GOYANG/CCC/UNFCCC
BLOCKCHAIN-BASED CLIMATE AND URBAN CDM INITIATIVE

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CONTENTS

1. Introduction

This paper highlights Goyang City initiatives focusing on Blockchain-based Green Space Management System(BGSMS) and Blockchain-based Urban CDM Program(BUCP) in partnership with UNFCCC and CCC.

The rapid expansion in urbanization and urban dwellers-whereby in about 30 years close to 70% of the world population will be living in cities. It is now recognized that city is the main cause of global warming.

- Blockchain-based Urban CDM is different from the first round of CDM, or old CDM. It is a tool for a carbon-centered comprehensive(3Cs) planning with transparency of overall management which is added value for planning system. It will increase cross-benefit when all project activities and technologies from different sectors at the city and community scale are integrated into one common approach.

1. Goyang Initiative

Goyang has a population of 1,050,000 people and covers a land area of 268.05㎢.

The city that truly moves towards a low-carbon smart eco-city capital and is doing very well for climate agenda of the Paris Climate Agreement.

e.g. UNCCD Award(June 17, 2015) : The First Prize of Land for Life Award

- Goyang City has created 580 ha of Forest(entitled Goyang Forest) in the deserted areas, Mogolia

1. Goyang Initiative

The Goyang climate city initiative can be highlighted in terms of goals, strategies, action plans, green space and Urban CDM activities as follows:

Title of the Initiative

Integrating climate action with urban planning and development : Towards low – carbon transition

Smart Goals of the Initiative

The goals to carry out climate. green space and sustainability program with the power of blockchain are:

- Climate Change Goal : Decarbonizing Goyang City toward a low-carbon society
- Land Use Goal: Increasing carbon sequestration resulting from green areas
- Governance Goal: Working on new governance and business market innovation for sustainability
- Recognition Goal : Being recognized as a model city for the Urban CDM and protection of green areas nationally and internationally

2. Partnership with CCC and UNFCCC

The initiative is currently going on through a great partnership between Goyang City, CCC and UNFCCC.

- Goyang City is a partner of CCC with resource mobilization & city and community innovation for the Global Climate Action Agenda.
- Goyang City & CCC Community Team cooperate on SDGs localization & climate action at the city level.

- In a pioneering initiative, process for a formal collaboration with UNFCCC to develop the Urban CDM methodologies and tools for carbon finance has been initiated.
- The initiative of the Urban CDM for enhancing Post-2020 Climate Markets can be considered as a community-focused Distributed Ledger Technology(DLT) application under the Paris Agreement.

“ It may be the first recognization of the importance and value of the Urban CDM by UNFCCC and CCC.”

3. Proposed Blockchain based Green Space Management Initiative between CCC, Goyang and UNFCCC

- Blockchain-based green space management influences on decision makers to select the most suitable areas for the creation of green space in the city, thereby removing GHG and enhancing biodiversity
- Due to blockchain-based monitoring capacity, the data can be collected and monitored to validate GHG removal by sinks
- The ledger for green space status and future plan can be shared among stakeholders and thereby raise their awareness about green space issues.
  - Goals
  - Innovation
  - Methodology

4.1 Definition of the Urban CDM

Urban CDM is an integrated mechanism which gives cities financial incentives and provides Carbon Emission Reductions(CERs) as much as certified amount of emissions reductions compared with baseline emissions at the city scale

"It is a new smart creativity which is different from the first round of UNFCCC CDM"

