Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety
of the Federal Republic of Germany

Blockchain solutions for climate policies: lessons learned from three case studies in Brazil, Costa Rica and Mexico

November 30th, 9:30-11:50 CDT / 16:30-18:50 CET

Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety
of the Federal Republic of Germany

AGENDA

9:30	Words of Welcome
9:40	Brazil: Blockchain for traceability within the meat value chain
10:00	Costa Rica: Enhancing traceability within coffee value chain through blockchain
10:20	Mexico: Blockchain and emissions trading systems
10:40	Comparative analysis: Lessons learned, needs and challenges for Blockchain applications within the climate context.
11:55	Questions and Answers
11:05	Discussion panel: Potentials of Blockchain in the climate field in Brazil, Costa Rica and Mexico
11:20	Closure

Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety
of the Federal Republic of Germany

Words of Welcome

Margareta Rössing-Dio,

Secretariat of the sectoral Network GADeR-ALC
(Environmental Management and Rural Development
Latin America and the Caribbean)

Kathrin Ludwig

Mexican German Climate Alliance – GIZ Mexico

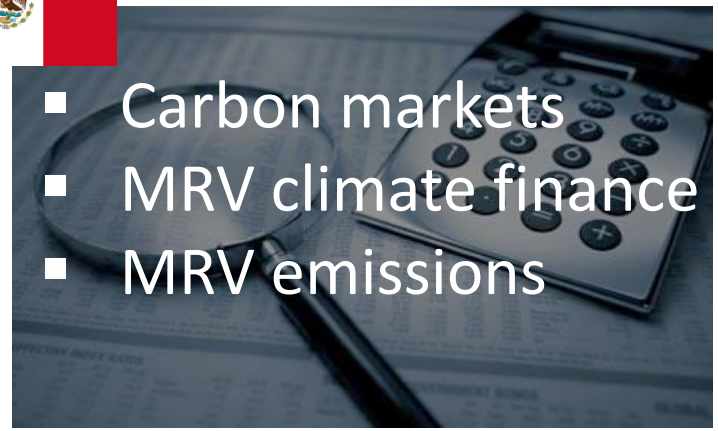
Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

On behalf of:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany



- Carbon markets
- MRV climate finance
- MRV emissions

Deforestation and lifestock value chains

Carbon footprinting in the coffee sector

Products

- **Introductory briefing paper** on blockchain and climate policy instruments
- **3 case studies** in Costa Rica, Brazil and Mexico focusing on climate policy and values chains
- **Final briefing paper** to summarize lessons leanred as well as enabling conditions for blockchain solutions
- **2 webinars** to disseminate results and interchange experiences

Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety
of the Federal Republic of Germany

Case Brazil: Blockchain for traceability within the meat value chain.

Doerte Segebart Director of the project “Integrated management of marine and coastal biodiversity” – GIZ Brazil

Vasco Varanda Picchi,
Independent consultant from AgriTech, Tracking of Meat origin

Potential use of Blockchain technology for beef traceability.

Mauro Armelin
Vasco Varanda Picchi

Fazenda 5 Irmãos, em Alta Floresta, parceira do projeto do ICV. Foto: Daniela Torezzan / ICV

Brazilian Greenhouse gases challenge

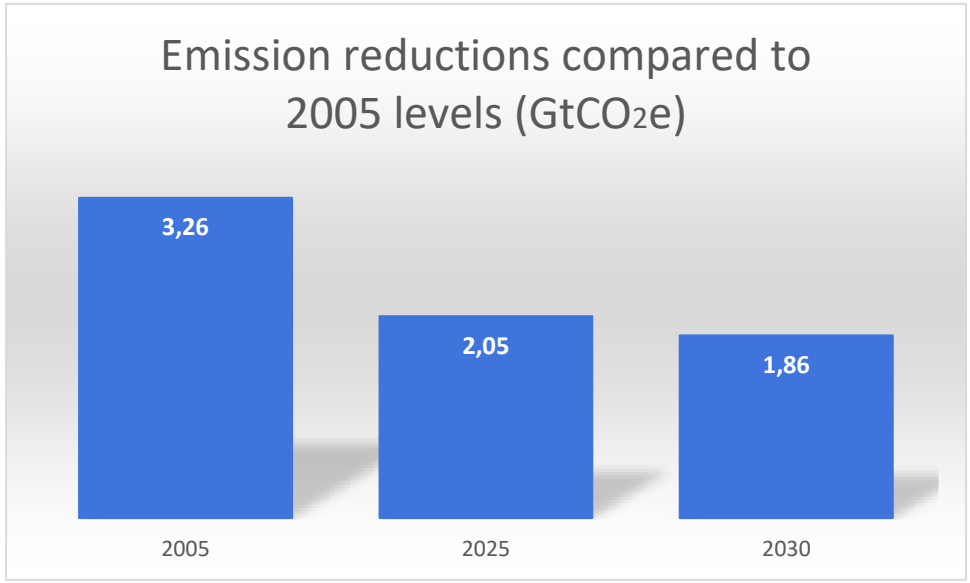
Top 10 Global GDP Ranking

Based on data from the International Monetary Fund, 2018

	Country	Value (in trillions)
1	United States	20.4
2	China	14
3	Japan	5.1
4	Germany	4.2
5	United Kingdom	2.94
6	France	2.93
7	India	2.85
8	Italy	2.18
9	Brazil	2.14
10	Canada	1.8

Source: IMF

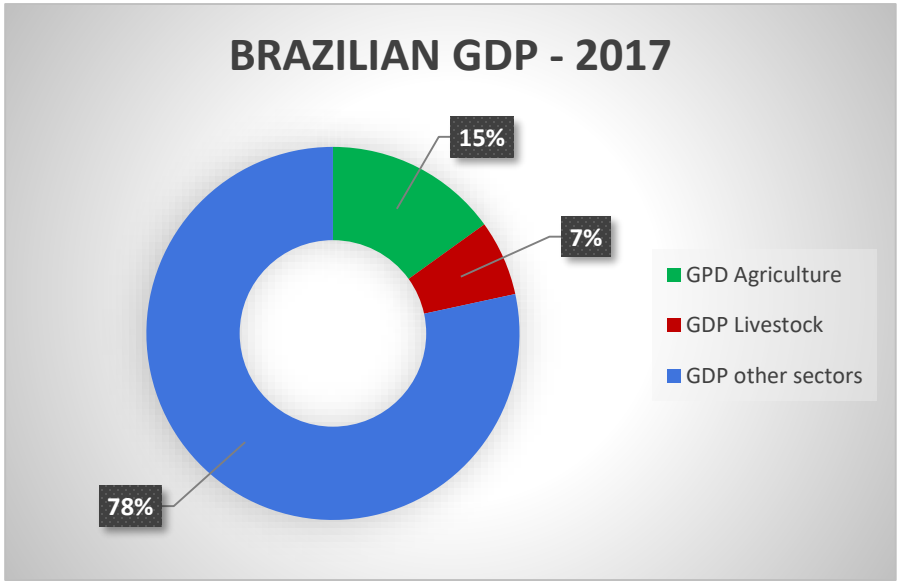
COP21 COMMITMENT



Source: MMA

Land use change and deforestation + Farming = 52% GHG

Beef production context



2017	TRILLIONS R$	%
GPD Agriculture	0,99	15
GDP Livestock	0,43	7
GDP other sectors	5,15	78

CATTLE PRODUCERS RANKING

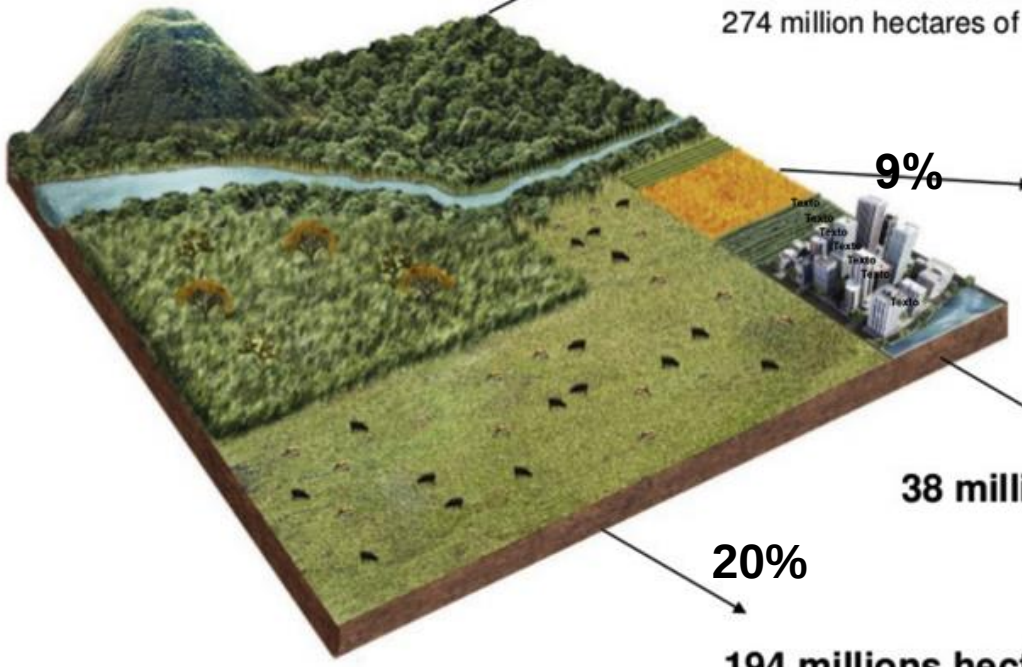
POSITION	COUNTRY	BOVINE (MILLION HEADS)
1	Brazil	221,8
2	India	186,8
3	China	83,6
4	USA	92,7
5	Ethiopia	60
6	Argentina	53,3
7	Pakistan	43,1
8	Mexico	34,1
9	Australia	25,5
10	Tanzania	27,2
11	European Union	89,3
12	Others	524,7

Productivity = 1 animal x 2 ha

Land use occupation

LAND USE AND OCCUPATION IN BRASIL

Brazil's total land area = 851 million hectares



67% → **554 million hectares of native vegetation**

177 million hectare in conservation units
103 million hectares in indigenous land
274 million hectares of native vegetations on private lands

