CDM IN THE BUILDING SECTOR

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1. Introduction

The author views the CDM in the building sector as one of six cross-cutting components in the Urban CDM: urban land use planning, transport, energy generation, building energy, solid waste, and wastewater and water efficiency in accordance with a new tenet of the CDM for the environmental integrity of a whole city (Figure 1)

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.

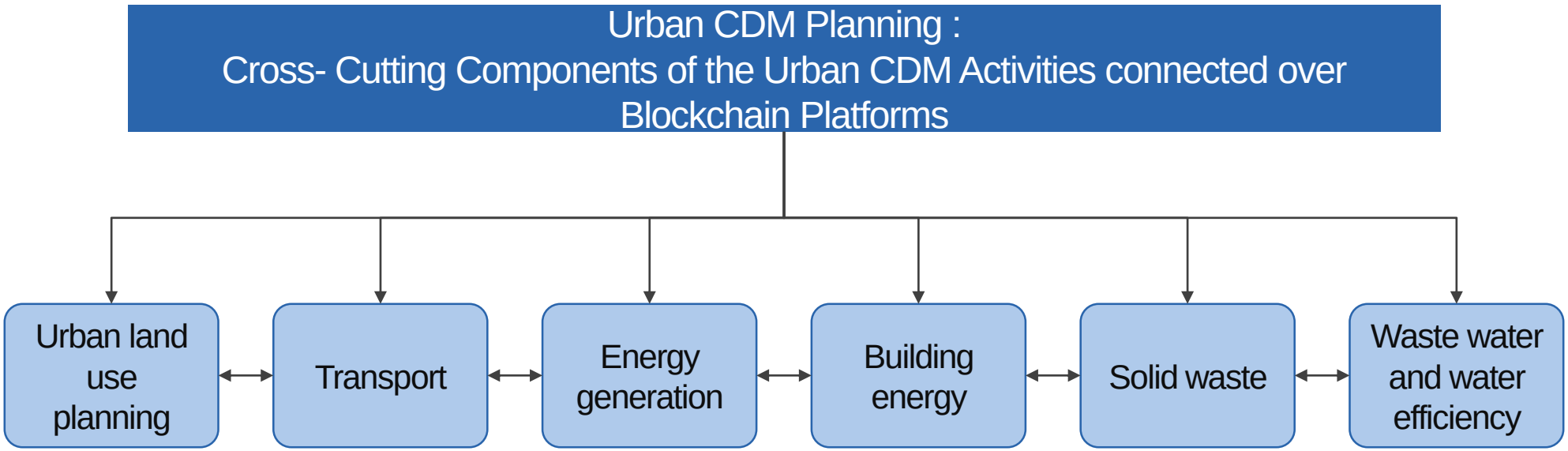


Fig. 1 Interconnections and Integration of different sectors in a city

2. Status Report on Methodologies and Implementation of the CDM in the Building Sector

Four points are identified that need to be adhered to in projects and program of activities.

The first one is that it has been reported that only a small number of registered methodologies in the building sector were implemented because of a small amount of GHG emission reductions, lack of demand and low carbon price .

The second point is that a great deal of difficulty and complexity of methodologies have caused financial burden for developing countries to hire expensive consulting firms.

The third item is that data monitoring system is designed for registering methodologies program of activities. But proper monitoring has not really been executed as an effective vehicle of CERs.

The fourth point is that lack of evidence on the data are resulted in inadequate tracing of baseline of existing technologies

From a practical standpoint, improvements are needed in the following areas:

1) CDM in the building sector as integral parts of the urban methodology
2) CDM methodologies prepared for programs rather than individual projects
3) Full consideration of all public and private review, comments and testimonies on existing methodologies
4) Streamlined application of smart digital technology for MRV
5) Better methods for co-benefits of mitigation, adaptation, biodiversity and social cohesion, etc.

3. The Potential for CDM in the Building Sector

The future of the CDM in the building sector will be characterized by manifold activities. It can be described according to elementary technology, green building standards, certification and performance systems, home IoT smart microgrid system, standardized baselines, and digital technologies.