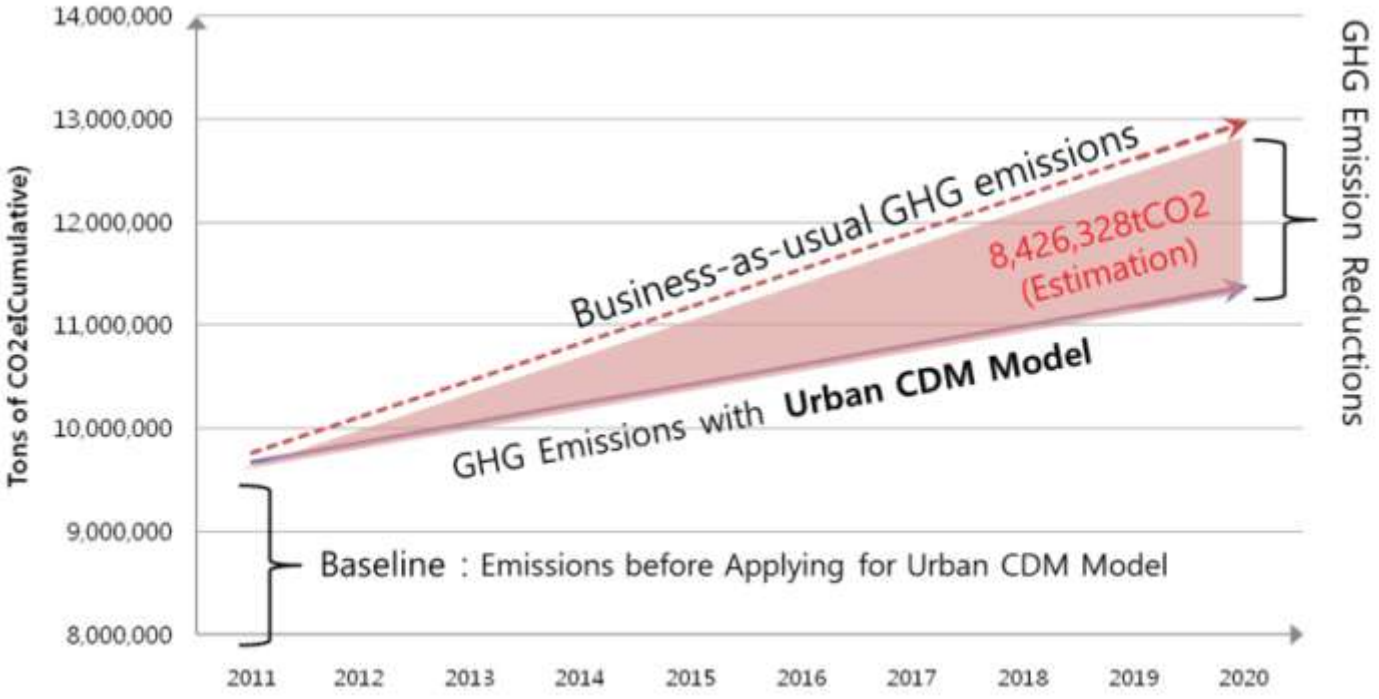

Fig. 1 Illustrative GHG Emission Trajectory at the city and community scale

4.2 Total Urban CDM Model

Total Urban CDM model(Fig. 2) incorporates GHG reduction activities(yellow arrows) into total urban system(Fig. 3) and urban smart grid system(Fig. 4).

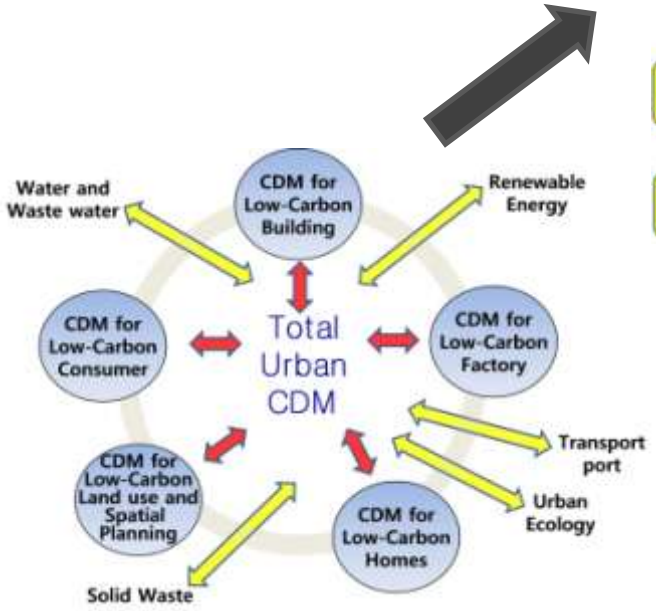

Fig. 2 Total Urban CDM model

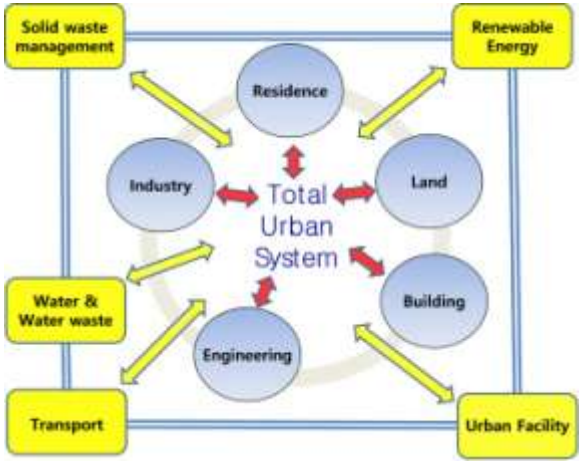

Fig. 3 Integrated urban planning and management

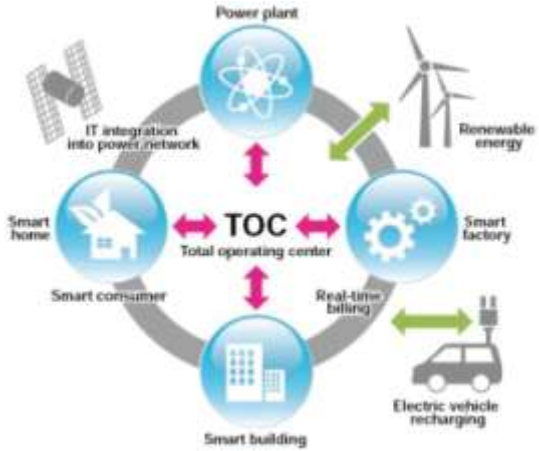

Fig. 4 Urban smart grid system

The Urban CDM planning directs each of different sectors of a city and needs overarching considerations with their interconnections to maximize the efficiency of each of them(Fig. 5).