9% → **65 millions hectares of productive land** (grains, fruits and planted forests)

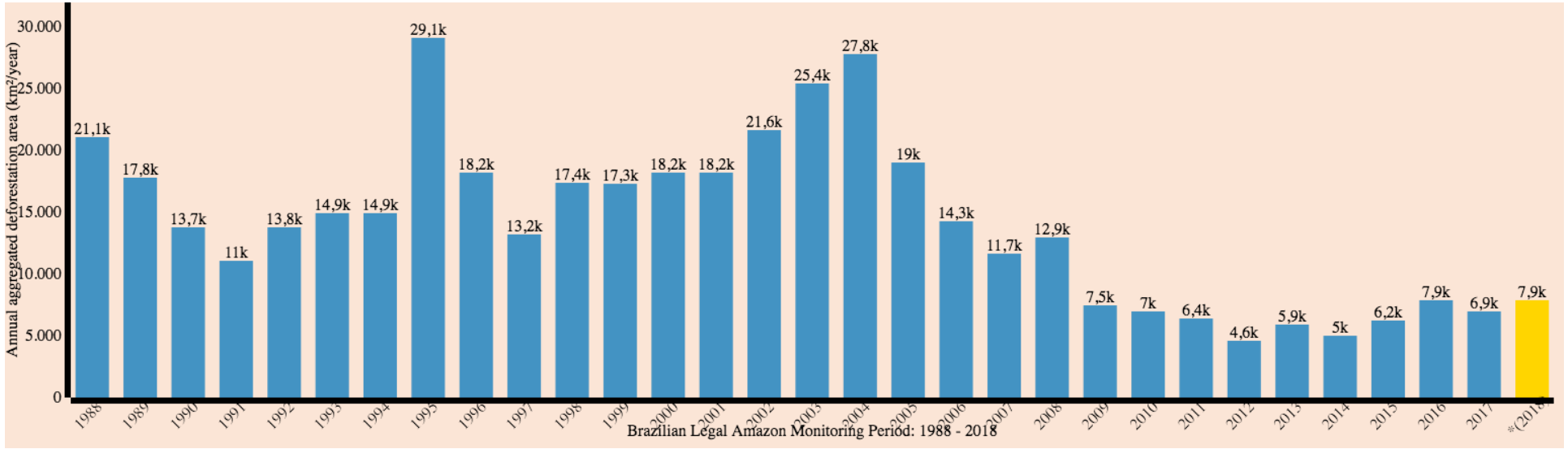
4% → **38 millions hectares in urbanized land**

20% → **194 millions hectares of pastures**

Source: ABIEC 2018

Key initiatives to sustainable production

Amazon Deforestation Monitoring System (PRODES)



Source: PRODES INPE

Slaughtering the Amazon Report – Greenpeace - 2008

Conduct Adjustment Term (TAC)– FEDERAL PUBLIC MINISTRY - 2009

New forest code - 2012

COP21 commitment - 2015

Conduct Adjustment Term Auditory - 2016

Institutional environment

MAPA
Ministério
da Agricultura
e do Abastecimento

MPF
Ministério Público Federal

LAW ENFORCEMENT

IBAMA e-Control

IBAMA e-Control operation: Every unauthorized deforestation area is automatically charged and embargoed.

Over 90% of PRODES at MT state charged and in progress to be

MMA and IBAMA change their strategy of law enforcement since less than 20% of fines are collected:

Strategy focuses on the industry that, even without paying the fines, suffers great impact when there is an operation paralyzed by buying animals from embargoed areas;
Closing a medium industrial plant are directly affected something between 200 to 300 direct suppliers and more than 1,000 indirect ones.

Business Environment

TAC - 32 SIGNING INDUSTRIES

OVER 90% OF LEGAL BEEF INDUSTRIES AT AMAZON BIOME

VOLUNTARY DEFORESTATION ZERO COMMITMENTS

Carrefour

GPA

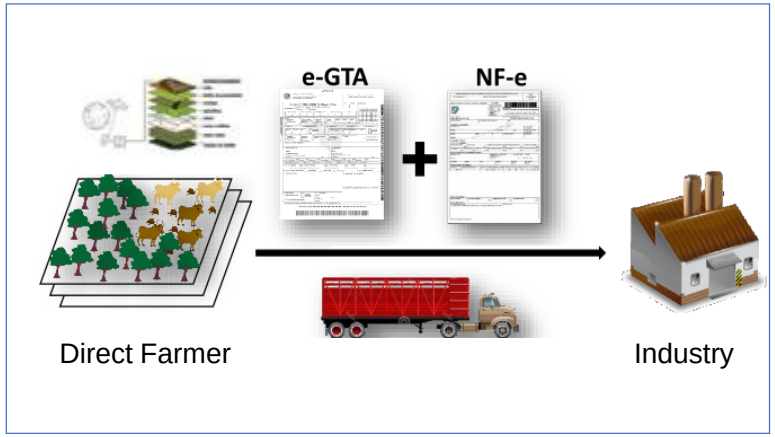
Walmart

Top 3 retailers with almost 50% market share

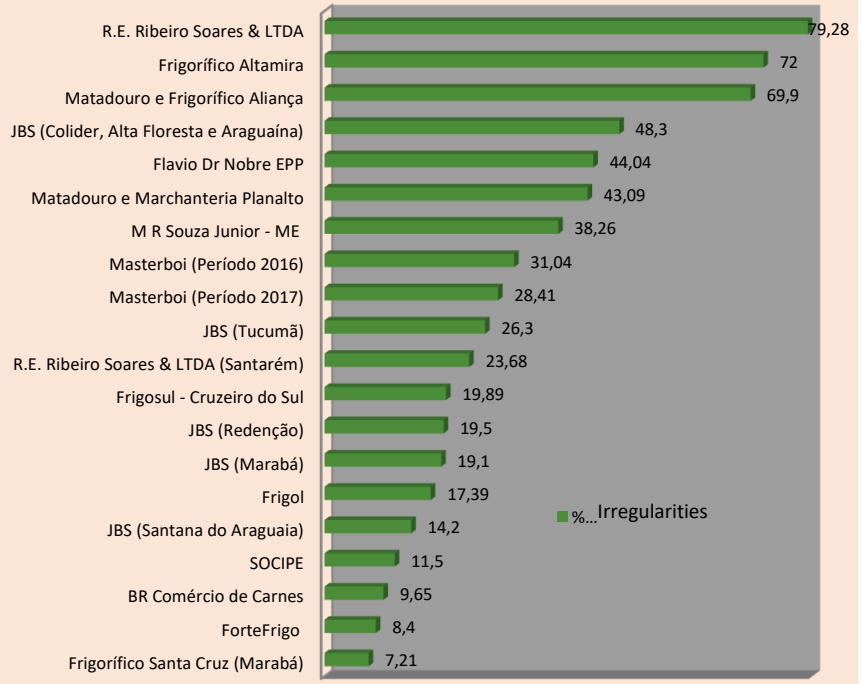
Sector Fragilities

AFTER 10 YEARS OF TAC, THE MPF AUDIT REVEALS FRAGILITIES CONTROLING DIRECT FARMERS DEFORESTATION…

IRREGULARITY (2016)	
18%	259.066 ANIMALS

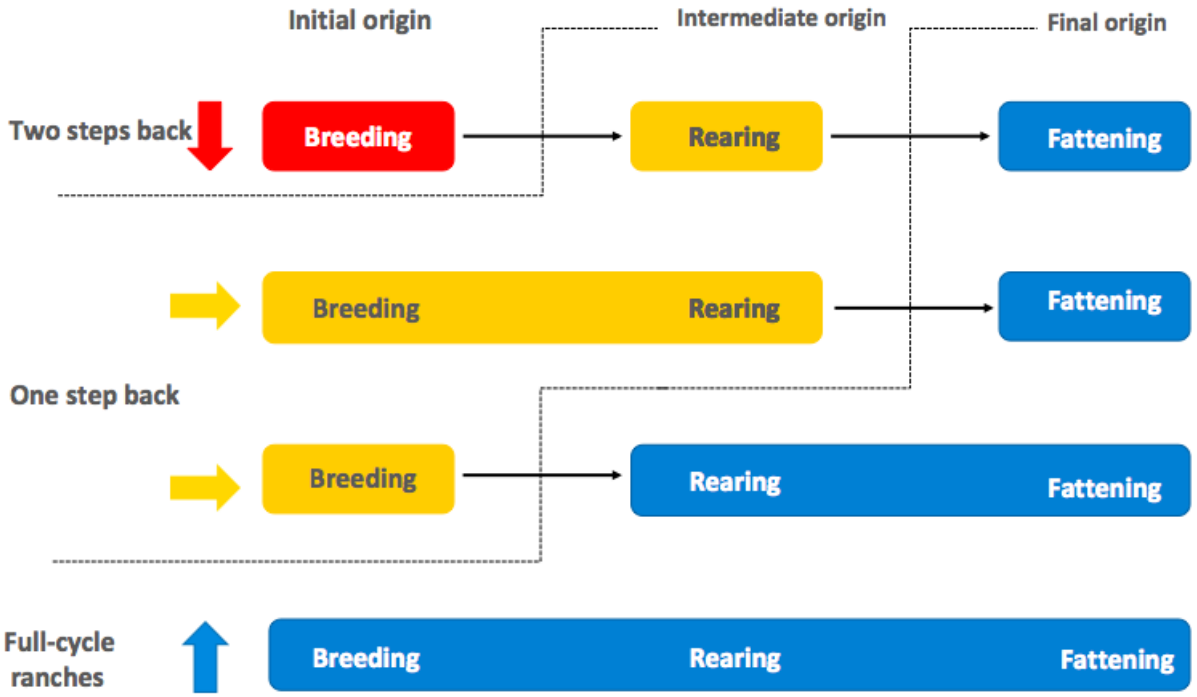


Source: MPF



Sector Fragilities

AND IGNORES THE COMPLEXITY OF THE PRODUCTION CHAIN



No current tool allows producers to comply with DCF rules and beef industries don’t be exposed to the risk of having their operations paralyzed and their image compromised

