



Original research article

Exploring peer-to-peer returns in off-grid renewable energy systems in rural India: An anthropological perspective on local energy sharing and trading



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ABSTRACT

Within the areas of distributed, off-grid, and decentralized energy, there is a growing interest in local energy exchanges. A crucial component of an energy exchange is a return provided by an energy-receiver to an energy-giver for the energy provided. The existing energy literature on such returns is primarily limited to monetary returns and lacks a critical discussion on the different types of monetary and non-monetary returns possible and variation in people's preferences for these. Based on an ethnographic 'research intervention' study conducted at two off-grid villages in rural India for 11 months, this article presents a sociocultural understanding of returns. The article presents a classification of returns consisting of three types, i.e., in-cash, in-kind and intangible, and proposes a conceptual model of 'returns-continuum.' The article showcases how people's preference for a type of return varies with the nature of their social relationships with each other and suggests that configuring a return is not merely an economic act but a complex sociocultural process. Finally, the article recommends to energy researchers and practitioners to enable diversity in returns, to acknowledge dynamics of social relations in returns, to interconnect energy economy with the local in-kind economy, and to engage with ethnographic approaches.

1. Introduction

The theme of local or inter-household energy exchanges is increasingly gaining attention in the academic as well as in the business world. Within the realm of distributed, off-grid and decentralized energy, the topic of energy exchange appears under the guise of various labels, such as peer-to-peer energy [1–3], transactive energy [4–6], energy trading [7–9], energy sharing [10–12], and mutual energy exchange [13]. Some off-grid pilots in the global south are utilizing local energy exchanges to provide access to clean energy to underprivileged population of the world (see, for instance, Lighting a Billion Lives¹ and

Rural Spark² in India, SOLShare³ and Grameen Shakti⁴ in Bangladesh, Ikisaya Energy Centre⁵ in Kenya). In many of the off-grid initiatives, energy exchanges are structured in the form of a rental service, where a central location in a village is set as a charging station for solar products such as solar lanterns and battery packs, and villagers access these products by paying a rent [14–17]. Such a setup has been described in energy literature as 'Energy Centre Model' [18,19], 'Centralized Charging Station Model' [15,20–22], 'Energy Kiosk Model' [21] and 'Energy Hub Model' [23]. These models are hailed as innovative ways to address energy poverty and lauded for increasing local community's participation by giving members of the community a central role in the

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¹ <http://labl.teriin.org/>.

² <http://www.ruralspark.com/>.

³ <https://www.me-solshare.com/>.

⁴ <http://www.gshakti.org/>.

⁵ <https://vimeo.com/57061330>.

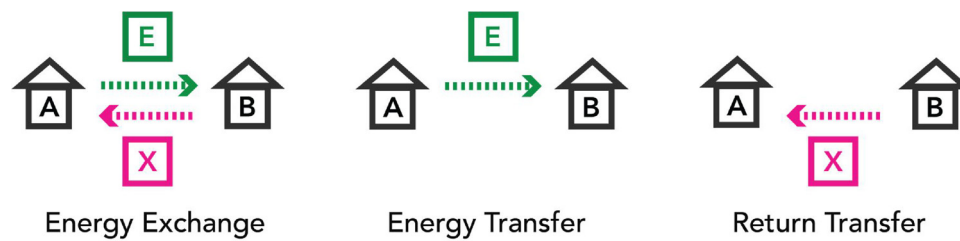


Fig. 1. Conceptual diagrams of energy exchange, energy transfer, and return transfer.

management of a local energy system [16,18,24–27]. Often external agencies (NGOs, utilities, governments) initiate an energy exchange pilot in an off-grid setting by creating a local energy market, where a return structure is constructed based on a socioeconomic evaluation of a local community gauged by willingness-to-pay metric and the local community is engaged in the payment collection (see [17,28]). In such settings, returns are discussed as ‘rent,’ ‘payment,’ ‘fee-for-service,’ and ‘pay-as-you-go’ (see [14–17,23,27,29–32]).

