Journal of Behavioral and Experimental Economics 119 (2025) 102457

Contents lists available at ScienceDirect

Journal of Behavioral and Experimental Economics

journal homepage: www.elsevier.com/locate/jbee

The honest (electricity) thief—Experimental evidence on the relationship between electricity theft and social norms

Esther Schuch [a,*], Maria Apergi [a], Luis Correa Lindarte [b]

[a] Research Institute for Sustainability (RIFS), Berliner Str. 130, Potsdam, 14467, Germany
[b] Uni Magdalena, Carrera 32 22 08, Magdalena, 470003, Colombia

ARTICLE INFO

Keywords:
Electricity theft
Honesty
Experimental Economics
Social norms

ABSTRACT

The sustainable development goals (SDGs) aim for universal access to affordable and reliable clean energy by 2030, but especially in rural areas this has not been achieved yet. Small scale electricity theft is one of the major obstacles to achieving electrification access in many countries of the Global South. Electricity theft has been associated with a number of different factors such as poverty, quality of electricity services, and social norms. Electricity theft causes problems that not only affect the electricity providers but have negative effects on whole communities. Combating electricity theft effectively requires a better understanding of the underlying causes. To analyse the role of dishonesty in electricity theft, we use the die-in-a-cup game to establish the prevalence of dishonest behaviour within Puebloviejo, Magdalena, a community in Colombia. We combine the game with a survey-based social norm elicitation to identify the predominant social norms. We find that acceptance of electricity theft is conditional on the reason, with poverty being the justification with the highest support. We find clear differences of dishonesty between people condoning or opposing electricity theft, with people condoning electricity theft being more honest.

1. Introduction

Electricity theft is a major obstacle to achieving access to secure and reliable energy in many developing countries. It is a phenomenon that manifests itself in different ways, including directly tapping power through informal connections usually via a neighbour, or indirectly through non-payment and billing irregularities usually in agreement with a utility employee (Smith, 2004; Winther, 2012). It is estimated that, per year, electricity worth about 90 billion US dollars is stolen worldwide (Arkorful, 2022). One of the consequences of electricity theft is a loss in productivity, since the theft contributes to power disruptions (Lewis, 2015), reduces quality of supply, and increases costs (Burgess et al., 2020; Depuru et al., 2011). Yet, even though there are well-known negative effects associated with electricity theft, this behaviour continues to be observed often (Briseño & Rojas, 2020a). There are several potential explanations for the continued existence of electricity theft, such as limited affordability and/or reliability of the electricity provided but also the social acceptability of electricity theft (Burgess et al., 2020; Wong et al., 2021). Policies so far have often focused on technical solutions to curb electricity theft, e.g., smart meters (Depuru et al., 2011; Nadeem & Arshad, 2021). These measures alone have been shown to be unsuccessful in eliminating this phenomenon, one potential explanation being that the acceptance of electricity theft is a social norm (Burgess et al., 2020). Social norms being defined as "shared understanding of how individual member should behave in a community" (Chen et al., 2009). These social norms rely on a shared understanding within the society of which behaviour is socially acceptable or desirable (Bicchieri et al., 2023; Krupka & Weber, 2013; Ostrom, 2014; Rimal & Real, 2003; Smerdon et al., 2020) and have been shown to solidify desirable as well as undesirable behaviour (Diekmann et al., 2015; Smerdon et al., 2020).

Only a few studies are concerned with social norms towards electricity theft (Burgess et al., 2020; Never, 2015; Ojedokun et al., 2021; Winther, 2012; Wong et al., 2021). We expand upon these by using survey-based social norm elicitation combined with a cheating game to analyse the drivers behind electricity theft. Fischbacher and Föllmi-Heusi (2013) established a simple method to measure average cheating behaviour in groups which has been shown to correlate with daily life actions (Dai et al., 2018; Gächter & Schulz, 2016; Hanna & Wang, 2017; Potters & Stoop, 2016; Rustagi & Kroell, 2022). This is particularly interesting given that cheating in the game financially harms only the person running the experiment, whilst dishonest behaviour in daily life actions negatively affects other people, often in their immediate surroundings (Hanna & Wang, 2017). Studying the presence of correlations

* Corresponding author.
E-mail address: esther.schuch@hotmail.de (E. Schuch).

https://doi.org/10.1016/j.socec.2025.102457
Received 14 December 2024; Received in revised form 3 September 2025; Accepted 5 October 2025
Available online 11 October 2025

with actions related to electricity theft will therefore help to deepen our understanding of what drives electricity theft and the role that social norms play.

More specifically we answer three research questions:

1 Is the dishonesty level higher in a population that is, on average, known to engage in illegal activities?
2 Are people who are condoning electricity theft, on average, less honest than those opposing electricity theft?
3 Which factors contribute to the condonement of electricity theft and to what extent do they depend on the justification for electricity theft?

In other words, we are interested in the average level of dishonesty in an area in which electricity theft is a problem. The die-in-a-cup game only allows judgements on dishonesty on group level. So, to answer our first research question, we compare population-level dishonesty of our sample to other studies with a similar design and/or similar context. This helps to establish whether our population that is constantly exposed to an environment of illegal activity is comparable to other populations in similar circumstances.

Given that it is difficult to identify whether an individual engages in electricity theft, we cannot measure whether these individuals have different dishonesty levels than those that do not take part in electricity theft. Instead, we use the condonement of electricity theft; it provides us with information of how people view this behaviour but does not tell us whether they actively engage in it. We are interested whether dishonesty levels differ between those that are strictly opposed to electricity theft and those that are not. We use stated social norms as a tool to analyse behaviour that is not socially desirable. Here, we use stated social norms regarding electricity theft as a proxy for the individual's behaviour. We expect that people reporting that most people similar to oneself engage in electricity theft are also highly likely to engage in electricity theft themselves. We therefore anticipate that these people are on average less honest in the game than people who report that the minority of people similar to them engages in electricity theft.

Based on the literature, we expect the social network (here defined as "people that are important to the respondent") as well as trust to play a major role in electricity theft. To answer our third research question we elicit trust level as well as injunctive norms in regard to electricity theft on an individual level. On the one hand, we are interested in the contagiousness of social norms erosion (electricity theft justified by the behaviour of the majority) and on the other hand, we examine whether an "access to electricity is a basic right" notion (electricity theft justified by poverty) is responsible for the condonement of electricity theft. To analyse the acceptance of electricity theft in a community, we ask about electricity theft in general, in how far the acceptance of electricity theft depends on the behaviour of the majority, and the socio-economic status of a person. Our survey also entails question on trust towards different entities such as the electricity provider or the government, satisfaction with electricity supply, the electricity access of the social network, awareness of negative effects of electricity theft on the local community, and general socio-economic data.