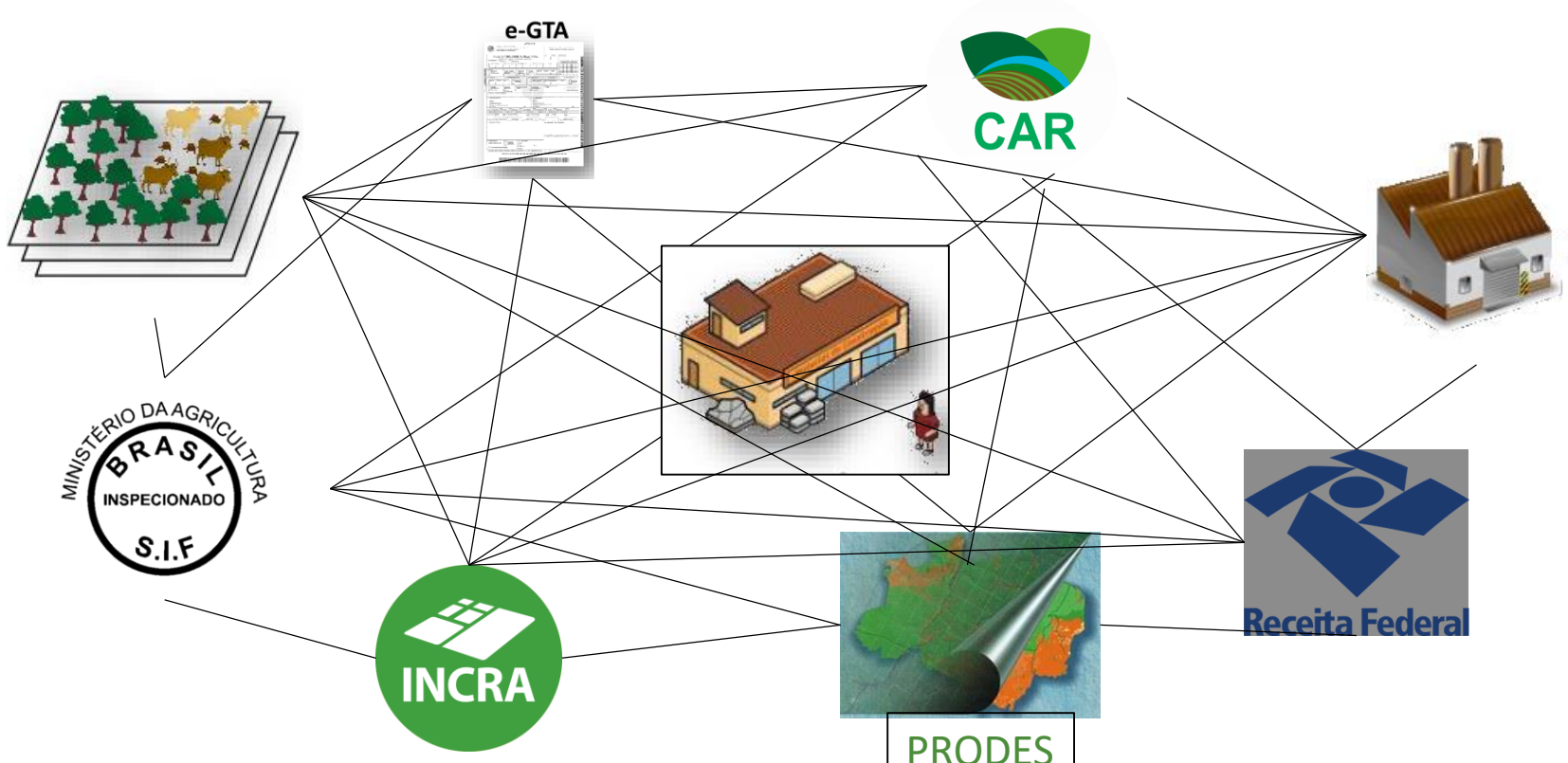
Initiatives to sustainable production

AVAILABLE INFORMATION SOURCES FOR FULL TRACEABILITY AND MONITORING

e-GTA	Movement and stock - Ministry of Agriculture Livestock and Food Supply	CAR	Rural environmental registration - MMA s SFB
MINISTÉRIO DA AGRICULTURA BRASIL INSPECIONADO S.I.F	Federal Inspection Service	PRODES	Shallow cut Areas –INPE
INCRA	Land Registers - Land Ownership	Receita Federal	IRS - Taxes

Potential Blockchain application

Unify information and act to give transparency to transactions and guarantee the confidentiality of sensitive or legally protected data from farmers to retailers, with shared governance and financial support.



Potential Blockchain benefits

- Eliminate the parallel market fueled by the lack of traceability;
- Reduce deforestation and, consequently, the emission of greenhouse gases;
- Strengthen the health control mechanisms of the herd;
- Reduce the risks of the business environment, favoring investments;
- Mitigating conflicts between the links in the production chain;
- Extend productivity.

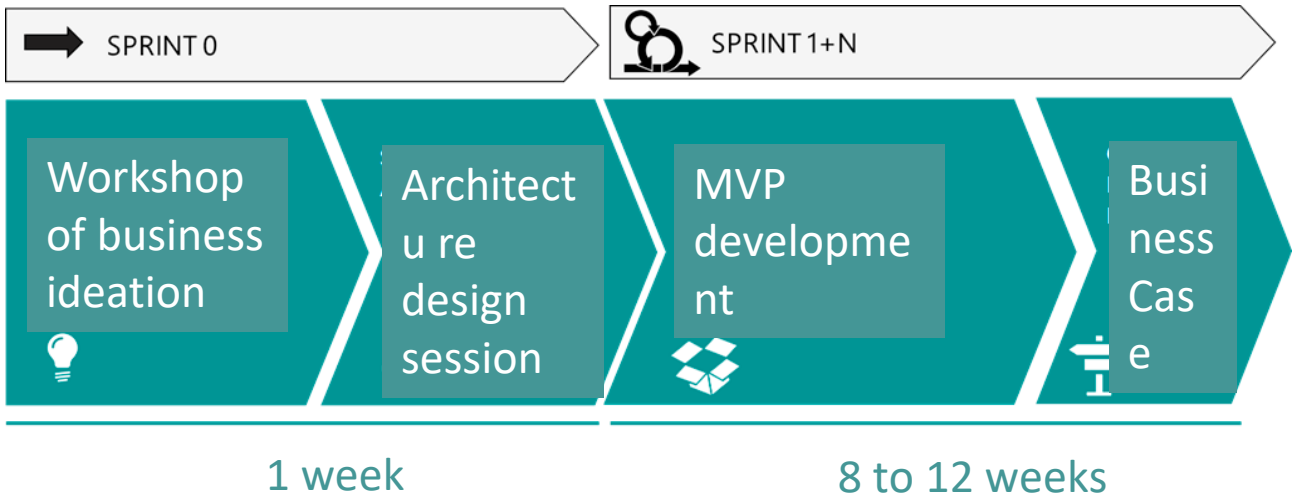
Key Challenges to be faced

- Create the multi-stakeholder discussion environment for solution proposal;
- Overcoming the difficulties of understanding and mistrust about technology and in particular about the secrecy of information;
- Establish business rules that meet the different interests and requirements in the production chain;
- Create a public-private partnership;
- Engage the stakeholders to adopt the tool once it’s available.
- Financial support;

This kind of discussions can take several months in Brazil

Blockchain Development RoadMap and Time Frame

1. Define Scope;
2. Define the Blockchain type, considering the need of access control, efficiency and consensus;
3. Workshop of business ideation;
4. Architecture design session;
5. MVP Development
6. Business Case.



Product validation in the market: 12-24 months for MVP launch, business model refinement and business model optimization.

Conclusion

The Blockchain technology (BCT) is highly applicable to provide transparency and credibility to the beef production chain in Brazil, favoring the reduction of illegal deforestation associated with meat production and providing incentive programs to increase the productivity of herds, thus addressing the two main vectors of emission of greenhouse gases in Brazil.

Brazil meets institutional conditions, legal basis and alignments in the private sector favorable to DCF beef.

The main implementation difficulties are in the ability to articulate and engage the stakeholders and in the definition of business rules;

It is also necessary to establish the governance and rules of a potential public-private partnership for implementation.

The time frame from first discussions to the Blockchain MVP can take more than 3 years.

Finance support until applications launch can be rare.

- Thank You

- Contact info:

- vasco@safetrace.com.br

Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety
of the Federal Republic of Germany

Case Costa Rica: Enhancing traceability within coffee value chain through blockchain

Alexia Quiros

Project “NAMA Café” – GIZ Costa Rica

David Cortés Poza

Consultant of Oruka.lat

Exploration of Potentials of Blockchain for Climate Governance in Costa Rica

Blockchain-based traceability for Costa Rica´s coffee supply chain

November 30th, 2018

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

oruka

Objective

Application of a blockchain solution to issues related to climate policies in Costa Rica,

- Specifically in the **value chain of coffee production** under the NAMA-CAfé Costa Rica project.

Identified the requirements in institutional, financial, technological, political and regulatory terms **for a pilot test of a blockchain** solution.

Elements that could be incorporated into a traceability process based on blockchain technology between each step of the chain and the reduction of carbon footprint, as established by the objectives of NAMA-Café Costa Rica.

Costa Rica

- The **coffee industry** has an important role in the Costa Rican economy
  - ~ 8.45% agricultural GDP, ~ 0.29 % National GDP
  - Employs ~ 8% of the Costa Rican workforce
- Represents ~ 9% of national GHG emissions
- It is overseen by the ICAFE, public institution established in 1933, and regulated by the Republican Law of Costa Rica No. 2762
- NAMA Café is the first agricultural NAMA in the world that is ready for implementation.

Nama Café - Costa Rica

- **First agricultura**l NAMA in the world
- Ready for implementation
- An innovative collaboration effort between the public, private, financial and academic sectors.
- At the time of the research, 56 mills belong to NAMA Café from the 259 mills
- **Aims to reduce GHG emissions** and improve resource use efficiency at the level of both **coffee plantations and coffee mills.**
- These actions will create the first low-emission coffee worldwide and give Costa Rican coffee producers access to new markets.