Conceptually, from an anthropological perspective, an energy exchange in such a system could be viewed as consisting of two types of ‘transfers’: ‘energy transfer’ and ‘return transfer’ (see Fig. 1). In this article, we extend Robert C. Hunt’s [33], an economic anthropologist, conceptual distinction between a ‘transfer’ and ‘exchange.’ An ‘energy transfer’ is a physical or figurative movement of energy units (E) either through cables or storage devices such as batteries from an energy-giver (A) to an energy-receiver (B). In contrast, a ‘return transfer’ or ‘peer-to-peer return’ or for brevity a ‘return’ is a counter-movement of an entity X from the energy-receiver (B) to the energy-giver (A).⁶ An energy exchange is complete when both A and B recognize X as a return for the energy units provided by A. In this article; we prefer to use the word ‘return’ rather than more commonly used money oriented terms in energy literature, such as rent, tariff, fee, and payment. A ‘return’ provides a larger conceptual canvas that allows us to include a variety of non-monetary and intangible entities observed in our analysis. Moreover, the concept of ‘return’ has an established discourse in anthropology (see [34–37]). We prefix ‘peer-to-peer’ (p2p) to ‘return’ to indicate specific structural elements of the returns discussed in this article, i.e., these are mutually structured, negotiated, and organized by energy-givers and energy-receivers.

In the existing energy literature on off-grid energy systems, there are two main knowledge gaps about peer-to-peer returns that this article attempts to address. First, an emerging body of energy literature sees a local, social, and cultural understanding of various aspects of off-grid systems as crucial for their success and adoption by people [16,17,38–41]. However, the existing discussion on returns in such energy systems is mostly rooted in a techno-economic analysis [14,20,23,42–44] and lacks an understanding of the sociocultural embedding of the returns, i.e. how these returns are grounded in the social and cultural reality of people’s life. Second, the existing energy literature on such returns in off-grid settings is primarily limited to discussion on monetary returns (fiat money) and lacks an understanding of different types of monetary and non-monetary returns possible and people’s preferences for these. Moreover, the contemporary understanding of p2p returns is limited to a ‘rational market’ paradigm that presumes universal and exclusive preference for fiat money and primacy of logic of market where the householders engage in competitive buying and selling of energy in return for fiat money. Such an understanding does not take social and cultural variations and particularities, and diversity in logics into account. To respond to these above-mentioned knowledge gaps, in this article, we bring a perspective from the

discipline of anthropology to develop a sociocultural understanding of p2p returns. To the best of our knowledge, p2p returns in off-grid energy systems have not yet been explored from an anthropological perspective. In a broad sense, an anthropological perspective focuses on two types of understandings. First, a holistic, bottom-up, and embedded understanding of a (sociocultural) phenomenon which starts by building and analyzing ‘emic’ (insider’s or internal) viewpoints, i.e., people’s multiple realities, perceptions, and logics. Second, translating the ‘emic’ understanding to ‘etic’ (external) concepts, i.e., an analytical and conceptual description of the phenomenon (for more on ‘etic’ and ‘emic’ perspectives see [45,46]). Hence, this anthropological perspective attempts to ground the understanding of a phenomenon in everyday realities of peoples’ social life.

This article is based on an ethnographic ‘research intervention’ study conducted at two off-grid villages Rampur and Manpur in rural India for 11 months (1 February 2016–31 December 2016).⁷ The study started with the installation of an off-grid energy distribution infrastructure to enable exchanges of solar-lighting in the villages. The ‘research intervention’ allowed one household in each of the villages to be a giver for their respective village. The householders had complete control of the energy infrastructure installed and freedom to structure returns, as they desired without any involvement of the ethnographer. This setup facilitated the ethnographic inquiry to address the following broad research questions: What types of returns givers and receivers invoke when they are given control of an off-grid energy distribution? How are these returns embedded in the social, cultural, and economic life of the villagers?

The ethnographic data analysis reveals the existence of three types of peer-to-peer returns: in-cash, in-kind and intangible returns. The article presents four ethnographic vignettes that showcase variations in preference of the three types of returns and demonstrate various issues with in-cash returns. Based on learning from the ethnography, the article presents ‘returns-continuum,’ a conceptual model that proposes the following.

- The three types of returns can be viewed as a coexisting, overlapping, dynamic, and continuous spectrum of returns.
- The people’s preference for a type of return varies with the nature of their social relationships with each other.
- A diversity of returns is a better fit for the social, cultural, economic and moral life of people engaged in off-grid energy system than solitary money-centric return;
- Configuring a return is not merely an economic act but an intricate sociocultural process.

Before moving ahead, we would like to clarify that some references to in-kind and intangible entities appear in energy literature in two broad contexts in which an external agency (non-governmental organization, utility, or state) is either a receiver (see [24,25,47–50]) or a giver (see [17,51–54]) of in-kind or intangible entities as payments. See Table 1 for more details on these two contexts. However, these have not

⁶ To be concise, we use the word ‘giver’ to refer to an ‘energy-giver.’ Similarly, a household who received a solar-item from the ‘giver’ is referred to as a ‘receiver’ in this article. For the p.

⁷ Please note that the real names of villages and all the participants have been changed in this article for the purpose of anonymity.

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