Given that in the literature dishonesty in the die-in-a-cup game often correlates with dishonest behaviour in the "real world", the first two research questions intend to shed light on whether dishonesty in the game carries over into norms condoning electricity theft, while the third research question provides novel insights on the factors that shape social norms towards electricity theft.

We run the study in Puebloviejo, one of the municipalities with the highest poverty rates in Colombia (Magdalena, 2016). In the area, electricity theft is a severe problem according to electricity users as well as the utility company, thus making this an intuitive place to run our study. While Puebloviejo is neither representative of Colombia nor of rural areas in Colombia, the results of this study are relevant for other communities facing high poverty rates and similar challenges regarding electricity theft.

We do find that our population has similar dishonesty levels than those reported in the literature. Overall, we find clear differences of honesty levels between the groups that condone electricity theft and those that are strictly opposed. The condonement of electricity theft depends on the reason for electricity theft. The biggest condonement for electricity theft can be seen if the theft is caused by necessity (a household being too poor to afford electricity) and the least support can be found if the justification for electricity theft is that the majority does it. We see that electricity theft is judged conditional on motivation. We find that the group that justifies electricity theft (independent of the justification) cheats less than the group opposing electricity theft.

Thus, electricity theft does not seem to be caused by dishonesty but rather is accepted as a necessary evil if people cannot afford it. Dishonesty in the acquisition of electricity seems to be an acceptable norms violation, a phenomenon that Diekmann et al. (2015) refer to as "relative appropriateness of norms violation". This is an important insight in regard to policy design, since it indicates that electricity theft could be curbed by financial support for struggling households without having to worry that social norms that justify electricity theft would counteract this policy.

The remainder of the paper is structured as follows: Section 2 discusses the literature regarding electricity theft, social norms, and the role of social norms in relation to electricity theft. Section 3 provides details on the study area Puebloviejo and the experimental methods and implementation, followed by Section 4 with the analysis. Section 5 provides a discussion of the results and concludes.

2. Literature overview

Electricity theft is unfortunately still widespread in many developing countries (Briseño & Rojas, 2020a). This is a pressing problem since the prevalence of electricity theft negatively affects the financial viability of utilities. Subsequently, this also impacts consumers as it leads to increased tariffs, poor quality of electricity provision, and it poses a number of safety hazards (Burgess et al., 2020). Finally, electricity theft also limits infrastructural expansion which is especially needed in countries that still have underserved populations (Razavi & Fleury, 2019). Evidence so far has shown that technological solutions (e.g. smart meters) are not enough to limit electricity theft drastically (Sharma et al., 2016). Therefore, when designing policies the underlying factors that contribute to electricity theft should be well understood and addressed. Determinants can include more standard socioeconomic factors like income, education and electricity tariffs but the limited evidence so far suggests that prevailing norms can also play a defining role. For example, Fjeldstad (2004) explores the role of trust on the decision to pay for public services including electricity in South Africa and argues that three levels of trust influence the non-payment of local service charges in South Africa: trust that the local authorities will use the payments to provide the service; trust that the service will be provided in an equitable way; and trust that others in their community also pay for the service. Other norms that have been shown to affect electricity theft are a widespread belief that electricity is a basic right and that it is the government's responsibility to ensure that people have access to it even if they cannot afford it (Burgess et al., 2020; Ganesan et al., 2019).

Currently, there are only few studies that have explored these dynamics in detail. So far, the literature has identified a number of determinants of electricity theft. The majority of the studies are quantitative and use secondary data on socioeconomic and governance factors as well as on the structure of the electricity sector. These are usually at the state, district or country level. A study by Gaur and Gupta (2016) uses data from 28 states of India over a time span of five years (2005–2009), to identify the factors leading to electricity theft at the state level and find that electricity theft is reduced when there is lower

corruption and poverty and when there is higher income and literacy as well as a higher state tax to GDP ratio, more efficient collection of electricity bills and a higher share of private installed capacity.

Additional factors that have been identified to contribute positively to electricity theft in similar studies are crime (Briseño & Rojas, 2020a, 2020b; Briseño et al., 2021; Razavi & Fleury, 2019), unemployment (Briseño & Rojas, 2020a; Briseño et al., 2021), government inefficiency (Briseño & Rojas, 2020b), election cycles (Min & Golden, 2014), average electricity consumption per capita (Razavi & Fleury, 2019) and price of electricity (Yurtseven, 2015). Whereas a negative effect has been found for urbanisation (Briseño & Rojas, 2020a; Briseño et al., 2021; Razavi & Fleury, 2019), population (Briseño & Rojas, 2020b), population density (Briseño & Rojas, 2020b; Briseño et al., 2021), education (Briseño & Rojas, 2020a), good governance (as measured by voice and accountability, political instability and violence, government effectiveness, regulatory burden, rule of law and corruption) (Smith, 2004) and social capital (as proxied by "electoral participation rate".) (Yurtseven, 2015).

Studies looking at electricity theft from the perspective of the consumer through qualitative methods or consumer surveys are more limited. A number of these studies have looked past the standard socioeconomic characteristics to explore how the role of norms and consumer attitudes can impact their decision making. Jamil (2018) studies the phenomenon of electricity theft in Rawalpindi and Islamabad in Pakistan using a structured questionnaire and regression analysis and finds that an electricity price increase is responsible for rising electricity theft. However, the behaviour of utility employees and monitoring also play an important role. A study in Ghana uses a survey and finds that higher electricity prices, poor quality of power supplied, corruption, poor enforcement of the law are the main explanations for electricity theft followed by attitudinal factors, illiteracy, unemployment, and poverty (Yakubu et al., 2018). A qualitative study examines the impacts of socio-economic factors, trust, informal social norms, electricity price, information/understanding of the metering system and billing systems for electricity consuming micro and small enterprises and households in Uganda. The study finds that technical solutions like bulk metering for micro and small enterprises and prepaid metering for households combined with stronger enforcement and information provision have led to a reduction of electricity theft. However, the study underscores that social norms that justify electricity theft and lack of trust for the government, the utility and others can still pose significant barriers to controlling the phenomenon (Never, 2015). Wong et al. (2021) find that acceptability of electricity theft is higher in situations of low income and poor-quality electricity supply. They find no evidence that people tolerate the cheating of others that have a similar background to them (religion, caste). Mistrust between the provider and user, especially the feeling of being cheated by the provider, acts as a moral justification to engage in electricity theft (Ojedokun et al., 2021). A qualitative study of electricity theft in Zanzibar, Tanzania and Sunderban Islands, India finds that perceptions about the utility as well as of the behaviour of others in the community can play an important role. More specifically lack of transparency as well as the poor quality of electricity supply can lead to lack of trust and non-payment for electricity. Non-compliance also increases when people think that others in the community are also not paying for electricity. These social norms can play a crucial role in manifesting electricity theft (Winther, 2012).

