Chapter 6
Peer-to-Peer Energy Trading Using Blockchain in Sub-Saharan Africa:
Towards a Policy and Regulatory Framework

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ABSTRACT

Peer-to-peer (P2P) energy trading using blockchain is presented as a great innovative potential to promote rural electrification. Opportunities and challenges assessment for the implementation of this technology in Sub-Saharan Africa shows that it is only at its embryonic stage in the region. The decreasing cost of stand-alone solar technology and the expansion of investment in mini-grid sector are among the opportunities. However, the considerable restriction of private participation in the mini-grid sector, the difficulty of the regulatory process and licensing requirements, the issues with tariff framework, and the uncertainty of the regulation about the future grid integration are among the main challenges. This chapter proposes a policy and regulation framework for the promotion of P2P energy trading using blockchain in Sub-Saharan Africa.

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INTRODUCTION

The implementation of energy systems in Africa is facing many challenges where one of the most important lies in the financial viability of the project although the technical reliability has been proven (Cabanero et al., 2020). Over the past few decades, digital technologies and innovation have been continuously affecting the energy sector and led to new business models, both for national utility grids and for decentralized systems (off-grids, mini-grids). The progress in digital technologies has allowed the promotion of effective management of the energy demand and therefore makes energy systems more economical and environmentally friendly (Majeed Butt et al., 2021).

At the heart of this innovative energy management system is the peer-to-peer (P2P) energy sharing concept which is a decentralized electricity trade between prosumers and consumers (Alladi et al., 2019). Trading based on P2P models makes renewable energy more accessible, empowers consumers, and allows them to make better use of their energy resources (IRENA, 2020). In recent years, P2P trading platforms have been developed considerably worldwide. Many projects have already been implemented such as the Brooklyn Microgrid in the United States, the Centrica plc in the United Kingdom, the Lumenaza in Germany, and the SolShare in Bangladesh. Considerable benefits for the energy management of the communities were implemented as a result of those projects. Therefore, promoting P2P energy trading can be very promising for electrification within Sub-Saharan Africa (SSA) where 548 million people, which is 47% of the population, in the region lack access to electricity in 2018 (IEA et al., 2020).

In addition, the emergence of new digital technologies like artificial intelligence, the internet of things, and particularly blockchains can have a very promising considerable impact on energy access finance since it can lead to the creation of new innovative marketplaces more transparent, secured, and tamper-resistant (Ndung'u & Signé, 2020). In recent years, different applications of blockchain have been continuously developed. More than one-third of the use of blockchain in the energy sector is for P2P energy trading (IRENA, 2019).

However, P2P energy trading using blockchain is just at the initial stages in Africa either in research or in project implementation. Only a few companies are currently exploring that technology in the region. For instance, there is Rehub in Kenya currently having a pilot project. There is also the Lightency exploring the use of this technology in Tanzania, Uganda, Burkina Faso, Senegal, Mali, and Lybia where the policy is more favorable according to the company.

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