, what are the barriers and opportunities at policy and market levels?*
- *What are the next steps to taking this agenda forward?*

How You Can Engage:

Sustainable Digital Finance Alliance

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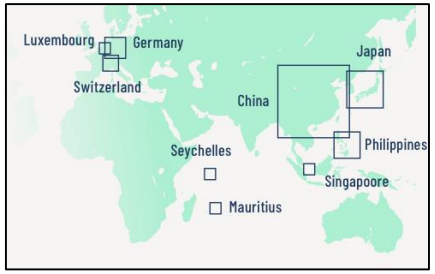

Digital Green Bonds Pilot & Toolbox

Fintech And Green Behaviors

Fintech Mapping & Micro

Thank You

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