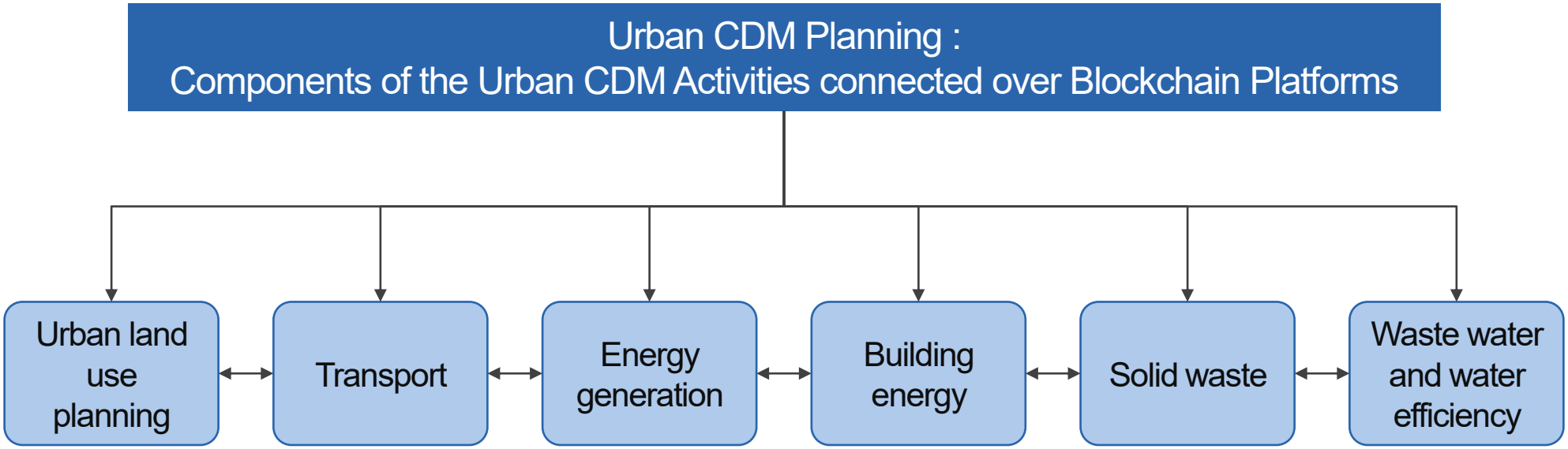

Fig. 5 Interconnections and Integration of different sectors in a city

4.3 Urban CDM Project Activities

The following list of methodologies relevant to the Urban CDM is considered.

- Urban CDM Project Activities at the City Scale which mitigate climate impacts.

- List of methodologies relevant to urban - Transport (Appendix 5)
- List of methodologies relevant to urban - Land use planning (Appendix 6)
- List of methodologies relevant to urban - Energy Generation (Appendix 7)
- List of methodologies relevant to urban – Building Energy (Appendix 8)
- List of methodologies relevant to urban – Solid Waste (Appendix 9)
- List of methodologies relevant to urban – Wastewater and Water Efficiency (Appendix 10)

4.4 Urban CDM Steps

Table 1 outlines thirteen BUCP steps that Urban CDM developers should follow for Urban CDM project development and project operation.

Table 1 Steps for Urban CDM

Step 1	Establish urban boundary (on-site and off-site)
Step 2	Identify sources of GHG emission and prepare GHG emission inventory report: Detailed steps and tools should be developed to complete a greenhouse gas inventory. The most important and time consuming step in inventory development is the identification and quantification of emissions sources, as a lot of data is needed.
Step 3	Formulate baseline scenario
Step 4	Identify the best available cross-sectoral program of activities for GHG reduction for the whole city: The program of activities for built form and urban infrastructure should be selected.
Step 5	Deploy selected program of activities in the master plan at the city-scale
Step 6	Formulate planning policy and development mechanisms for implementation of the selected program of activities
Step 7	Quantify emission reductions of each program of activities: Measure or estimate
Step 8	Aggregate emission reductions of each program of activities for the whole city
Step 9	Develop a 'program of activities design document (PDD)'
Step 10	Estimate the aggregated GHG emission reduction scenario of planned program of activities
Step 11	Implement and monitor the activities
Step 12	Evaluate carbon effectiveness of existing CDM methodologies and newly proposed CDM methodologies: Economic feasibility analysis
Step 13	Validate or verify ER benefit from Urban CDM

4.5 Shared virtual Database : Based on DLT and Blockchain Technology for Local Climate Actions and Urban CDM

Cities need good distributed data to make impactful emissions reductions. Blockchain can be better decision tools and encourage stakeholders' involvement.

4.5.1 Benchmarking examples of blockchain project

1) Singapore : Blockchain-based renewable energy marketplace (Renewable energy certificates(RECs))

2) Energy Web Foundation : Tracking and trading of RECs

3) City of Santa Clara, California : Tracking and trading carbon offsets

4.5.2 Blockchain models for Urban CDM

Four types of blockchain models were evolved for blockchain-based Urban CDM initiative. It is expected that all these models could be actionable with the greatest respect to the advantages of blockchain technology.

- Blockchain Model for Causal Factor and Cross-Effect Analysis (Appendix Fig. 1).
- Blockchain Model for Enhancing Urban CDM Operation (Appendix Fig. 2)
- IoT/Blockchain Model for Carbon Markets (Appendix Fig. 3)
- Blockchain Model for Distributed Ledger for Urban CDM Stakeholders (Appendix Fig. 4)

4.6 Umbrella Considerations for the Implementation of the Urban CDM

One of the attractive features of the proposed Urban CDM is that it can be expanded or contracted from the list of methodologies(Appendices 5~10) to achieve the greatest degree of compliance with the considerations below.More holistic approach which integrates all sectors into one common approach will increase co-benefits of climate mitigation and adaptation, and support blockchain initiatives for climate actions.

- Project activities
- Technology selection
- Project boundary
- Data availability and accuracy
- Accountability
- Cross-effects
- Step-by-step approach : Scaled-up approach starting with testbeds at the community level

5. Expected Benefit to Other Cities

Other cities can benefit from the new policy on blockchain-based Urban CDM and protection of green areas.

- Enabling cities to innovate by considering climate actions as essential to the urban planning and development
- Keeping cities' climate actions continuously through financial gains by adopting and practicing the Urban CDM
- Supporting cities in increasing their access to carbon markets through the Urban CDM
- Encouraging cities to raise citizens' awareness about climate change issues by sharing blockchain-based database on city climate status and future planning with regard to actions to be taken at the city and community level

This is an action-oriented, innovative and unique initiative to continue Goyang legacy by Mr. Jae Jun Lee, Mayor of Goyang City.