Social norms are informal rules that help govern societies. Social norms rely on a shared understanding within the society on which behaviour is socially acceptable or desirable (Bicchieri et al., 2023; Krupka & Weber, 2013; Ostrom, 2014; Rimal & Real, 2003; Smerdon et al., 2020). Social norms govern actions rather than outcomes. Two actions can result in the same result but the motivation for the action is what is shaped by social norms (Krupka & Weber, 2013). These norms are shaped by culture and traditions and act as informal institutions governing populations (Ostrom, 2014). We differentiate between two kinds of social norms; descriptive and injunctive social norms (Cialdini et al., 1990). Thus, "descriptive norms refer to perceptions of a behavior's prevalence among a group's members while injunctive norms reflect perceptions of group members approval for the behavior" (Cialdini & Jacobson, 2021).

Social norms are inherently dynamic. Bicchieri (2005) introduces the idea that social norms are partially followed based on the idea of "normative expectations"; the individual's expectation on whether others expect her to comply and the idea of "empirical expectations"; the individual's expectation that enough others will comply. People adjust their expectations based on observed rule-following or rule-breaking behaviour (Gächter et al., 2017). This dynamic can either reinforce or deteriorate positive social norms. Observing frequent rule-breaking changes the descriptive social norm since it signals that this is a common behaviour. As such it is easier for the individual to engage in such a behaviour as well, leading to what Diekmann et al. (2015) refers to as "contagiousness of norm violations". Observing a change in descriptive norms leads to a re-evaluation of the appropriateness of one's own actions and also changes the idea of what others approve of (injunctive norms) (Diekmann et al., 2015; Kroher & Wolbring, 2015). Observing norm-violating behaviour is only a proxy for changed descriptive norms, since it is only a subsample of the whole population that is observed. Thus, individuals might adjust their behaviour, thinking that the social norms have changed, even though they do not necessarily endorse this behaviour. If the majority of individuals prefers a certain behaviour but each individual wrongfully thinks that the majority endorses a different behaviour we can see a deterioration of social norms (Smerdon et al., 2020).

Judgement of social norm violations depends on the context. While being on time is always an appropriate behaviour in many cultures, breaking the rule is not always judged equally, e.g. being late when meeting a friend is less socially unacceptable than being late for a funeral. This relative appropriateness of norm violations has a strong influence on behaviour (Krupka & Weber, 2013). There are also individuals that do not align their behaviour according to social norms. The discrepancy can be either between what the individual deems to be the normative rule and their actual behaviour or between what the individual thinks others ought to do and their actual behaviour. This misalignment is referred to as hypocrisy and is more often observed in individuals that hold powerful positions in society than less powerful members of society (Lammers et al., 2010).

One social norm and its violation that has been studied a lot is honesty. While Abeler et al. (2019) find in their meta-study that people in general have strong preferences to be honest, one of the major influences that leads to dishonesty is if people believe that others are also dishonest. Thus, they base their actions on descriptive norms which allow them to justify their dishonest behaviour (Gächter & Schulz, 2016). Honesty norms have been studied in different contexts such as tax evasion (Bobek et al., 2013; Fergusson et al., 2019), corruption (Gächter & Schulz, 2016), fraudulent absenteeism (Hanna & Wang, 2017), public transport fare dodging (Dai et al., 2018), cheating in asymmetric markets (Rustagi & Kroell, 2022) or banking business culture (Cohn et al., 2014). If these behaviours are widespread in society the likelihood of an erosion of social norms is increased (Gächter & Schulz, 2016). In systems that are perceived as unfair, individuals find it easier to engage in dishonest behaviour (Fergusson et al., 2019; Gächter & Schulz, 2016). Similar effects have inefficient bureaucracies, high crime rates, low levels of trust into the governments, and little economic freedom (Fergusson et al., 2019). Overall, unfair systems can lead to a rationalisation of dishonest behaviour (Andreoni et al., 1998).

While previous research established the factors that contribute to electricity theft, we are still lacking information on the individual level. We add to the literature by using the die-in-the-cup game to establish dishonesty levels, eliciting the endorsement of social norms towards electricity theft on an individual level, and eliciting information on the main factors that contribute to electricity theft via survey. To the best of our knowledge we are the first ones to measure dishonesty levels and social norms in relation to electricity theft on an individual level.

3. Method and implementation

3.1. Study area - Puebloviejo

Puebloviejo is a municipality located in the Magdalena Department in the Caribbean region of Colombia. The municipality has four main townships: Tasajera, Palmira, Isla del Rosario and Puebloviejo (Cabecera) located between the Ciénaga Grande de Santa Marta and the Caribbean Sea (see Fig. 1). It is located on the road between the cities Santa Marta and Barranquilla and 1426 km from the capital city of Bogotá D.C. The municipality has around 33,000 inhabitants. Most of them live from traditional fishing, craftsmanship, and informal commerce (Borja & Ojeda, 2020). Puebloviejo is one of the municipalities in Colombia with the highest poverty rate. A main impediment the population is facing is lack of basic public services like access to running water and a sewage system access (National Department of Planning, 2020). Electricity is currently provided by AIR-E S.A.S a private enterprise, which replaced Electricaribe S.A. E.S.P a company managed by the state in October 2020 (AIR-E S.A.S, 2020). Although 98.77% of the population of Puebloviejo is covered by the national grid, the service is characterised as "deficient" with bad service quality, frequent interruptions, and prolonged power cuts (Borja & Ojeda, 2020).

Colombia has achieved a national electrification coverage of over 97% (Briseño et al., 2021). However, energy losses, which are partly due to electricity theft (Romero-Lopez & Vargas-Rojas, 2010), and poor quality of supply remain pressing challenges for the electricity sector (García et al. 2020 in Briseño et al. 2021). The average transmission and distribution losses, defined as any losses of electricity between source of supply, the points of distribution, and in the distribution to consumers, which include electricity theft as well as technical losses, in the country in 2019 were 11.85%. Colombia has 32 departments and for the 28 with data availability transmission and distribution losses (which are a proxy for electricity theft) were estimated to be between 0.1% in Putumayo and 30.5% in Arauca in 2019 (Briseño et al., 2021). Although the department of Magdalena has generally low transmission and distribution losses compared to the national average (3.1% compared to the national average of 11.85%) (Briseño et al., 2021), there is a high prevalence of user non-payment and informal connections in Puebloviejo (interviews with utility company and local users). All the different forms of electricity theft (informal connections, non-payment, billing irregularities) have been reported to occur frequently in Puebloviejo and to constitute a major impediment for the sustainability of the service (interviews with utility company and local users). This makes the municipality an interesting case study for the study of electricity theft and its interaction with community norms and socioeconomic indicators.