Findings

NAMA cafe major stakeholders can build trust by focusing on:

1. Make the use case.
2. Build an industry ecosystem.
3. Determine the rules of engagement.

ICAFE is a key player for the adoption of a blockchain solution in this industry.

- It can bring together to the entire supply chain actors
- Establish the rules of adoption,
- work on the engagement process,
- develop the strategy for technology appropriation,
- among other governance activities.

Instituto del Café de Costa Rica

Findings

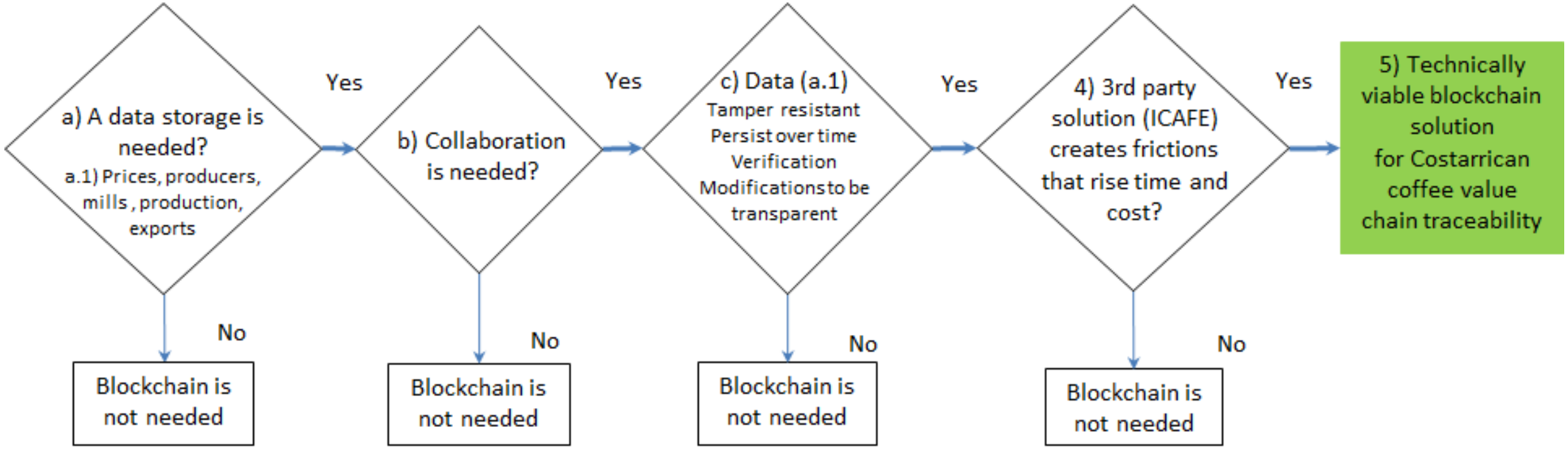
ASOCIACIÓN BLKCHAIN COSTA RICA

Value chain

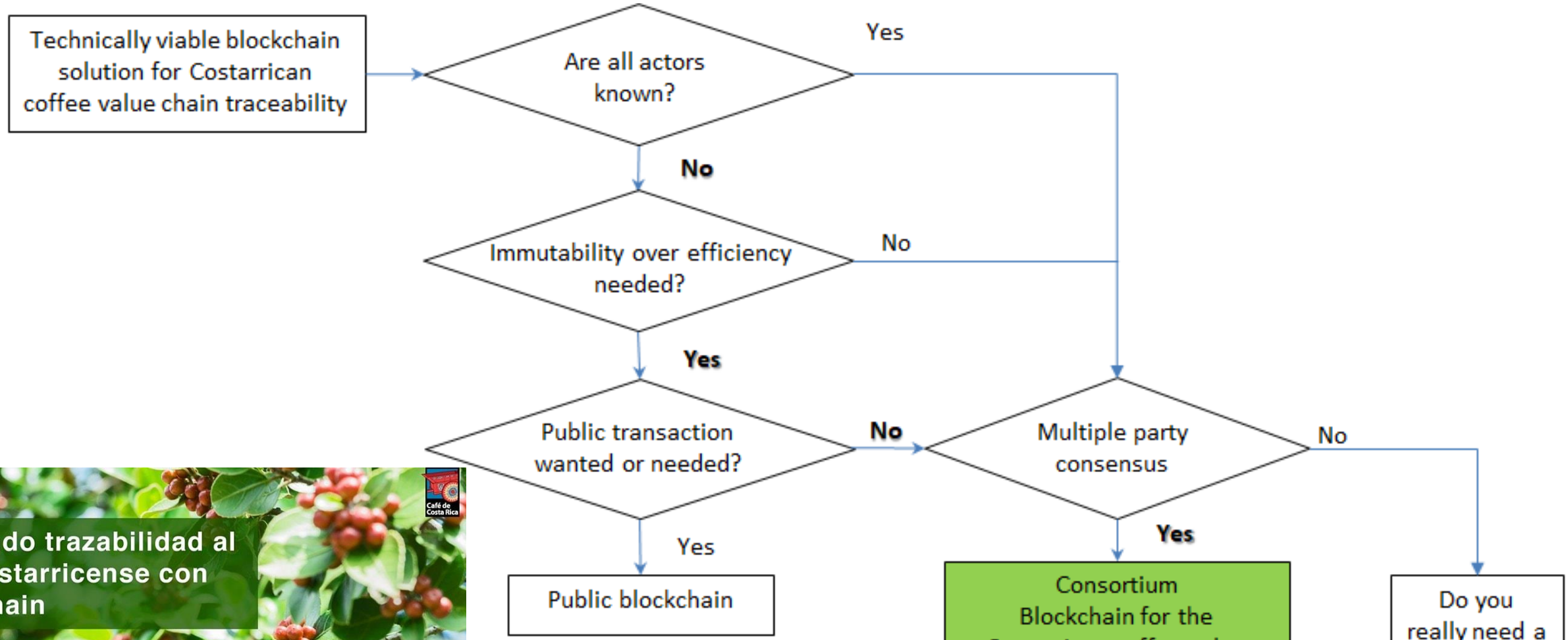
The coffee value chain has the following processes:

a) Production on the farm:
   i) Plantation, ii) fertilization and ii) pruning of coffee plants
b) Coffee mill processing:
   i) Depulped, ii) washed, iii) drying iv) bare, v) classification and vi) storage.
c) Export:
   i) Transport, ii) roasting and iii) consumption

Decision tree for a traceability blockchain solution to the Costa Rican coffee value chain



Blockchain type decision tree



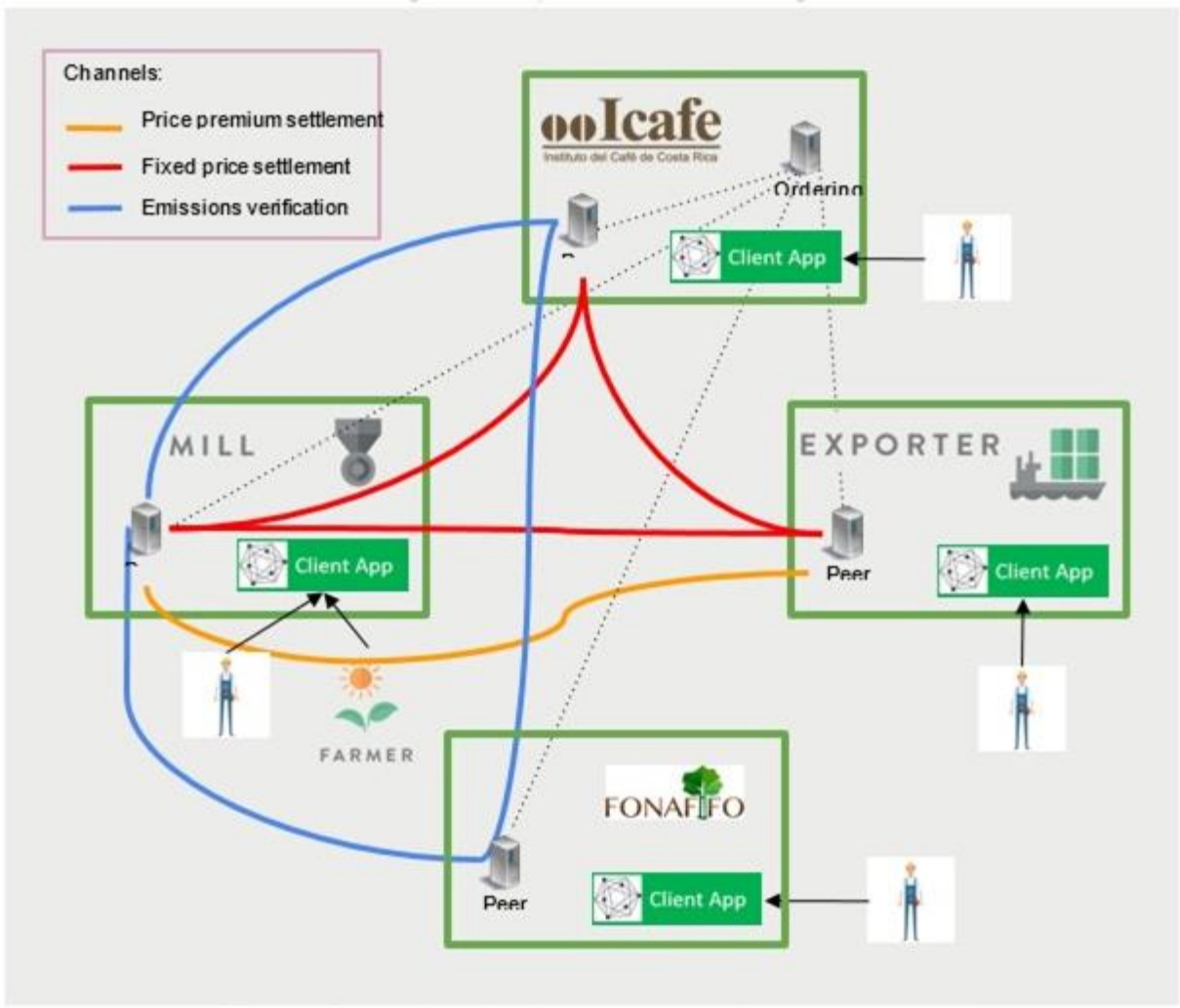
Preconditions

Aspects	Findings
Legal	Law 2762: Regime of Coffee Producer, Mill and Exporter Relations" Law 8968: Personal Information Protection Resolution DGT-R-012: Electronic Invoices
National Institutions/ Political	ICAFE Nama Café FONAFIFO SINAMECC MINAE Climate Change Directorate Costa Rican Blockchain Association
Technological	Strong innovation, blockchain and technological ecosystem. Accelerated digital adoption in Costa Rica. The Costa Rican Government launched the Digital Transformation Strategy, which aims to accelerate productivity, competitiveness and socioeconomic development. It promotes, among other aspects, the use of electronic signature and electronic invoices. Costa Rican Blockchain Association with legal recognition launched on October 2018.
Financial	The local market has strong fundamentals for the coffee value chain. Local market weakness for a potential
Conjunctural	Digital Transformation Strategy