6. Further Actions to Be Taken

A version of architecture for blockchain-based Urban CDM has been addressed as a carbon finance response to climate impacts.To transform this version into reality in a shared mission, further actions for convergence of climate actions and blockchain technology should be taken as follows:

- Software and algorithm requirements
  - Component requirements and system requirements
  - Product-based arguments and process-based arguments
- Probabilistic approach vs deterministic approach
- Test, verification and validation and certification criteria
  - Tests should be science and evidence-based.
- Safety and security of blockchain systems
  - High level of risk mitigation
  - Low level of risk mitigation
- Artificial neural network-based deep learning, machine learning and AI
  - On/off machine learning
  - Combining computer system with human system

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Thank you very much for your kind attention!

APPENDICES

Appendix 1. Main Features of Blockchain-based Urban CDM

- City has specific features which impact climate change, including cross-effects of each sector.
- Blockchain is one type of a distributed ledger and organizes data into blocks, which are chained together.
- Blockchain/DLT could increase transparency, cost-effectiveness and efficiency advantages of Urban CDM and optimize use of resources. The technology could provide more transparency regarding GHG emissions and make it easier to track and report emissions reductions, thereby addressing possible double counting issues.
- Blockchain could serve as a tool to monitor the progress made in implementing the Nationally Determined Contributions, or “NDCs” under the Paris Agreement, as well as in city targets.
- Although research on ways to integrate blockchain into different sectors related to sustainable development and climate change is now expanding, more work is needed for blockchain to fully support the Urban CDM initiative.

Appendix 2. Key Strategies of the Goyang Initiative

- Working together with people, business leaders and civil societies
- Localizing SDGs
- Implementing the Paris Agreement at the city level
- Generating blockchain-based shared database for adoption and implementation of the Urban CDM
- Establishing the best partnership with national and international interested parties on climate
- Using technology for civic engagement

Appendix 3. Proposed Concerted Action Plans for Harmonious and Balanced Sustainable Goyang City

" Prioritizing actions with the greatest impact toward Goyang City's protection of green areas and climate goals while positioning it to pursue opportunities that can benefit its communities in the future."

- Science based sustainability targets and indicators

  e.g. 1) 8.9㎡(2017) of park areas per inhabitant to 11.6㎡(2030)

  2) 20% of GHG emissions reduction by 2020 on the basis of BAU and 4% on the basis of GHG emissions in 2005

- Integrated standards

  e.g. One common approach for integrating city planning, environment, transport and construction

- Systems for carbon credits

  e.g. 1) ETS(on-going) 2) Urban CDM(planned)

- Example programs of project activities

  1) Urban CDM project
  2) GHG emissions reduction project
  3) Green area protection project
  4) Smart eco-city project
  5) Living Lab project
  6) Climate change adaptation project
  7) ETS project
  8) Climate cooperative project
  9) Energy self-sufficient village project
  10) Off / on community microgrid project

Appendix 4. Proposed Blockchain-based Green Space Management Initiative between CCC, Goyang and UNFCCC

Goals

- To meet the needs of a growing city without losing green space
- To increase productivity of green belt areas
- To remove GHG by sinks
- To develop blockchain technology which helps financing towards the most effective mitigation measures according to Article 6 of the Paris Agreement
- To apply for registration of green space and Urban CDM project

Appendix 4. Proposed Blockchain-based Green Space Management Initiative between CCC, Goyang and UNFCCC

Innovation for the Initiative

- To allow combining the conservation of green space with water resources
  - Creation of urban greenblue grids
- To maintain the connectivity between protected green space and surrounding regions, including the DMZ of Korea
- To increase the square meter of green space per inhabitant index
- To increase carbon sequestration and carbon stocks resulting from green space, including urban tree cover and wetlands
- To establish and enact “Municipal System of Green Space Conservation” which will enable the protection of green space remnants in the city
- To promote wise use of greenbelt areas
- To carry out actions in environmental education through courses for city employees and citizens
- To generate a shared virtual database and ensure transparency of overall green space management with support from DLT/blockchain technology

This measure is part of city’s system of climate measures for total Urban CDM model which is described later.

Methodology for Assessment of GHG Removal enabled by blockchain-based Green Space Management System

Goyang City Green Space Management Initiative aims at combing the conservation of green areas with enhancement of bio-diversity by adopting DLT/blockchain technology for green space management. It is hoped that this initiative will enable startups to work with government entities.

To achieve the main objective of the initiative, a methodological approach has been proposed as follows:

1. Overview of DLT/blockchain technology service
2. Green development impacts of DLT/blockchain technology service
3. Discription of Green space managrment project and DLT/blockchain project
4. The project activity of DLT/blockchain technology and its second order effects:
   The effects created by the use if DLT/blockchain technology include the GHG removal after adopting of DLT/blockchain technology services

Appendix 4. Proposed Blockchain-based Green Space Management Initiative between CCC, Goyang and UNFCCC

5. Project boundary of green space management, and DLT/blockchain technology services ;

   The methodology establish two different project boundaries. The green space management project boundary includes the spatial boundaries, criteria and procedures to quantity reductions. DLT/blockchain project boundary includes deployment, performance, verification, compatibility, and customization of shared blockchain data.