3.2. Die-in-a-cup experiment

To measure dishonesty we follow (Fischbacher & Föllmi-Heusi, 2013). We use a six-sided die and ask the participants to roll the die in private. They then announce the number they rolled and are paid a pre-defined sum. The pay-off increases the higher the number thrown is and we always use a pay-off that is higher than zero. If people report a number that is different from their roll it is considered cheating. Cheating in this game has no negative consequences since there is no possibility that people get caught. The incentives have to be substantial compared to income but not as high that everyone defaults to cheating. While the individual cheating behaviour cannot be observed, we can measure the amount of cheating on group level since we know the true distribution of the die rolls. Comparing the observed distribution with the true distribution provides information about the lying behaviour on group level.

Fig. 1. Municipality of Puebloviejo in the department of Magdalena in the northern part of Colombia. The townships of Isla del Rosario, Palmira, Tasajera and the village of Puebloviejo are marked.
Source: Map adjusted from Wikipedia (2015)

3.3. Survey and social norms elicitation

We elicited perceived social norms in regard to electricity use via survey questions. We use perceived social norms since we ask participants to report on the prevailing collective norms. While perceived norms might not describe reality accurately, perceived norms are those that shape human behaviour (Rimal & Real, 2003). We focus on injunctive norms and personal beliefs. While descriptive norms would be interesting, the elicitation is even harder than for injunctive norms, since we would ask people to implicate their neighbours as thieves.[1] Since electricity theft is a sensitive topic especially towards outsiders, we refrain from asking direct questions on whether a person steals electricity. We have three main questions to elicit norms towards electricity theft. We ask whether people who are in a similar situation to the respondent think it is ok to use electricity without paying for it. We consciously do not use the term theft to avoid triggering negative responses due to social desirability. Also, by asking about people in a similar situation, we provide the respondent with the option of responding honestly to the question without implicating themselves, whilst providing us with a good proxy for the respondent's behaviour and people in a similar situation (Never, 2015). Thus, this question provides us with a proxy for a person's general attitude towards electricity theft. Apart from the general acceptance of electricity theft, we are also interested in the justification of electricity theft. To analyse the contagiousness of norm violations we ask whether electricity theft can be justified if the majority engages in this behaviour. Lastly, we focus on the relative appropriateness of norm violations by asking whether electricity theft is acceptable if it is caused by poverty (for an overview of the main questions see Table 1).

We are establishing social norms that an individual experiences in its closest circle of friends and family. We include questions on individual beliefs, electricity access of the social network, and trust levels

[1] Eliciting descriptive norms via surveys would lead to questions such as "How many out of your 10 closest neighbours are using electricity without paying for it?". We were advised to drop these questions by local partners since they would be considered rude and invasive.

Table 1
Questions and variable names on injunctive norms, individual beliefs, social network, and trust. Questions eliciting main variables of interest are highlighted in bold. The variables refer to factors that, based on the literature, are expected to play a role in the condonement of electricity theft.

Injunctive norms	**Similar people: more/less than half think electricity theft ok**	How many people who are in a situation similar to yours think it is okay to use electricity without paying for it? [General norm violation]
	Electricity theft ok/not ok if majority does it	**If the majority of the community sometimes uses power without paying for it, is it okay for others to do so? [Contagiousness of norm violation]**
Individual beliefs	**Poverty: electricity theft ok/not ok**	**Do you consider that, if a person does not have the means to pay the electricity bill, it is okay to use it without paying? [Relative appropriateness of norm violation]**
	Electricity theft causes outages	Do you consider that the theft of electricity in the community contributes to poor electricity supply since the utility is not able to cover its costs?
	Satisfaction with electricity service	Are you satisfied with the current electricity service?
	Energy poverty is a problem in the community	In your opinion: Is energy poverty a problem for your community?
		People use electricity without paying for it because:
	Electricity theft reason: low quality of service	The quality of service is very poor
	Electricity theft reason: affordability	Cannot afford to pay
	Electricity theft reason: no negative consequences	There will be no negative consequences for the individual
Social network	Important people to me: electricity unaffordable	How many of the people who are important to you do not have enough resources to pay for electricity?
	Important people to me: no connection	How many of the people who are important to you applied for the electricity connection but did not receive it?
Trust	Trust: local government	How much do you trust local government representatives?
	Trust: neighbours	How much do you trust other neighbours?
	Trust: electricity provider	How much do you trust the electricity supplier?

which have all been shown to be influential factors when explaining electricity theft (see Table 1 for detailed questions and variable names. The complete survey can be found at section A.1.4) .

3.4. Implementation

The survey and the experiment were conducted in June 2021 in the municipality of Puebloviejo. Our survey questions where part of a household survey on electricity usage and energy justice. The experiment concluded the survey. The university of Magdalena selected the enumerators to conduct the survey and run the experiment. The enumerators were from the communities of Puebloviejo to lower the barrier when approaching participants at their home. We used a random walk procedure to determine the households for the survey. While random walk methods help to avoid biases in household selection they do not necessarily result in a representative sample (MICS, 1995). We only surveyed one member per household who had to be 18 years or older. At the end of the survey, the participants were told that they can earn some money by throwing the die. The enumerator explained that the person interviewed will get paid depending on the number they roll. The higher the number rolled, the higher the payoff (see Table 2 for details). The maximum amount to be earned was 12000 Colombian Pesos, which corresponded to slightly over one third of the daily minimum wage. The roll was done in secret (the enumerator did not observe the number thrown). The enumerator asked which number was rolled and the participants were paid without further questions asked. To account for illiteracy/poor literacy the enumerators provided a paper which linked the number of the die with the payoff (see appendix fig. A.1). The participants were encouraged to play around with the die until they were certain that the die was fair. Once the participants were certain, they rolled the die, reported the number, and got paid.

Table 2
Incentivisation of the die game.

Die roll	Colombian Pesos	Euro
1	2000	0,46
2	4000	0,91
3	6000	1,37
4	8000	1,83
5	10 000	2,28
6	12 000	2,74

Note: The minimum wage in Colombia at the time was 1.014.980 Colombian Pesos per month (including transport allowance) which corresponds to 231,72 Euros. The minimum wage per day is therefore 33.832 Colombian Pesos, 7,72 Euros.

4. Results

4.1. Sample overview

Our sample consists of 386 people of which the majority is female (288), 97 male, and one person preferred not to answer this question. The age of our respondents is measured in age brackets and ranges from 18 to 75+. Education levels range from "1 - No or primary education", to "2 - High school", "3 - Technical", to "4 - University". Trust levels are measured on a Likert scale from "1 - high trust" to "5 - high distrust. We find that people are most distrustful towards the local government, followed by the electricity provider and neighbours. The main cause for electricity theft is considered to be affordability (71%), while low quality of service is only by 33% considered to be a cause for electricity theft and 4% think that the idea that electricity theft has no negative consequences leads to electricity theft. We find that 94% think that energy poverty is a problem within the community but 64% report that they are satisfied with their electricity service (see Table 3 for details).