Preliminary Blockchain architecture design

Participant	Activity	Blockchain rol
Coffee Producer	Data collection of GHG Inputs through proxies (digital or paper invoices and registries)	Data input
Mills	Receive producer information Register operation's GHG emissions (digital or paper invoices and registries) Register receipts	Data input
Roaster	Register operation's GHG emissions	Data input
ICAFE	Producer and mills production verification Settle payments	Data input Transaction verification
Transport	GHG emission registration	Data input
Exporter	Register logistic operations Issue payments	Data input
Importer, retail and final consumer	Query emission information	Data consumer
Auditor certified by the ECA	Certify information	Data input Transaction verification

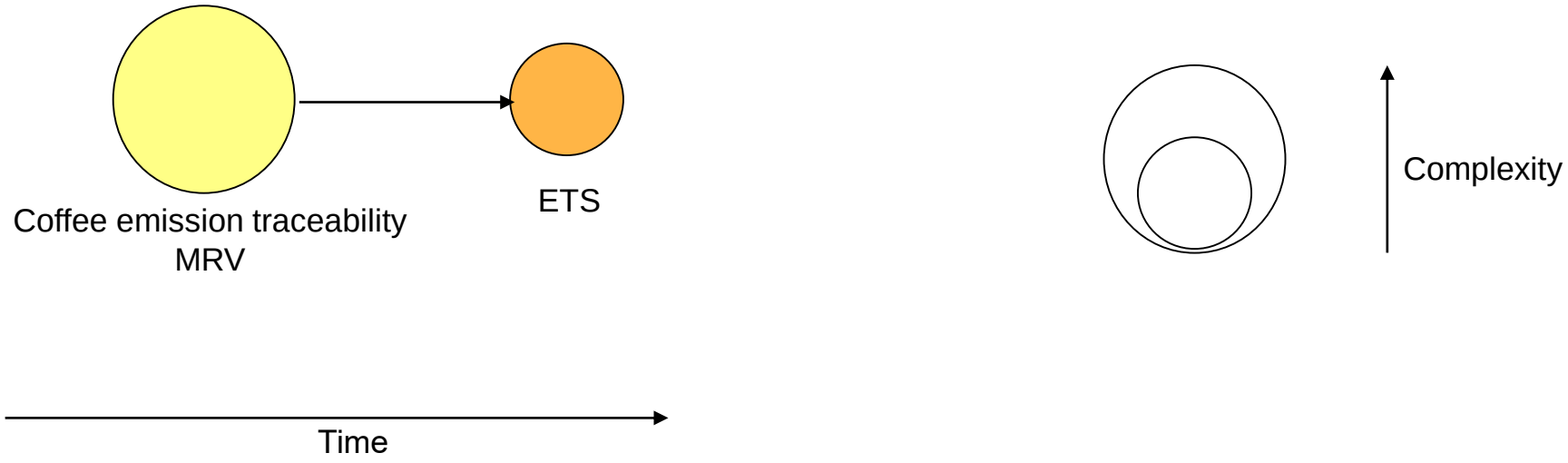
Sample architecture design



Source: Own elaboration based on interviews and research

Implementation roadmap

Implementation roadmap



Benefit identification of a Blockchain solution

Benefits	
Economic benefits	Potential price premium for NAMA cafe. Possibility of developing along with a coffee supply chain solution (for commercial and exporting purposes) and solving both problems with a marginal cost increment.
Social benefits	Human capital creation Potential boost of fair-trade mechanisms
Environmental benefits	Potentially 250,000 t CO_2e reduction according to Costa Rica Low Carbon Coffee NAMA The aggregate emission reduction potential amounts to 1.85 million tons CO_2e over 20 years. Emission reductions of 50.000 tons CO2e are directly attributable to the NAMA Support Project.

Thank you

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Oruka

Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety
of the Federal Republic of Germany

Case Mexico: Blockchain applications for emission trading and MRV systems

Ximena Aristizabal

Advisor of the project “Preparation of an Emissions Trading System in Mexico” – GIZ Mexico

Sven Braden

independent consultant and representative of the Climate Ledger Initiative

“Blockchain-based solutions for climate policy in Latin America”

MEXICO: Climate Instruments and Blockchain Technology

Sven Braden/Climate Ledger Initiative

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

of the Federal Republic of Germany

Date: 30.11.2018

Scope of Study

Analysis tasks are divided into

1) Explorative and capacity building phase (Work Package 1: Exploration of potentials of blockchain for climate governance), and

2) **Recommendation phase** with definition of preconditions for applying blockchain-based climate policy, where appropriate (Work Package 2).

Activities

Exploring the application of blockchain technology within Emissions Trading and climate-related Monitoring, Reporting and Verification systems in Mexico.

Objectives

Evaluation of the suitability of blockchain for

- an Emissions Transaction Registry
- a Governmental Monitoring System for Climate Policies , and
- a system to support MRV of Climate Finance

General Considerations - **Benefits** and **Downsides** of Blockchains in practice

+ Due to the element of decentralization, data on stored on a blockchain is considered **very secure**, **data remains reliably available** even if a large portion of the network is offline.
+ Blockchain-based Data Management makes it **harder for colluding participants** to act in ways that benefit them at the expense of other participants (censoring, disrupting, blacklisting, restricting, seizing or freezing transactions or preventing users from participating in the network)
+ Blockchain based approaches are **highly efficient** in cases **with inherent P2P relationships** (e.g. sharing economy, energy trading)

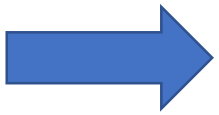
- Blockchain-based database **operations are often slower** than their centralized counterparts
- Depending on the level of decentralization, Blockchains have **a lower transaction performance** and may create eventually higher costs compared to conventional databases. Writing into a centralized database needs to be done once, writing into a distributed ledger needs to be done as many times as there are ledger nodes.
- Executing **overall control (Governance)** within a blockchain based system can become **cumbersome.**

General Considerations for determining the suitability of Blockchain

- A **centralized database** can always be programmed like a blockchain and behave as such.
- It is **decentralization** that is acquired by a Blockchain and that provides the abovementioned security and data availability features (in a centralized system these features would have to be developed and maintained by a central administrator – which may become an issue of credibility).

How crucial is decentralization for a given problem? Focus should be given on the blockchain-specific governance approach. If Blockchain technology is not the only solution to a given problem, it is very likely that a centralized database can solve the problem more efficiently.

- However, Blockchain technology may not only be suitable to solve given problems. The technology may also enable the operation of completely new markets (e.g. via tokenization of real-world assets) and economical interactions.



The core features of blockchain technology generally point to suitable use case in **disintermediation, cross jurisdiction and reporting and compliance** applications.

Suitability of Blockchain for Climate Instruments

Pre-considerations for determining **the suitable** Blockchain

- Permissioned Blockchain (with integrated control layer)
- Scripting language of protocol needs to be able to execute smart contracts

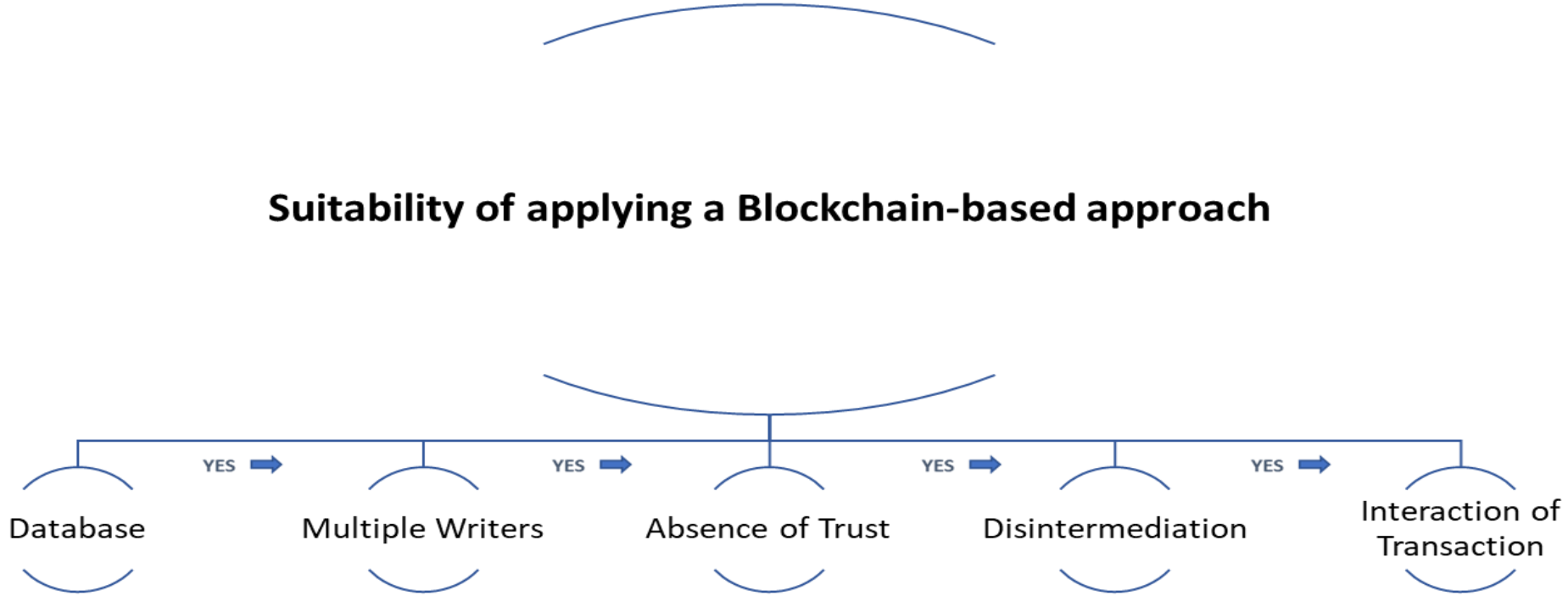
Suitability of Blockchain for Climate Instruments