6. Determining of the baseline and project activity
7. The calculating of baseline scenario
8. Development of greenspace project scenario, including new trees and wetland added through the urban greening project
9. Calculation of the GHG reductions of green space with support from DLT/blockchain technology
10. Monitoring, and validation and verification
11. CERs and trading
12. Development of the sustainability and resilience benefits assessment matrix

Appendix 5. List of methodologies relevant to urban - Transport

	Measure	CDM methodology
Mode shift	Build rapid transit system(bus, tramway, subway)	**Small-scale:** AMS-III.U, AMS-III.BM **Large-scale:** ACM0016, AM0031
	Operational upgrades for existing transit (Mapping, route optimization, ticketing upgrades)	
	Travel demand management (car sharing, congestion charging zones, parking restrictions and cycle hire program)	
	Bicycle infrastructure upgrades	
	Pedestrian infrastructure upgrades	
	Parking infrastructure management to disincentivize private car use	
Fuel switch and fuel efficiency	Public vehicle electrification	**Small-scale:** AMS-III.C, AMS-III.S, AMS-III.T, AMS-III.AA, AMS-III.AK, AMS-III-AP, AMS-III-AQ, AMS-III-AY, AMS-III-BC
	Taxi electrification	
	Electric vehicle infrastructure upgrades	
	Transit electrification	
	Bus electrification	
	Bus fuel switching	
	Private electric vehicle incentives (reduced fees, parking, tolls, taxes)	
	Low emission truck incentives (reduced fees, taxes)	
	Freight (delivery) system improvement (freight consolidation centers and improved logistic info, last mile bike delivery)	

Appendix 6. List of methodologies relevant to urban - Land use planning

	Measure	CDM methodology
Low carbon and green land use and efficiency	Transit oriented development	
	Infill/densification	
	Urban forestry and green space programs	

Appendix 7. List of methodologies relevant to urban - Energy Generation

	Measure	CDM methodology
District heating/cooling	Establish district heating/cooling	**Small-scale:** AMS-II.B **Large-scale:** AM0044, AM0058, AM0072, AM0117
	Efficiency improvements in district heating/cooling	
	Fuel switching in district heating/cooling	
Municipal renewable energy	Municipal renewable energy installation (solar, wind, biomass, etc.)	Heat for cooking, water and space (RE) **Small-scale:** AMS-I.I, AMS-I.J, AMS-I.K, AMS-III-AC Heat for cooking, water and space (EE) **Small-scale:** AMS-II.A, AMS-II.K
	Incentive program for residential and commercial building integrated renewable energy	
	Municipal clean energy procurement	

Appendix 8. List of methodologies relevant to urban – Building Energy

	Measure	CDM methodology
Private buildings	Establish mandatory building energy codes	Building efficiency/ Renewable energy **Small-scale:** AMS-III.AE, AMS-I.F, AMS-I.J **Large-scale:** AM0091 Appliances **Small-scale:** AMS-II.C, AMS-II.E, AMS-II.J, AMS-III-M, AMS-II.N, AMS-II.O, AMS-II.Q, AMS-II.R, AMS-III-AV **Large-scale:** AM0046, AM0070, AM0091, AM0113, AM0060, AM0086
	Residential EE existing buildings retrofits (lighting, envelope, heating, cooling, water) incentives or support	
	Residential new buildings green building standards	
	Commercial EE existing building retrofit incentives or support	
	Commercial new buildings green building standards	
	Establish energy reporting, benchmarking program for residential and/or commercial buildings	
	EE appliances incentive program	
	Fuel switching	
	Centralized chiller energy efficiency	
	Rooftop solar PV	
	Rooftop solar water heating	
Municipal buildings	School building retrofits	Building efficiency/ Renewable energy **Small-scale:** AMS-III.AE, AMS-I.F, AMS-I.J **Large-scale:** AM0091 Appliances **Small-scale:** AMS-II.C, AMS-II.E, AMS-II.J, AMS-III-M, AMS-II.N, AMS-II.O, AMS-II.Q, AMS-II.R, AMS-III-AV **Large-scale:** AM0046, AM0070, AM0091, AM0113, AM0060, AM0086
	Municipal rooftop solar PV	
	Municipal rooftop solar hot water	
	Municipal green building certification program	
	Municipal building EE retrofits (Lighting, building envelope, heating, cooling, water)	
	Building energy monitoring	
	Fuel switching	
Municipal public lighting	LED street lighting replacement	**Small-scale:** AMS-II.L

Appendix 9. List of methodologies relevant to urban – Solid Waste

	Measure	CDM methodology
Waste management (sorting, recycling, composting, treatment)	Residential / commercial /industrial recyclables collection	**Small-scale:** AMS-III-AJ, AMS-III-BA
	Residential / commercial / industrial food waste collection and compost	**Small-scale:** AMS-III.E, AMS-III.F, AMS-III.G, AMS-III.O, AMS-III.AF, AMS-III-AO, **Large-scale:** AM0053, AM0057, AM0069, AM0083, AM0093 , AM0112, ACM001, ACM0022, ACM0024
Waste collection and transportation energy	Waste transport vehicle efficiency/ fuel switching	
	Waste transport vehicle routing/ reduce km travelled	
	Waste treatment site operational efficiency	
Waste to energy	Install waste to energy plant	

Appendix 10. List of methodologies relevant to urban – Wastewater and Water Efficiency

	Measure	CDM methodology
Wastewater	Wastewater treatment switching and optimization	**Small-scale:** AMS-III.H, AMS-II.I **Large-scale:** AM0080, ACM0014
	Biogas capture and use	
	Wastewater capture and reuse/recycling	
Water conveyance/ delivery	Efficiency improvements (loss reduction, pumping)	**Small-scale:** AMS-III.AV **Large-scale:** AM0020, AM0086

Appendix 11. Possible Methodologies for Community Project Activities and Technologies

● Urban CDM Project Activities at the Community Scale : Methodologies for community smart microgrid

Project Activities		Availability of Registered Methodology for a Single Project	"Minor Changes" for Expanded PoA(Sectoral)	A New Methodology for Integrated Urban CDM(Cross-Sectoral)
Renewable Energy	Solar Energy	O	O	O
	Wind Power	O	O	O
Energy Efficient Household	Insulation	O	O	O
	Lighting	O	O	O
	Heating & Cooling	O	O	O
Water Saving	IoT-based Water Metering	?		O
	Rainwater	?		O
Land USe	Urban Farming	?		O
	Afforestation	O		O
	Wetland Restoration	?		O
Transport	Community Parking Lot	O		O
	Bike	O		O
	EV Charging Station	O		O
Smart Tech	IoT	?	O	O
	Blockchain	?	O	O
Grid	Grid electricity	O	O	O
	Offgrid electricity/isolated grids	O	O	O
Waste management	Reduction	O	O	O
	Reuse	O	O	O
	Recycling	O	O	O