Table 3
Summary statistics.

	Population				
	N	Mean	SD	min	max
Gender (1= female)	385	0.75	0	0	1
Education	346	1.89	1	1	4
Energy appliances (categorical)	376	2.33	1	1	4
Income (categorical)	367	2.45	1	1	4
1: Lowest income quartile (Colombian Pesos)	94	129 212.8	80 048.89	0	250 000
2: Second lowest income quartile (Colombian Pesos)	101	356 732.7	54 938.31	300 000	450 000
3: Second highest income quartile (Colombian Pesos)	85	550 352.9	55 042.13	460 000	650 000
4: Highest income quartile (Colombian Pesos)	87	1 006 782	418 567.6	700 000	3200000
Age classes	386	2.94	1	1	6
1: 18–29	70				
2: 30–39	96				
3: 40–49	78				
4: 50–64	88				
5: 65–74	36				
6: 75 +	18				
Trust: electricity provider (1 - high trust; 5 - high distrust)	386	3.62	1	1	5
Trust: neighbours (1 - high trust; 5 - high distrust)	385	3.29	1	1	5
Trust: local government (1 - high trust; 5 - high distrust)	386	4.08	1	1	5
Electricity theft cause: low quality of service (1=yes)	384	0.33	0	0	1
Electricity theft cause: affordability (1=yes)	384	0.71	0	0	1
Electricity theft cause: no negative consequences for individual (1=yes)	384	0.04	0	0	1
Energy poverty is a problem in the community (1=yes)	386	0.94	0	0	1
Townships	385				
1: Isla del Rosario	81				
2: Palmira	11				
3: Puebloviejo	116				
4: Tasajera	177				
How many of people similar to you think it is ok not to pay for electricity? (1=more than half)	386	0.32	0	0	1
Do you think electricity theft leads to power outages in your community? (1=yes)	386	0.84	0	0	1
Is it ok to use electricity without paying if a person cannot afford it? (1=yes)	386	0.40	0	0	1
Are you satisfied with the electricity service? (1=yes)	386	0.64	0	0	1
If majority uses electricity without paying for it: is it ok to do so yourself? (1=yes)	385	0.20	0	0	1
Share of people important to respondent applied but have no connection (1 - none; 2 - less than half: 3 - more than half; 4 - everyone)	386	1.64	1	1	4

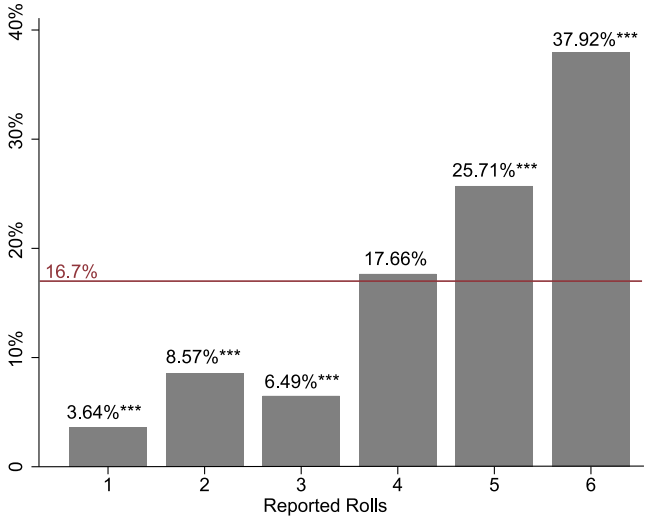

Fig. 2. Distribution of rolls according to the participants. Stars display the significance of two-sided binominal test that the observed percentage differs from 16.7%. * 5%, ** 1%, *** 0.1%.

4.2. Average dishonesty level

We see that we have an unequal distribution (Fig. 2) in what people report as their rolls. The true distribution of a six-sided die is represented by the red line in Fig. 2. As is to be expected, we find that the number six (which yields the highest payoff) is severely over-represented with 37.92% of all recorded rolls. We run a Kolgomorov-Smirnov one sample test that confirms that the distribution is not uniform at a 1% level.

We follow the assumption of Fischbacher and Föllmi-Heusi (2013) that people do not lie to their disadvantage but at the same time they do not always lie to the maximum. Thus, we consider the people reporting a 1 to be honest. Assuming that the amount of honest people per die roll is equal, we have about 22% honest people in our sample. Following Gächter and Schulz (2016) we have 21.22% income maximisers (people reporting a six minus the expected probability of a six being thrown (16.7%)). The average dishonesty levels in our population are comparable to studies with a standardised rate[2] of 0.468 where 0 indicates no cheating at all and 1 income maximisation. In comparison to the few dishonesty rates that are reported for Colombia our sample lies within the reported range (ranging from −0.13 (lying to their disadvantage) to 0.54).[3] Further, our sample population from an area with high electricity theft, shows the same average dishonesty rates as other samples that have the same experimental setting (for details see section A.1.1).

[2] We follow Abeler et al. (2019) in their standardisation procedure where $r_{\text{standardised}} = \frac{\pi - E[\pi^{\text{truthful}}]}{E[\pi^{\text{truthful}}] - \pi^{\min}}$ if $\pi < E[\pi^{\text{truthful}}]$ and $r_{\text{standardised}} = \frac{\pi - E[\pi^{\text{truthful}}]}{\pi^{\max} - E[\pi^{\text{truthful}}]}$ if $\pi \geq E[\pi^{\text{truthful.}}]$

[3] These dishonesty rates are based on coin-flips as well as die-in-a-cup games, vary between one-shot and multiple rounds, and include student as well as general public populations (see https://www.preferencesfortruthtelling.com/ for more information).