3.1 Inclusion of more elementary (or unit) technologies in scoping of project activities

An area of future importance is the use of methodologies for more elementary technologies with data and information storage and retrieval systems (Table 1).
There are many elementary technologies which are not fully considered for registration of methodology

Table 1 Comparison of existing and proposed elementary technologies for the CDM in building sector

Existing methodologies	Proposed methodologies
• Cook stove • Water pumping • Waste purifier • Water saving • Refrigerators/chillers • Lighting • Whole building • Others/various technologies	• Architectural elements - Direction of buildings ,etc. • Facility elements - Equipment efficiency, etc. • Political elements - Policy, law, regulations, etc.

3. The Potential for CDM in the Building Sector

3.2 Incorporation of green building standards, certification and performance systems in the CDM rules and regulations

In addition to measurable technologies (e.g. fuel switch, building insulation, etc.), extension of standard and certification, and performance in often used in green building decisions would seem to be a particularly promising approach (Table 2 and Figure 2)

From windows and doors, to carpet, paints, and skylights, many more building products have achieved a sustainability rating from a third party based on life-cycle parameters. The Brock Environmental Center achieved LEED Platinum and Living Building Certification and had full transparency of the materials, products, and systems used in the project.
Photo Prakash Patel Photography, courtesy of SmithGroupJJR

Fig. 2

3. The Potential for CDM in the Building Sector

Table 2 Green building standards and certification systems

PRODUCT CERTIFICATION	SINGLE- OR MULTI-ATTRIBUTE	TYPE OF STANDARD OR CERTIFICATION	MANAGING ORGANIZATION	ISSUE OF FOCUS
Energy Star	Single-Attribute	Government certification relying on manufacturer-provided data or third-party testing	U.S. EPA and U.S. DOE	Energy consuming products
WaterSense	Single-Attribute	Government label based on third-party testing	U.S. EPA	Showerheads, toilets, faucets, urinals, and valves
Forest Stewardship Council	Single-Attribute	Third-party certification	Forest Stewardship Council (FSC)	Forests and forestry products
SCS Global Services	Multi-Attribute	Third-party certification	SCS Global Services	Wide range of products (i.e. carpets, textiles, wood products, insulation, and more)
Green Seal	Multi-Attribute	Third-party ISO Type 1 certification	Green Seal	Wide range of sectors (paints, adhesives, lamps, electric chillers, windows, window films, occupancy sensors)
Cradle to Cradle	Multi-Attribute	Third-party certification, Cradle to Cradle Certified^{CM} Product Standard is managed and updated by the Institute's Certification Standards Board	Cradle to Cradle Products Innovation Institute C2CPII	Building materials, interior design products, textiles and fabrics, paper and packaging, and personal and homecare products
GREENGUARD	Multi-attribute	Third party certification	UL Environment	Indoor air quality, children and schools focus
Green Squared	Multi-attribute	Third-party ISO Type 1 environmental labeling and declaration requirements (ISO 14024)	TCNA	Tiles and tile installations

3.3 Home IoT smart microgrid system

It can be proposed that the current project-based procedure should be considered as an interim measure, to be eventually replaced by a more streamlined procedure closely tied to integrated settlement planning. An important area is alternative rates of energy consumption resulting from various settlement patterns. The most innovative technique is solar energy driven community smart microgrid systems (Figure 3). The technologies for describing a solar energy-connected IoT microgrid system model equipped with ESS (off/on) for housing developments are as follows:

- Energy saving houses, commercial and office buildings
  - Solar garden lighting
  - Solar parking lots
  - Solar water Heaters
  - Solar door lockers
  - Solar EV charging stations
  - Solar cook stoves and other types of home appliances
  - Solar heat pumps (heating and cooking)
  - Solar LED room lighting, etc.

3. The Potential for CDM in the Building Sector

- Energy saving public facilities
  - Solar parking lots
  - Solar LED street lightings
  - Solar bus stop and bus information terminals (BIT)
  - Solar smart parks
  - Solar smart play grounds
  - Solar schools
  - Solar kiosks
  - Solar farms
  - Solar underground water table meters
  - Solar benches, etc.