메모 포함[GH1]: May need major changes to include detailed approaches

메모 포함[GH2]: Could also include TOD (transit oriented development)

Appendix 12. Proposed Goyang blockchain projects

- Use of blockchain for measurement and accounting process(tracking, measuring, forecasting, etc.) of GHG(national and local inventory), digital MRV, carbon asset and monetarizing carbon benefits for digital economy
- Use of blockchain for data management related to urban forestry and green areas for climate economy
- Use of blockchain to support sharing benefits from carbon community cooperative for shared economy
- Blockchain/DLT could bring us both climate benefit and green space benefit as well for co-benefit of mitigation and adaptation in value chain for circular economy.

Appendix 13. Blockchain Model for Causal Factor and Cross-Effect Analysis

Fig. 1 shows a GHG matrix for describing the relationship between typical measures listed in the Appendix 5~10 and their potential ultimate impact on urban development activities.

The basic philosophy of the analysis is that a meaningful use of blockchain technology must ultimately be a tool for determination of direct and indirect impacts on GHG emissions reductions at the city scale.

Urban CDM Project Elements which reduce GHG emissions		Urban development activities which impact climate					
		Land use planning	Transport	Energy generation	Building energy	Solid waste	Waste water and water efficiency
Measures	Transport	Major GHG reduction	Major GHG reduction	Major GHG reduction	Minor GHG reduction	Its magnitude cannot be determined	Its magnitude cannot be determined
	e.g. Transit oriented development						
	Building Energy	Major GHG reduction	Minor GHG reduction	Major GHG reduction	Major GHG reduction	Minor GHG reduction	Minor GHG reduction
	e.g. Mandatory building energy code						
	Land Use Planning	Major GHG reduction	Major GHG reduction	Major GHG reduction	Minor GHG reduction	Minor GHG reduction	Minor GHG reduction
	e.g. Infill/densification						
	Energy Generation	Major GHG reduction	Minor GHG reduction	Major GHG reduction	Major GHG reduction	Minor GHG reduction	Its magnitude cannot be determined
	e.g. District heating & cooling						
	Solid Waste	Major GHG reduction	Major GHG reduction	Major GHG reduction	Minor GHG reduction	Major GHG reduction	Its magnitude cannot be determined
	e.g. Waste transport vehicle routing reduce km travelled						
	Waste water and water efficiency	Minor GHG reduction	Minor GHG reduction	Major GHG reduction	Major GHG reduction	Its magnitude cannot be determined	Major GHG reduction
	e.g. Wastewater switching treatment and optimization						

Fig. 1 Causal Factor and Cross-Effect Analysis between component CDM project activities(CPA) and urban development activities for blockchain-based Urban CDM

Appendix 14. Blockchain Model for Enhancing Urban CDM Operation

Fig. 2 involves the three steps for tracking of emissions reductions of each CPA, GHG reduction measures and aggregation of each emission reduction by the measures:

- Horizontal arrows(➡) indicates the steps for tracking of emissions reductions following CDM rules and regulations(Category 1).
- Vertical arrows(⟶●) indicates blocks for different cross-sectoral components of Urban CDM activities for emissions reductions which could influence technologies that have to do with energy, transport, etc.(Category 2).
- Vertical and horizontal arrows result in aggregation of emissions reductions by each project activity which should be done for the future, less costly to put today(Category 3).

Appendix 14. Blockchain Model for Enhancing Urban CDM Operation

The guide using the interaction matrix in Fig.2 is as follows:

1. Enter the matrix at the left-hand under the heading "CDM Project Activities." In this example, the matrix includes six measures.
2. Read to the right. Steps that may result in a GHG reduction is shown at six urban development activities.
3. A block(▭) indicates that a relationship exists between six measures and steps.
4. Read downward from the block1.1 until the block 1 is encountered. If block1 encounter block 1.1, “Node1.1.1(★)” appears.
5. Read to the right from the block1 until a block1.1 is encountered. If block1.2 encounters block1,"Node1.1.2" appears.
6. In Category 3, "Cross-Sectoral Program of Activities for GHG Reductions" is a block describing the way in which technologies for CDM activities are identified.
7. In Category 3,"Estimation of the Aggregated GHG Emissions Scenario" is a block describing the sum of GHG emission scenario after each scenario for six CDM activities with each technology from different sectors has taken place.