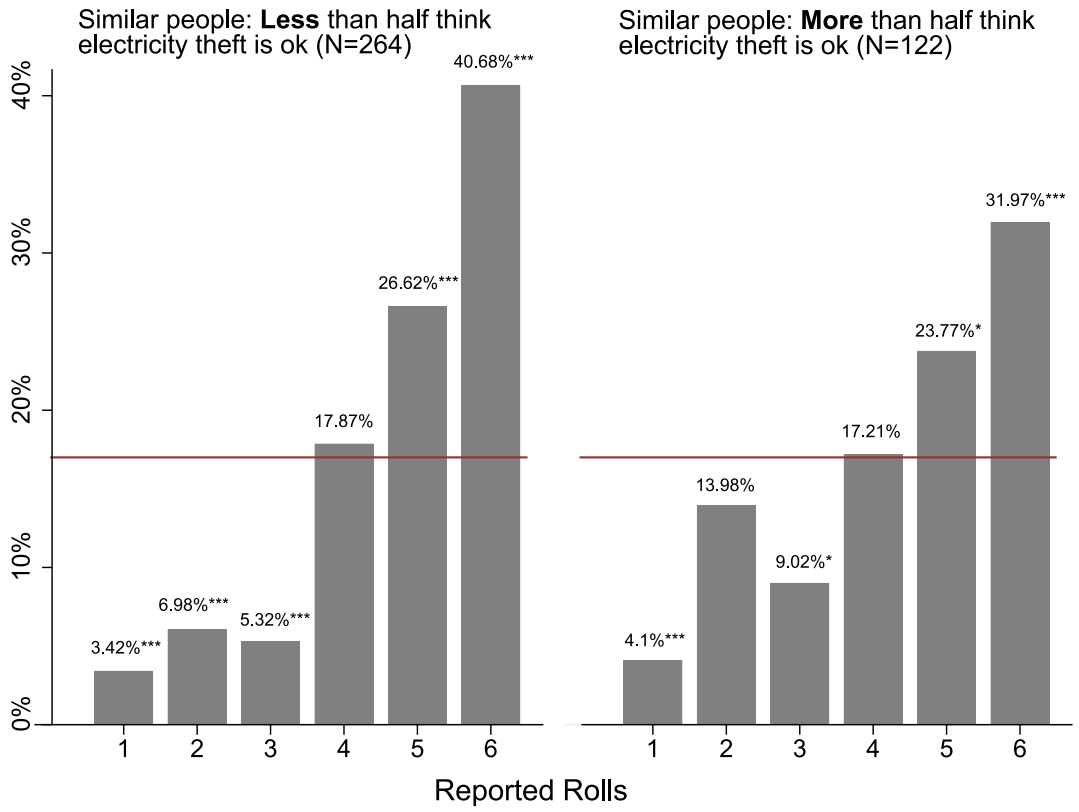

Fig. 3. Distribution of rolls as reported by the participants attitude towards electricity theft. Stars display the significance of two-sided binominal test that the observed percentage differs from 16.7%. * 5%, ** 1%, *** 0.1%.

4.3. Condoning electricity theft and dishonesty levels

To test whether the condoning of electricity theft correlates with cheating in the die game, we have three questions referring to justifications for electricity theft; one referring to the social acceptability of electricity theft in general, one testing the susceptibility of electricity theft to the contagiousness of social norm violations and the last one referring to the relative appropriateness of norm violation, electricity theft due to poverty.

To gauge the general acceptance of electricity theft we ask how many people similar to our respondent condone electricity theft. Asking about electricity theft acceptance in general (without any justification such as poverty or majority behaviour) provides us with a benchmark of what the social norm is. We see that the majority of people do not find electricity theft acceptable (264 out of 386 report that less than half of the people similar to themselves condone electricity theft) (see Fig. 3). We find the distribution between groups differs significantly (Mann–Whitney two-sample test, p = 0.0145). Interestingly, we see that the group that finds electricity theft not acceptable (standardised cheating rate of 0.52) cheats more than the group that finds electricity theft acceptable (standardised cheating rate of 0.37).

We are also interested in how the majority behaviour influences the participants to see whether the acceptance of electricity theft might be subject to an erosion of social norms. We find that electricity theft is not very susceptible towards a contagiousness of social norms violation, since even if the majority violates the "no-stealing" rule, this behaviour is still not condoned. Only 77 people think it is ok to steal electricity if the majority does it, compared to 307 people who are opposed to this idea (Fig. 4). Again, we do find very different behavioural patterns in the experiment. While the people who declare being opposed to electricity theft have a high cheating rate (standardised cheating rate of 0.53), the group that condones electricity does report rolls that are mostly not significantly different from the true distribution (standardised cheating rate of 0.22). These distributional differences are statistically significant with a *p*-value of 0.0002 (Mann–Whitney two-sample test).

Given that electricity access can be seen as a basic right, we also ask whether electricity theft is acceptable if a person cannot afford to pay for electricity. While even in this situation electricity theft is a violation of the norm "do not steal", this norm violation might be judged less harshly if it is done out of necessity. Again, we see that the majority does not condone electricity theft, but the overall judgement is less harsh. This behaviour hints that electricity theft might be judged according to the "relative appropriateness of norm violations". Electricity theft due to poverty is acceptable to 154 out of 386 people (see Fig. 5). Again, we see that the group that is strictly opposed to electricity theft has a significantly different cheating behaviour (standardised cheating rate of 0.53) than the group that accepts electricity theft as "necessary evil" (standardised cheating rate of 0.37) (p=0.0023, Mann–Whitney two-sample test) with higher dishonesty levels in the electricity theft opposing group. Overall, we find that honesty levels are higher in groups that condone electricity theft for all tested dimensions of the social norm violation.

We identify a clear difference between observed and unobserved behaviour. Arguably, condoning electricity theft is not socially desirable. Therefore, the group opposing electricity theft but at the same time having high dishonesty rates might be driven by social desirability in the observable behaviour and thus this is not in line with the unobservable behaviour. The group supporting electricity theft does not seem to be driven by the need to give a socially desirable answer in the social norm elicitation. Given that the experiment results are not influenced by any social desirability bias we conclude that we are having two distinct groups based on their responses towards the social norms elicitation but we cannot make the claim that people that do oppose electricity theft are more dishonest than those that do not. Rather, we see that people who are more honest in the cheating game