Methodology

- Determination of Evaluation Criteria for the suitability of applying a blockchain based approach
- Defining the specific Climate Instrument Use Case - *Emissions Transaction Registry, a Governmental Monitoring System for Climate Policies and a system to support MRV of Climate Finance*
- Examination check of the defined use case against the determined Evaluation Criteria
- Evaluation Result and Recommendations

Suitability of Blockchain for Climate Instruments

Evaluation Criteria for the suitability of applying a blockchain based approach



Suitability of Blockchain for Climate Instruments

Evaluation Criteria for the suitability of applying a blockchain based approach

Database:	Does the selected climate instruments involve a (relational) database?
Multiple Writers:	Does the case involve more than one entity / participant who are modifying the database?
Absence of Trust:	Does the user accept modification to the joint state of the shared database by another user without further proof?
Disintermediation:	Is there a need to remove the middleman?
Interaction of Transaction:	Are transactions dependent on one another?

Emissions Transaction Registry

Defining the specific Climate Instrument Use Case – **Emissions Transaction Registry**

Objective: An Emissions Transaction Registry forms the administrative backbone of an Emissions Trading System (ETS). These systems establish markets where GHG emitting companies trade their short and long positions of emission allowances. In order to manage the transaction (allocation, transfer, surrender, cancelation) of digital emission allowances an Emission Transaction Registry has to be set up, similar to a banking system.

Characterization: An Emissions Transaction Registry is an IT databases that assigns a unique serial number to each unit of an allowance and tracks those serial numbers from their issuance onward. This includes information on who has been issued allowances, who holds those allowances as well as other units, and when and from where units are surrendered or canceled. Market participants (emitting companies, financial markets etc) sign up to the registry and create an account where their units are stored.

Mexico introduces a 3 year pilot phase of an ETS from 2019 to 2021.

Suitability of Blockchain for Climate Instruments

Suitability of applying a blockchain based approach for an **Emission Transaction Registry**

Database:	**Yes!** An Emissions Transaction Registry is an online database that records serialized GHG units (e.g. emission allowances, offset units, etc.). It also **enables the transfer between multiple account holders** on the registry (internal transfers) and may for the transfers of units to another registry (external transfer).
Multiple Writers:	**Yes!** Emitters, government, auditors, financial institutions etc. constantly add transactions into the registry thereby modify the database.
Absence of Trust:	**Yes!** The economic and political incentives of the database's users are too different to work on a trusted basis. Entries in the registry do have legal consequences (compliance, ownership etc.) and need to be managed along pre-defined rules.

Suitability of applying a blockchain based approach for an **Emission Transaction Registry**

Interaction of Transaction:	Yes! Transactions within an Emissions Transaction Registry depend on each other (e.g. when complying with offset limits, banking thresholds, validator opinions etc.).
Disintermediation:	Depends! **NO:** The **allocation of allowances, the management of ETS registry accounts or the recognition of offset credits** are first of all **sovereign tasks** of the government. On a decentralized blockchain network these tasks would be more complex than on a conventional centralized database. **YES:** The generation of emission allowances via pre-defined smart contracts could add a significant level of **transparency** into the ETS; and could facilitate ETS linking. The **tokenization of emission allowances** (but **also of verified emissions**) could introduce a new level of data **interoperability** in Emissions Trading.

Suitability of applying a blockchain based approach for an **Emission Transaction Registry**

	Allowances / Offset Units	**Account Management**
Centralized *Executed by Registry Administration*	Allowances / Offset Units are reflected via database entries by Registry Administrator	Accounts are managed by **Registry administrator**, he also provides associated **services** (lost password, hotline, etc.).
	Changes (e.g. reflecting allocation / surrendering) to database are possible at all times – the supply power is centralized	
	Use of data beyond ETS is relatively limited – increases complexities for linking system with other systems / programs outside the registry boundaries (avoidance of double counting of allowances / offset units)	
Decentralized *Executed by smart contract and network protocol*	High interoperability since fungible / non-fungible token approach may offer efficiency gains through **increased interaction of data** with other databases (linking)	**Management of private keys** for allowances / offset ledger not trivial (e.g. lost private keys cannot be recovered without considering pre-defined additional security measures)
	Allowances / offset units are reflected via tokens within a smart contract – once the total amount of allowances / offset units is generated any later adjustment are complex and will mean a new setup of the underlying smart contract	

Suitability of Blockchain for Climate Instruments

Evaluation Result and Recommendation for an **Emission Transaction Registry**

A Hybrid Approach - Combining the best from both sides, centralized and decentralized

- Centralized Database (**Transaction Layer**): Allocation of allowances, Acknowledgement of offset units and Management of Registry accounts

- Decentralized Database **(Blockchain/Settlement Layer**): The generation and distribution of tokens (with different characteristics) on dedicated administrative wallets takes place on a permissioned blockchain via a smart contract.

- The advantage of this hybrid model is that the capabilities of the Blockchain Layer may be gradually and subsequently enhanced by the respective development of the underlying smart contract (rules setting, fixation of token specifications etc.).

- The **majority of ETS activities will happen on the centralized Transaction Layer.** The middleman is needed in order to ensure the proper management of the account/wallet-based Registry system.

Governmental Monitoring System for Climate Policies (SIAT-NDC)

Defining the specific Climate Instrument Use Case – **Governmental Monitoring System for Climate Policies (SIAT-NDC)**

Objective: Ensuring that the planning, implementation and execution of climate policies for mitigation and adaptation takes place on community, sub-national and federal level as required by the respective laws. The system also provides an overview on the state of current NDC implementation.

Characterization: System compiles data in order to track the development and progress of climate policies on community, sub-national and federal level. The federal Government may also use some information (policies/measures with highest GHG mitigation performance) for reporting obligations under the UNFCCC's transparency framework.

Mexico is working on **SIAT-NDC**, **a NDC progress tracking tool** that integrates subnational and federal GHG and policy reporting. Several Mexican states have introduced their own MRV systems to track progress on emissions reductions. Common formats or standards are largely missing. SIAT-NDC should lead to increased collaboration between federal and subnational agencies and may one day serve as the common registry to inform the federal and subnational government departments on climate relevant developments.

Suitability of applying a blockchain based approach for an **Governmental Monitoring System for Climate Policies (SIAT-NDC)**

Database:	**Yes!** SIAT-NDC involves a database where **information on mitigation and adaptation policies and their associated outcomes are registered**. It is up to the responsible (subnational or federal) authority to define corresponding reporting procedures.
Multiple Writers:	**Yes!** SIAT-NDC involves multiple writers. Although all writers maybe associated to the public sector, they modify the dedicated database while executing their competences. **All writing levels (community, subnational, federal) operate on the same hierarchy and have to respect each other's entries**.
Absence of Trust:	**No!** The acting participants are **operating on the same "side"** – the public sector. It does not make a difference whether the subnational Government may have or have not leeway in designing climate policies. The actors in question **operate under one legal framework**. This situation does not require trust since it is (on all levels) regulated by legislative (and executive) guidance. **This guidance provides for a trust-like environment**.

Suitability of applying a blockchain based approach for an **Governmental Monitoring System for Climate Policies (SIAT-NDC)**

Disintermediation:	**NO!** A “middleman” or intermediate could be mandated to manage the SIAT-NDC tool. In fact, **SINACC** (a commission that brings together representatives of all Mexican states and the federal government) would be a legitimate institution to mandate a respective “middleman” to run SIAT-NDC.
Interaction of Transaction:	**NO!** Transactions or (better:) **database entries** within SIAT-NDC **would not depend on each other.** As indicated above, subnational and national authorities are acting on the same hierarchy where no actor may modify the entry of the other one. A transaction dependence could be assumed in cases where data entries would be linked to specific claims or even sanctions, e.g. if SIAT-NDC would provide the basis for an incentive mechanism. However, the **objective of SIAT-NDC is not “incentivizing” mitigation and adaptation actions**, but to provide for a national transparency mechanism to enable the communication of relevant mitigation and adaptation outcomes internally and externally (e.g. to the UNFCCC).

Evaluation Result and Recommendation for a **Governmental Monitoring System for Climate Policies (SIAT-NDC)**

The evaluation concluded that **a Governmental Monitoring System for Climate Policies in its current form and context (SIAT-NDC) would not benefit from a blockchain based architecture**.

In order to ensure a flawless exchange of climate relevant data between subnational and federal governments **a conventional data management system appears to be more suitable**.

MRV System for Climate Finance

Defining the specific Climate Instrument Use Case – **MRV System for Climate Finance**

Objectives of a MRV System are **strengthening the transparency, accountability and trust** between donating entity and receiving entity. Furthermore the system should support the assessment, deployment and general use of climate finance. The system should help to **show who profits from financial support** and make it possible to **identify gaps in regional and sectoral support**. It may also help to monitor and evaluate trends and progress in climate-related investment.

Characterization: : MRV of climate finance is **very complex** due to the multitude of actors, the proliferation of funds and financing mechanisms through which funding is channeled. In order to provide for an appropriate instrument for the intended evaluation, the **proposed MRV system follows the principles of result-based finance**.

Broadly defined, result-based finance is a financing modality under which funds are disbursed by an investor or donor to a recipient upon the achievement of a pre-agreed set of results, with achievement of these results being subject to independent verification.

In order to maintain some level of oversight Mexico established RENE-CID. RENE-CID is led by AMEXCID and monitors climate finance through international cooperation. Other climate finance related MRV types do not yet exist within Mexico.