Appendix 14. Blockchain Model for Enhancing Urban CDM Operation

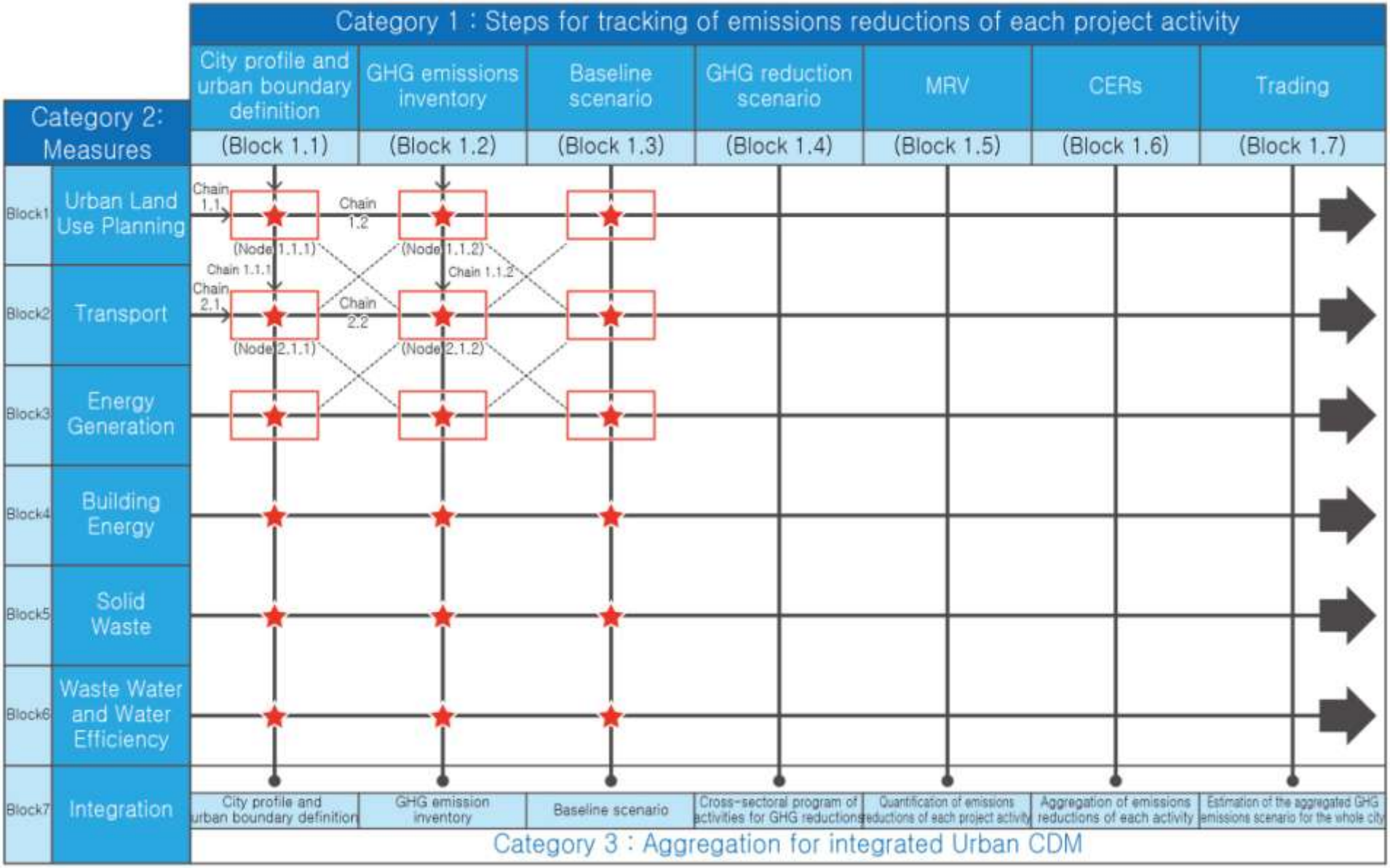

Fig. 2 Use of blockchain and its related technology for enhancing Urban CDM operation

Appendix 15. IoT/Blockchain Model for Carbon Markets

In this model(Fig.3), each block illustrates different digital functional layers of climate markets which are connected each other. Blockchain technology can synthesize and support the transaction of all types of GHG emission-related data(e.g. climate measures, additionality,etc.) in a shared visualized database.