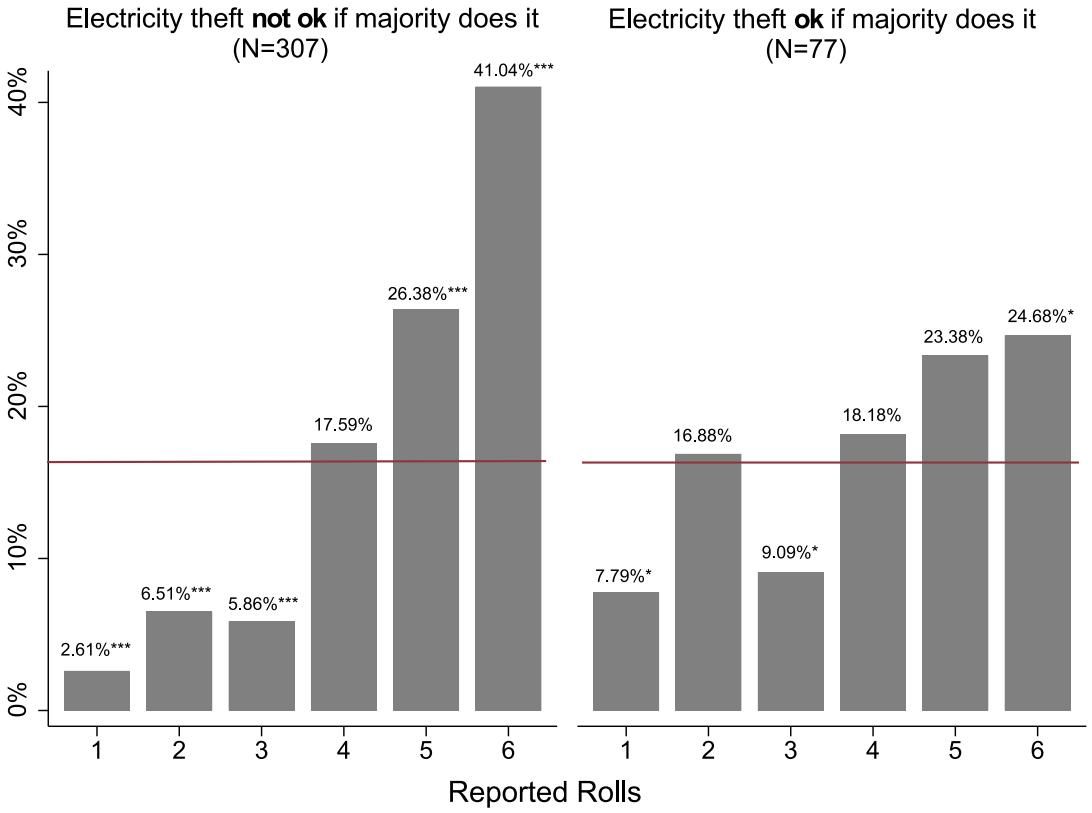

Fig. 4. Distribution of rolls as reported by the participants by attitude towards electricity theft and the behaviour of the majority. Stars display the significance of two-sided binominal test that the observed percentage differs from 16.7%. * 5%, ** 1%, *** 0.1%.

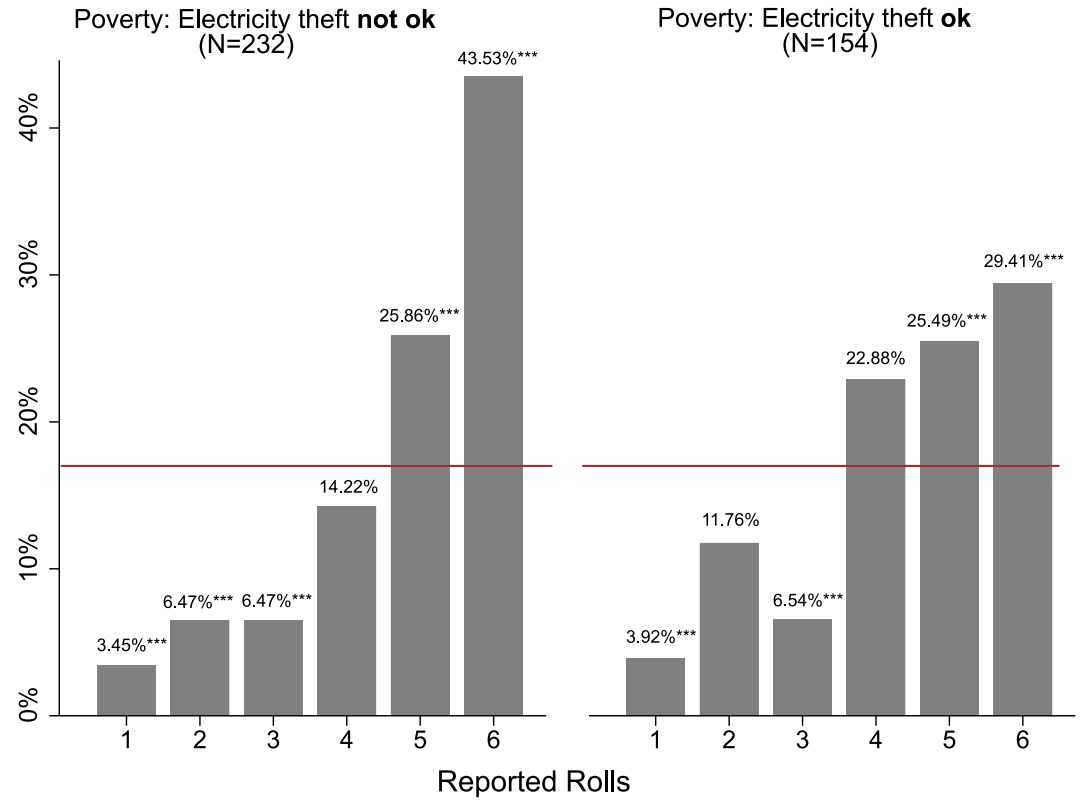

Fig. 5. Distribution of rolls as reported by the participants attitude towards electricity theft and poverty. Stars display the significance of two-sided binominal test that the observed percentage differs from 16.7%. * 5%, ** 1%, *** 0.1%.

Table 4
Factors explaining the probability of electricity theft condonement.

Dep.Var: Similar people: more/less than half think electricity theft is ok					
	(1)	(2)	(3)	(4)	(5)
Female	−0.00115	−0.00485	−0.000585	0.00414	−0.0303
	(0.0597)	(0.0596)	(0.0531)	(0.0522)	(0.0498)
Education	−0.0793**	−0.0758**	−0.0488	−0.0587*	−0.0452
	(0.0362)	(0.0364)	(0.0326)	(0.0311)	(0.0310)
Energy appliances: Lowest quartile	−0.188***	−0.211***	−0.212***	−0.202***	−0.141**
	(0.0713)	(0.0703)	(0.0622)	(0.0611)	(0.0618)
Energy appliances: Second lowest quartile	−0.245***	−0.256***	−0.279***	−0.248***	−0.232***
	(0.0946)	(0.0942)	(0.0802)	(0.0802)	(0.0748)
Energy appliances: Second highest quartile	−0.116	−0.124	−0.113*	−0.107	−0.0976
	(0.0763)	(0.0753)	(0.0676)	(0.0664)	(0.0654)
Income: Lowest quartile	0.116	0.0818	0.0959	0.104	0.0636
	(0.0818)	(0.0846)	(0.0735)	(0.0717)	(0.0690)
Income: Second lowest quartile	−0.100	−0.121	−0.0707	−0.0446	−0.0391
	(0.0729)	(0.0739)	(0.0659)	(0.0658)	(0.0680)
Income: Second highest quartile	−0.0919	−0.119	−0.0497	−0.0299	−0.0435
	(0.0737)	(0.0722)	(0.0635)	(0.0626)	(0.0641)
Age	0.00104	−0.000332	−0.00599	−0.00619	−0.00120
	(0.0184)	(0.0180)	(0.0164)	(0.0159)	(0.0162)
Trust: electricity provider		−0.0746**	−0.0662**	−0.0608**	−0.0458*
		(0.0298)	(0.0271)	(0.0266)	(0.0261)
Trust: neighbours		−0.00819	0.0252	0.0254	0.0189
		(0.0270)	(0.0250)	(0.0247)	(0.0240)
Trust: local government		−0.0169	−0.0416	−0.0349	−0.0364
		(0.0310)	(0.0281)	(0.0280)	(0.0272)
Electricity theft causes outages			0.0438	0.0547	0.0335
			(0.0629)	(0.0618)	(0.0602)
Satisfaction with electricity service			0.0493	0.0180	0.0274
			(0.0489)	(0.0495)	(0.0467)
Energy poverty is a problem in the community			−0.148	−0.109	−0.162
			(0.112)	(0.109)	(0.0999)
Important people to me: no connection			0.0698**	0.0688**	0.0859***
			(0.0309)	(0.0306)	(0.0308)
Important people to me: electricity unaffordable			0.186***	0.173***	0.142***
			(0.0275)	(0.0273)	(0.0282)
Electricity theft reason: low quality of service				−0.0452	−0.0241
				(0.0682)	(0.0647)
Electricity theft reason: affordability				0.0961	0.0740
				(0.0714)	(0.0707)
Electricity theft reason: no negative consequences				−0.0999	−0.106
				(0.121)	(0.123)
Townships					√
Observations	319	318	318	318	317
Pseudo R^2	0.061	0.085	0.232	0.249	0.294