Suitability of Blockchain for Climate Instruments

Defining the specific Climate Instrument Use Case – MRV System for Climate Finance

Further Specifications (Verification Platform):

A common requirement within climate finance is the need for verifying results, especially in the context of result-based finance. The verification of results goes beyond the reporting objective.

The access to and the disbursement of climate finance will be facilitated if the intended outcome is verified. The proposed MRV System therefore has to provide for means to allow (or better: to incentivize) the verification of climate actions claims (mitigation and adaptation).

The suitability of applying a blockchain based approach is therefor checked against a verification platform as MRV System for Climate Finance.

Suitability of Blockchain for Climate Instruments

Suitability of applying a blockchain based approach for a **MRV System for Climate Finance**

Database:	**Yes!** The verification platform stores information about the climate action claims as well as the associated verification processes. The platform will also be the gateway exchanging the token.
Multiple Writers:	**Yes!** The platform involves multiple writers. The right to write and modify will be executed by various stakeholders coming from different angles (project developers, auditors, financial institutions, subnational and federal government). As a matter of fact, the integrity of the verification platform requires different writers in order to ensure objective verification of climate action claims.
Absence of Trust:	**Yes!** The realization of climate action is complex. Impact has to be created and formulated in a way that it can be used beyond the trusted participants of a activity. In other words, proof of impact needs to be objective, it cannot be subjective trust. Climate finance environment would therefore benefit from a verification platform.

Suitability of applying a blockchain based approach for a **MRV System for Climate Finance**

Disintermediation:	**YES!** The platform is a tool to accommodate various approaches of implementing and verifying climate action. The tool itself should provide for an **open data pool**, which provides access to relevant stakeholders. A core objective of the verification platform is to generate **data for improved policy planning**. This data should be **managed jointly by the platform community (project developers, subnational and federal government, donors etc.)**, rather than by one single company. The protocol rules of the verification platform ensure that climate action claims are only verified once the conditions are met. This approach also enjoys a higher credibility towards climate finance donors than assigning the content management to a middleman.
Interaction of Transaction:	**YES!** The transactions of the verification platform require interaction. Data entries may (or may not) lead to the creation of a token, representing a verified impact claim. Token forwarded to a specific wallet environment will expose information which in turn may trigger execution of further transactions.

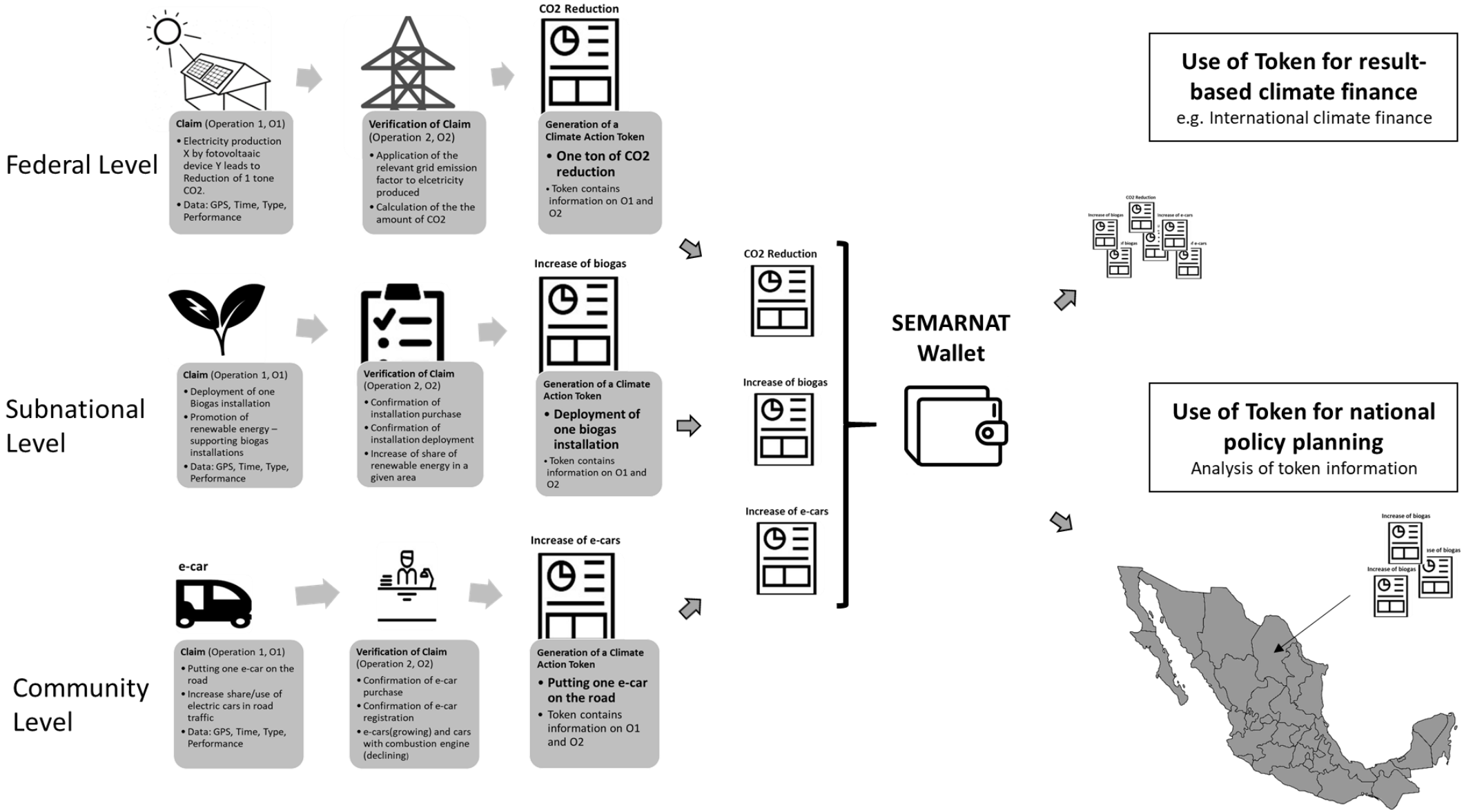
Evaluation Result and Recommendation for a **MRV System for Climate Finance**

Access to climate finance could be facilitated and supported by the use of **a decentralized platform that enables the verification of climate action claims.**

These verified claims may be traded / exchanges, for example in the context of **result-based finance** in international climate finance.

In addition, a shared ledger that gathers all tokens with verified climate action claims states **a valuable source for data which can be used for future policy planning.**

Suitability of Blockchain for Climate Instruments - Verification Platform Simplified Illustration



Suitability of Blockchain for Climate Instruments - Verification Platform Simplified Illustration

Activities	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Months 7-12
Feasibility Study to identify appropriate Pilot Cases for the Verification Platform, incl. 1) Analysis of Climate Action Programs (e.g. subsidy schemes) on federal, subnational and community level, 2) Determination of respective/appropriate verification methods, 3) Identification of 3 Pilot Cases based on 1.) and 2.) and national priorities							
Conclusion of arrangements with relevant stakeholders of identified Pilot Cases							
Implementation of the required hardware configuration (e.g. oracles)							
Digitizing the formulation of • climate action claims, and • verification methods / processes using ixo protocol or sth. similar.							
Validation of Verification Platform with stakeholders (claims and verification)							
Implementation of improvements / validation outcomes; incl. fine tuning of operational model. Model needs to "onboard" "project owner", Originating Service, Verification Services (DOEs), blockchain coding and maintenance							
Capacity Building / Training of stakeholders / communication							
Start of Pilot Case(s) with real time verification of climate action claims							

Thank you!

Sven Braden / Climate Ledger Initiative

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

of the Federal Republic of Germany

Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

Lessons learned from the comparative analysis of the three cases

David Cortés Poza

Consultant of Oruka.lat

Comparative Analysis – Mexico, Brazil and Costa Rica

November 30th, 2018

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

oruka

Comparative analysis

1. Technical / technological
2. Governance

Brazil

Potential use of blockchain technology for the traceability of the productive chain of beef

Costa Rica

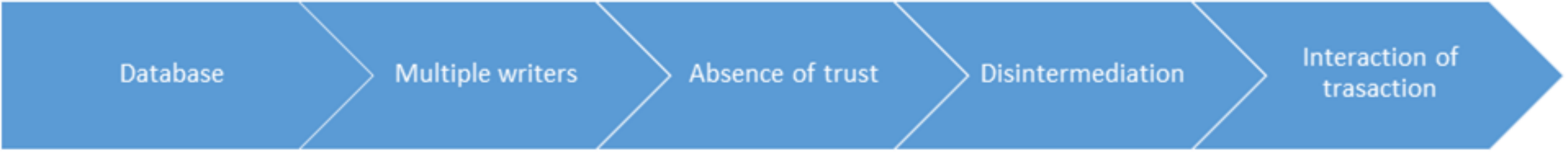
Blockchain-based traceability for Costa Rica’s coffee supply chain

Mexico

Selected Climate Instruments and Blockchain Technology. Preparation of an ETS in Mexico

- Suitability of Blockchain for an Emission Transaction Registry (ETR)
- MRV of GHG and Climate Policies
- MRV of Climate Finance

Suitability of applying a blockchain-based approach



Yes Yes Yes Yes

Source: Selected Climate Instruments and Blockchain Technology. Preparation of an Emissions Trading System in Mexico (SiCEM). Sven Braden, November 2018

Technical / Technological

Suitability of applying a blockchain-based approach					
Criteria	**Brazil**	**Costa Rica**	**Mexico**		
			ETS	MRV GHG	MRV CF
Database	●	●	●	●	●
Multiple writers	●	●	●	●	●
Absence of trust	●	●	●	●	●
Disintermediation	●	●	●	●	●
Interaction of transaction	●	●	●	●	●
Potential for Blockchain	●	●	●	●	●

Criteria presence / potential: ● High ● Medium ● Low

What type of blockchain?

Technical / Technological

Blockchain type decision					
Need	**Brazil**	**Costa Rica**	**Mexico**		
			ETS	MRV GHG	MRV CF
Are all actors known?	●	●	●		●
Immutability over efficiency?	○	○	○		●
Public transaction?	○	○	○		●
Multiple party consensus?	●	●	○		
Type of Blockchain solution	**Private / consortium**	**Private / consortium**	**Hybrid** (private + centralized)		**Public**

Criteria in the needs: ● Yes ○ No

Blockchain use case

MRV in value chains:

- Well suited for value/supply chain MRV.
- Streamlines processes avoiding information silos and desynchronization among different actors.
- Provides full history of the assets/production/processes at every step of the value chain.