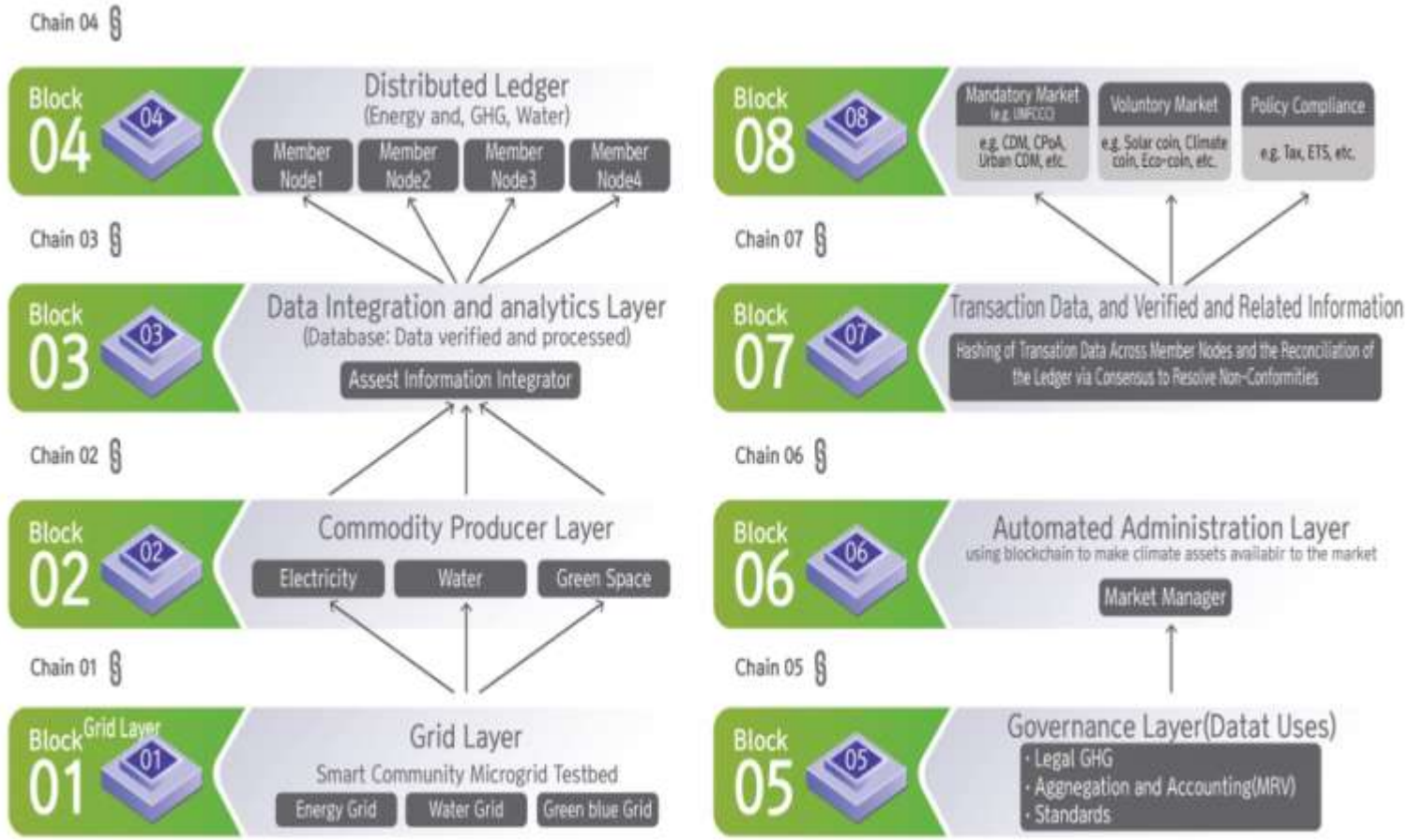

Fig. 3 Application of blockchain for carbon markets : An IoT/blockchain model(World Bank Group, 2018, Modified by Kwi-Gon Kim)

Appendix 16. Blockchain Model for Distributed Ledger for Urban CDM Stake holders

Ledger for Urban CDM procedure can be distributed to stakeholders with the power of blockchain for the transparent tracking and control of Urban CDM implementation.

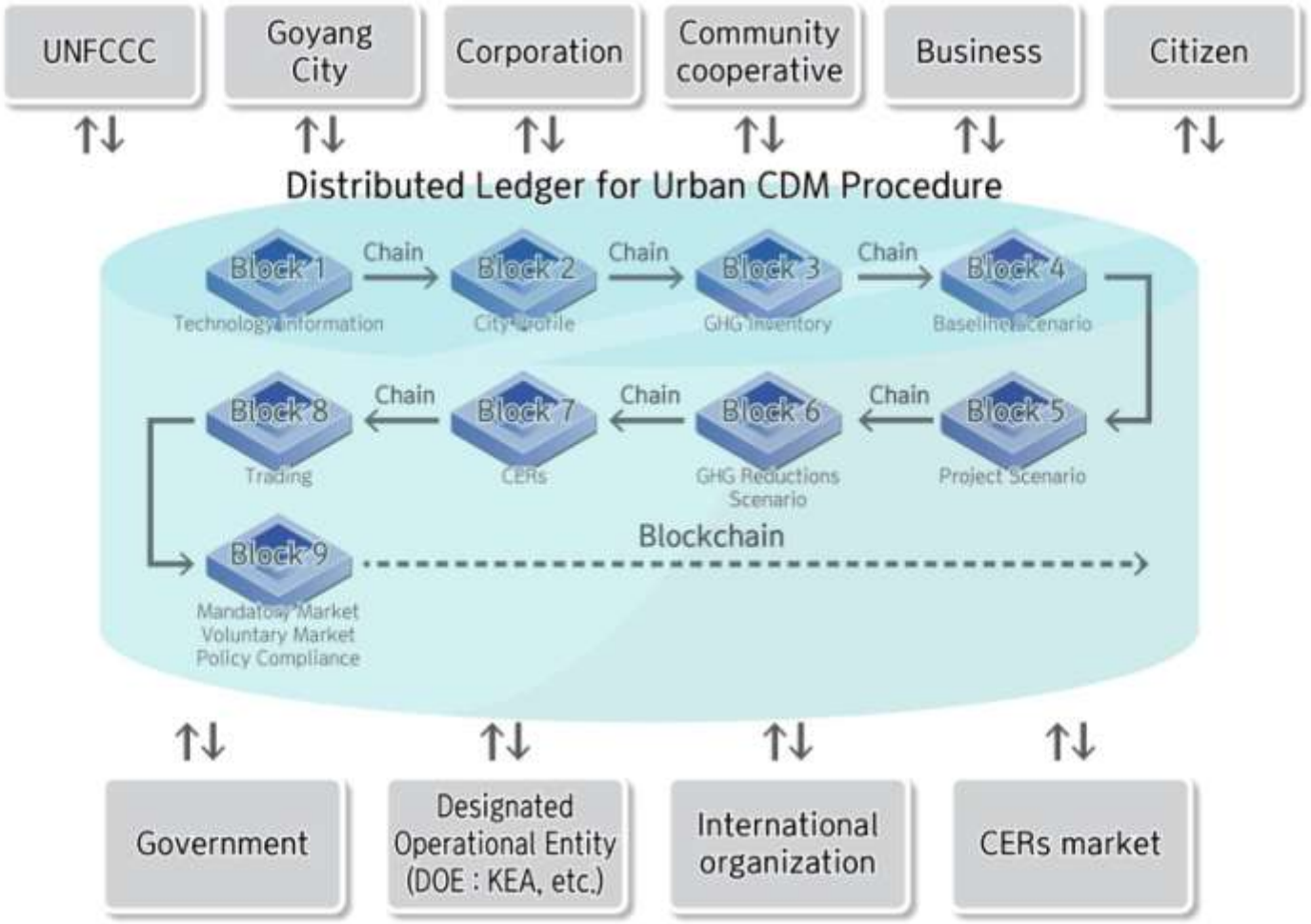

Fig. 4 Urban CDM DLT model for stakeholders