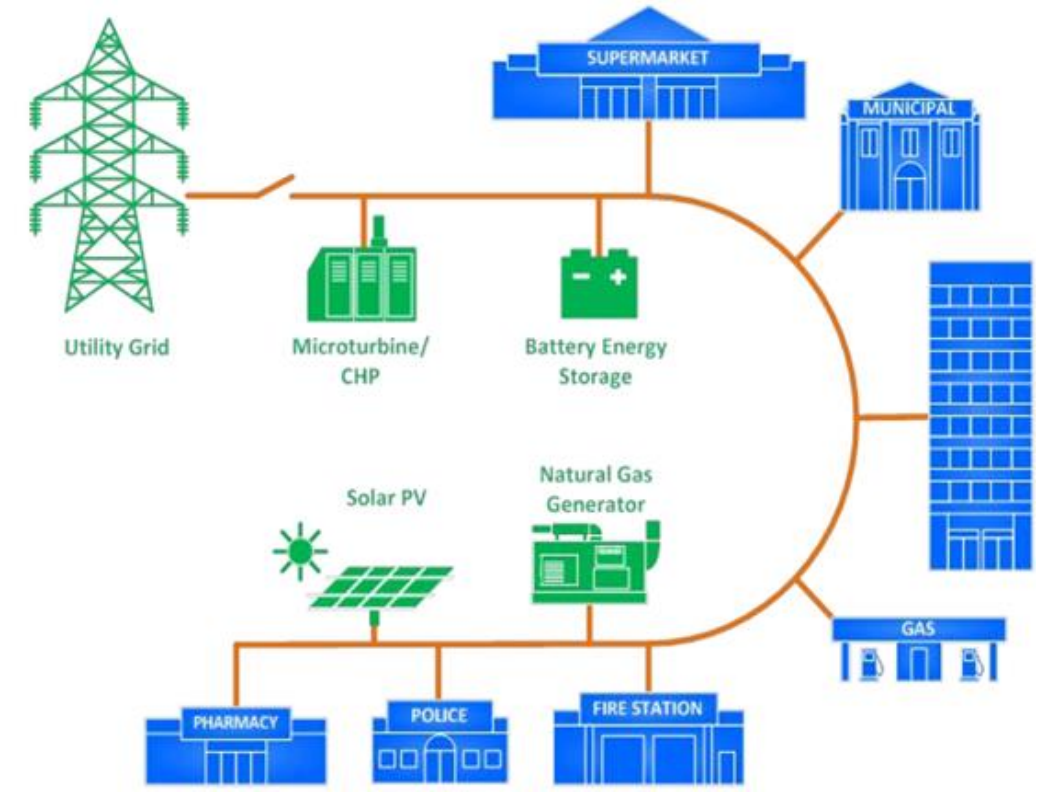


Fig. 3 Conceptual community smart energy microgrid

3. The Potential for CDM in the Building Sector

3.4 Standardized baselines

Building and house sector- specific standards could be developed for baseline calculations and demonstration of additionality taking into account the specificities of sectors at the international, national, regional and urban level (Table 3).

Table 3 The difference between CDM methodologies/tools and standardised baselines

• International Standards • To calculate emission reduction of • Specific Applicability conditions • Specific projects boundary • Project-by-project baseline scenario determination and demonstration of additionality • Baseline using 48(a) (historical or actual), 48(b) (most attractive course of action), or 48(c) (Average of top 20%) • Project emissions • Data not monitored • Data monitored	• Sector-specific standards(Could be regional, national or international) ; • Takes into account the specificities of sectors; • Either calculate baseline emission factor broad class of mitigation activities (measures) taken up in the sector; or baseline emission factor for entire sector; • Baseline emission factor to be used for baseline emission calculations and demonstration of additionality; • To be used in conjunction with an approved methodology/tool.