Exchange of assets:

- Digital assets represented in a blockchain can be easily integrated in centralized exchanges.
- Allows to integrate in the future to other systems.
- Allows for full ownership of the asset by providing a private key.

Climate finance:

- Allows for traceability of funds and the progress of

implementation of a project.

Governance

	Brazil	Costa Rica	México
Political will			
Industry shaker	Ministério da Agricultura e do Abastecimento	Icafe Instituto del Café de Costa Rica	SEMARNAT Secretaría de Medio Ambiente y Recursos Naturales
Blockchain ecosystem	ABCB	Asociación BLKCHAIN Costa Rica; Brindando trazabilidad al café Costarricense con Blockchain	BxMx
Previous experience	SISBOV	Café de Costa Rica; Café de Costa Rica Trazabilidad & Sostenibilidad	SIAT-PECC | SIAT-NDC
Other information	Brazilian Beef; ABIEC		La Ley General de Cambio Climático

Challenges

- Governance
- Access to digital infrastructure
- Automated reporting (IoT) or human verification
- Cultural: adoption of new standards, systems and technologies
- Political changes or instability
- Scarcity of blockchain developers
- Funding for climate initiatives

Conclusions

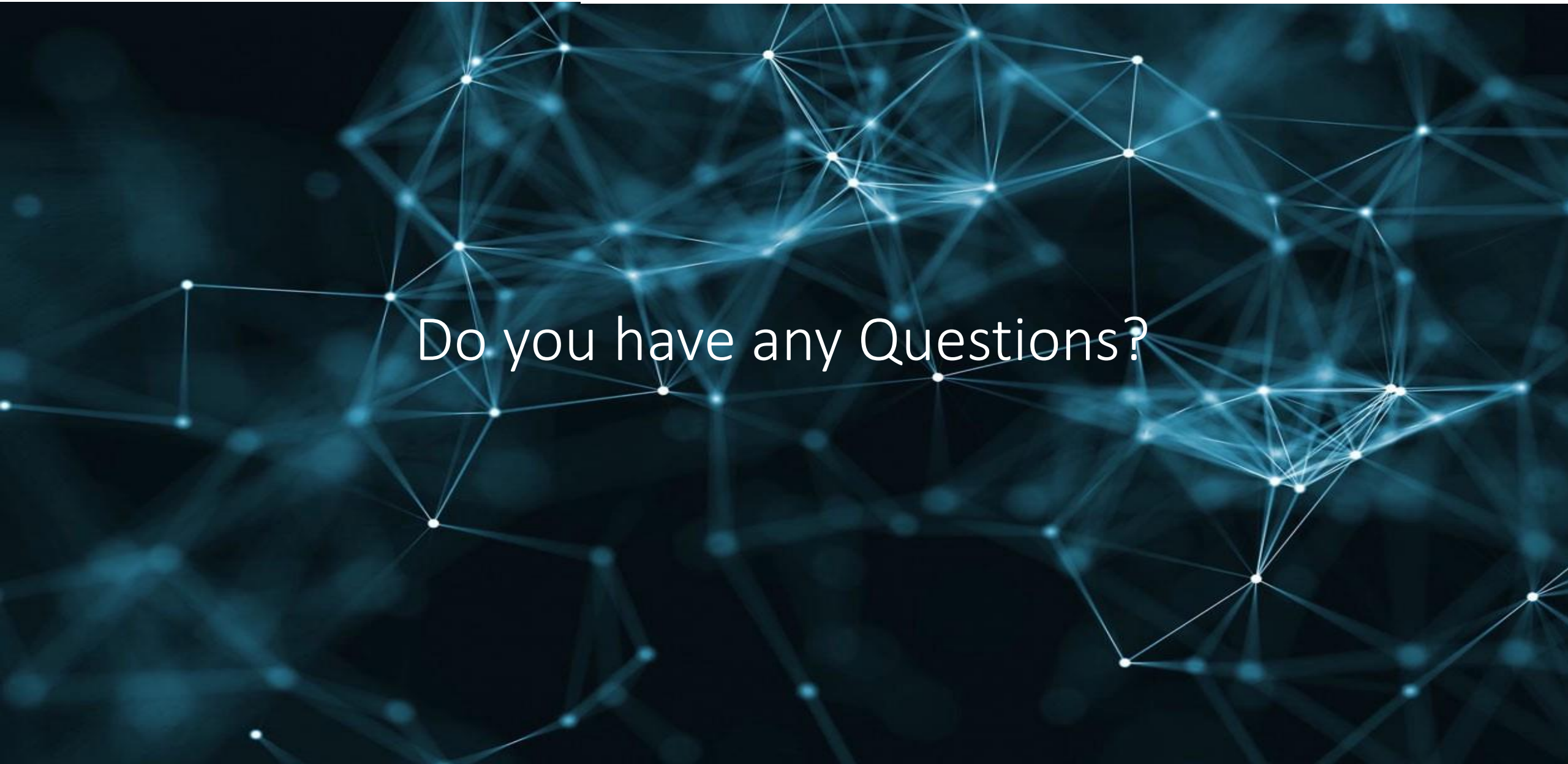
- Blockchain allows for greater transparency for decision making.
- Blockchain provides certainty in traceability.
- Proof of concept or pilot projects with few actors should be carried out before full implementations.
    - Small and homogeneous countries like Costa Rica are good laboratories for pilot studies.
- Blockchain is not the typical centralized software system.

Governance is key.

Thank you

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Oruka


Do you have any Questions?

Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety
of the Federal Republic of Germany

Discussion panel: Perspectives on blockchain in the climate sector in Costa Rica and Mexico

Victor Hugo Escalona

Deputy Director of mitigation Policies (carbon market) Mexican Ministry of Environment and Natural Resources (SEMARNAT), México

María Paz Lobo Zeledón

Director of the Traceability and sustainability project at Café ICAFE, Costa Rica

Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

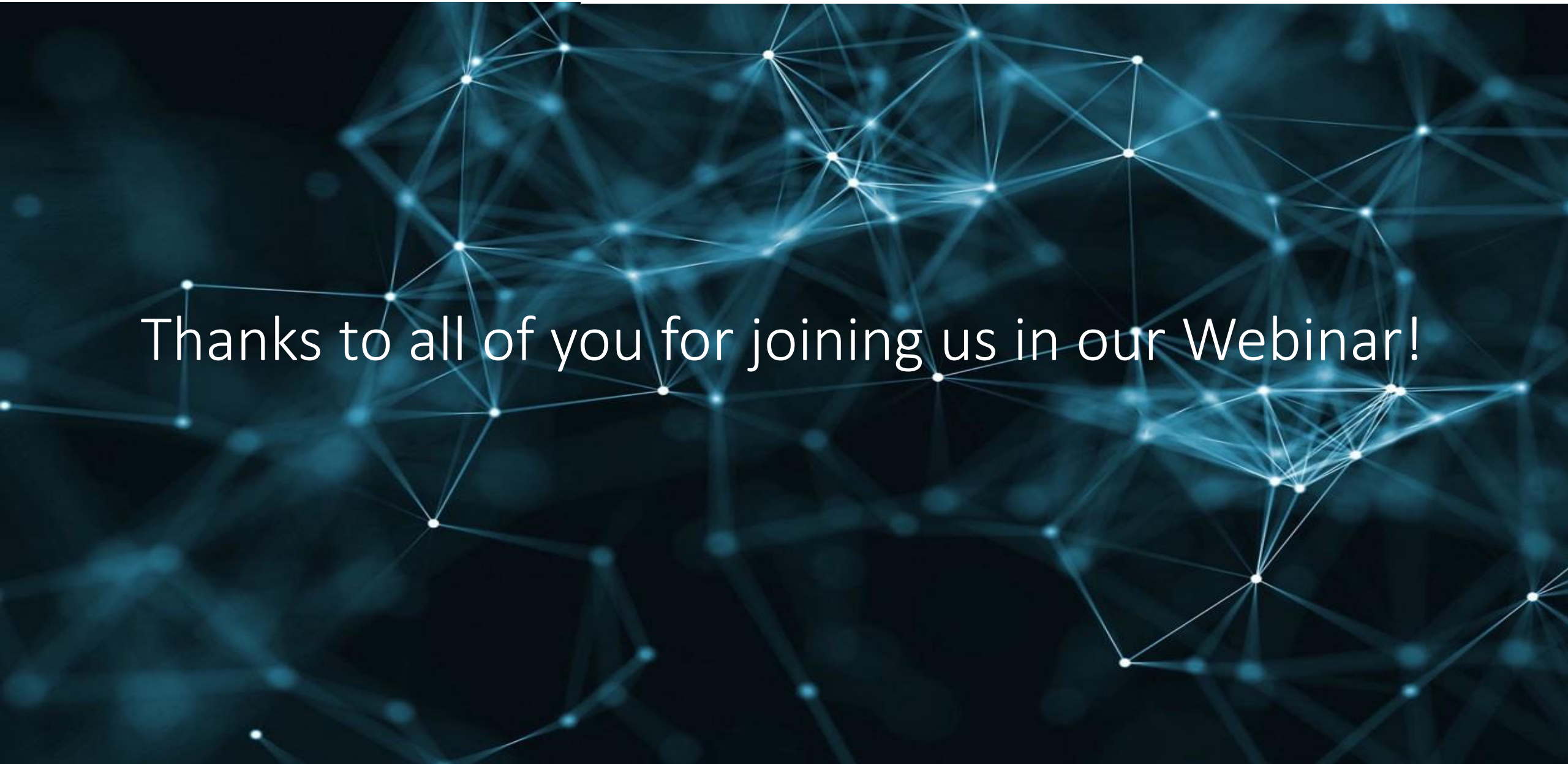
On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety
of the Federal Republic of Germany

Discussion Panel

Red Sectorial
Gestión Ambiental y Desarrollo Rural
América Latina y Caribe

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety
of the Federal Republic of Germany



Thanks to all of you for joining us in our Webinar!