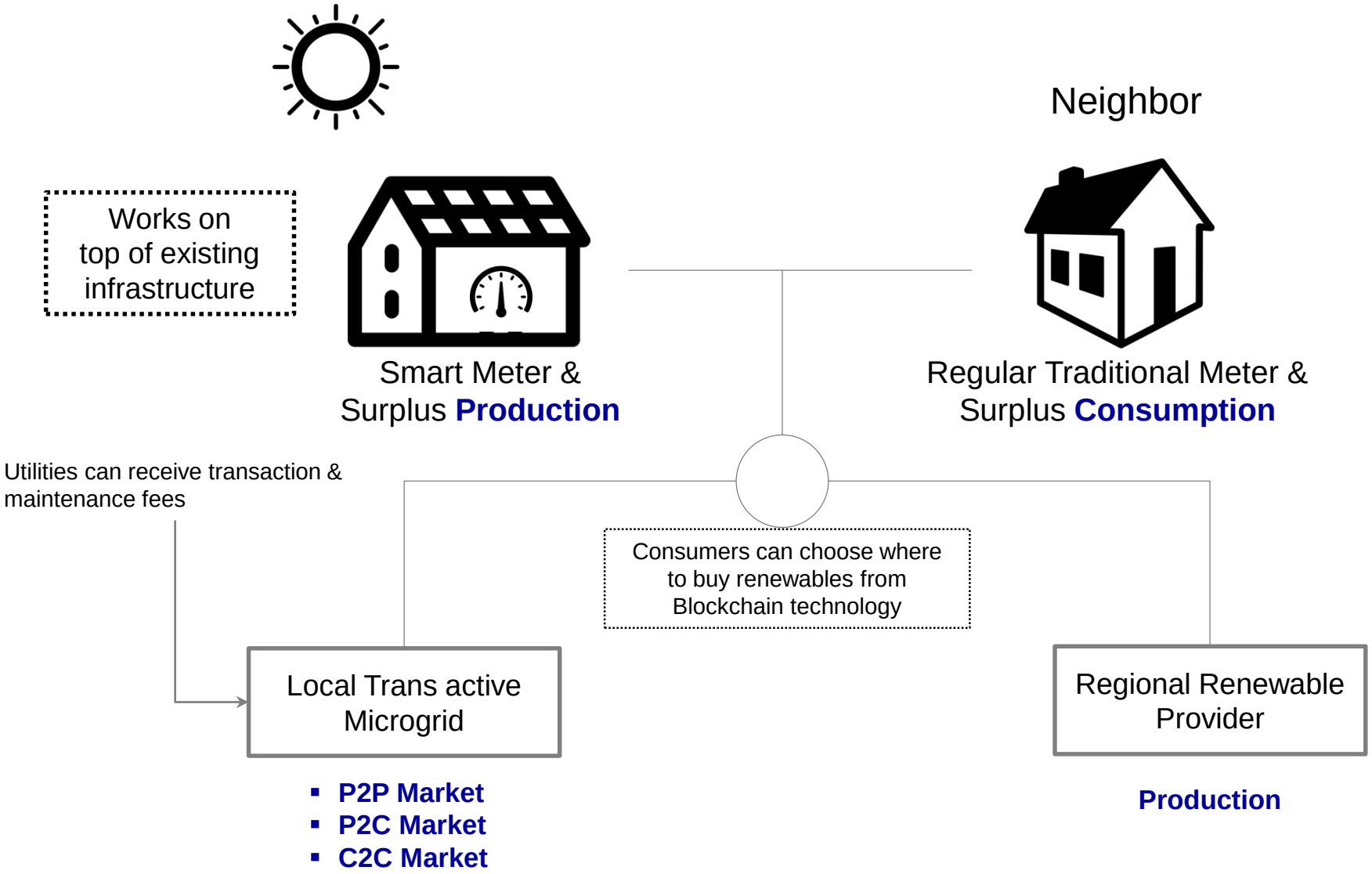
Source : Victoria Novikova, 2014

3.5 Digital technologies

Big Data, AI, IoT and Blockchain technology can be used for MRV and, in particular, accurate prediction of potential GHG emission reductions (project scenarios), as well as baseline emissions (average performance scenarios). Emission reductions are monitored difference between baseline and project buildings

Blockchain technology holds much promise and other interesting opportunities for the CDM in the building sector as an intermediary between producers and consumers in trading energy and carbon emissions (Fig. 4)

Transacting Local Energy with Neighbors



(Fig. 4) Interacting local energy with neighbors
: Blockchain is a database technology that processes and stores transaction data.

4. Concluding Remarks

- Methodological approaches to user needs: Scoping
  - Individual end-uses
  - Whole building
  - Group of buildings by category (e.g. apartments, condominiums, flats, single detached houses, commercial and office buildings)
- Reduced transaction costs for MRV
  - Targeting individual end-uses
  - Using models and benchmarks
  - Using intelligent digital technologies
- Providing methodologies to address specific needs and level of technology of LDCs, SIDs, African countries, Underdeveloped Zones in developing countries
- Integrated holistic approach versus deductive approach to the CDM: “Everything is connected.”

Thank you