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

are answering the social norms question with less concern for social appearance. This could either be due to them being more honest in general or it could indicate that for them electricity theft is not a major norm violation and thus they do not feel the need to respond in a social desirable way. With our setting, we are unfortunately not able to identify which of these explanations is true.

4.4. Explaining electricity theft condonement

Overall we find, that honesty is higher for people who condone electricity theft. Yet, we see clear group differences in honesty levels based on social norms towards electricity theft, as well as different support levels depending on the justification of electricity theft. We are interested in the factors that lead to support for a specific social norm. We include socio-economic data (gender, education, income, ownership of energy appliances, age) in model 1, adding trust variables (towards neighbours, local government, and electricity provider) in model 2, and complementing this with individual and network variables related to electricity (electricity theft causes power outages, satisfaction with electricity service, energy poverty in the community, and people within the network that applied for an electricity connection but did not get it or cannot afford it) in model 3, while model 4 adds the believed reasons for electricity theft (quality of service, affordability, no negative consequences), and model 5 controls for townships. We estimate a probit model and report average marginal effect.

4.4.1. Electricity theft condonement without justification

Condoning electricity theft without any justification is measured by the question "How many people who are in a situation similar to yours think it is okay to use electricity without paying for it?". The variable takes the value 1 if the person reports that the majority holds this view, and 0 if the minority holds this view. We do not find any effect on gender, age or income (Table 4). The role of education indicates that a higher level of education reduces the probability of condoning electricity theft but this effect is not significant in all of our models. We find that people with less energy appliances are less

Table 5
Factors explaining the probability of electricity theft condonement due to majority behaviour.

Dep.Var: Electricity theft ok/not ok if majority does it	(1)	(2)	(3)	(4)	(5)
Female	−0.0309	−0.0369	−0.0252	−0.0167	−0.00771
	(0.0531)	(0.0504)	(0.0509)	(0.0470)	(0.0472)
Education	0.0589*	0.0448	0.0431	0.0248	0.0176
	(0.0308)	(0.0297)	(0.0300)	(0.0273)	(0.0273)
Energy appliances: Lowest quartile	−0.0288	−0.0158	−0.0233	−0.00666	0.00565
	(0.0673)	(0.0667)	(0.0688)	(0.0660)	(0.0648)
Energy appliances: Second lowest quartile	−0.0267	−0.0338	−0.0411	−0.0107	−0.0264
	(0.0905)	(0.0877)	(0.0886)	(0.0828)	(0.0787)
Energy appliances: Second highest quartile	−0.0865	−0.0796	−0.0917	−0.0753	−0.0651
	(0.0663)	(0.0660)	(0.0660)	(0.0621)	(0.0602)
Income: Lowest quartile	0.0429	0.0690	0.0859	0.0747	0.0841
	(0.0747)	(0.0724)	(0.0746)	(0.0692)	(0.0661)
Income: Second lowest quartile	−0.0908	−0.0798	−0.0717	−0.0288	−0.00755
	(0.0660)	(0.0643)	(0.0648)	(0.0621)	(0.0596)
Income: Second highest quartile	−0.0537	−0.0571	−0.0587	−0.0271	0.0247
	(0.0668)	(0.0627)	(0.0622)	(0.0591)	(0.0608)
Age	−0.00780	−0.00843	−0.00911	−0.0131	−0.0240
	(0.0164)	(0.0158)	(0.0155)	(0.0144)	(0.0147)
Trust: electricity provider		0.0196	0.0254	0.0321	0.0211
		(0.0272)	(0.0274)	(0.0245)	(0.0239)
Trust: neighbours		0.0573**	0.0463*	0.0406*	0.0337
		(0.0232)	(0.0240)	(0.0222)	(0.0217)
Trust: local government		0.0331	0.0331	0.0434	0.0345
		(0.0278)	(0.0274)	(0.0264)	(0.0260)
Electricity theft causes power outages			−0.0179	−0.00355	−0.0252
			(0.0645)	(0.0593)	(0.0588)
Satisfaction with electricity service			0.0797	0.0275	0.0111
			(0.0499)	(0.0495)	(0.0490)
Energy poverty is a problem in the community			0.0165	0.0436	0.0707
			(0.0974)	(0.0982)	(0.101)
People important to me: no connection			0.0114	0.0123	0.00688
			(0.0326)	(0.0306)	(0.0308)
People important to me: electricity unaffordable			−0.0385	−0.0383	−0.0232
			(0.0327)	(0.0297)	(0.0307)
Electricity theft reason: low quality of service				−0.0808	−0.0804
				(0.0743)	(0.0718)
Electricity theft reason: affordability				0.190**	0.145*
				(0.0794)	(0.0764)
Electricity theft reason: no negative consequences				−0.180	−0.135
				(0.137)	(0.130)
Townships					√
Observations	318	317	317	317	316
Pseudo R^2	0.038	0.081	0.095	0.163	0.187

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

likely to condone electricity theft. One explanation could be that the more energy appliances are owned, the more electricity is needed, thus making electricity theft more profitable. Or, to phrase it differently, the lack of electric appliances reduces the need for electricity theft. In regard to trust, only trust towards the electricity provider plays a role. The more trust is placed in the electricity provider, the lower the probability of electricity theft condonement. In model 3, both network variables are significant. We find that people who come from a background in which a lot of people applied for a connection but did not get it, are more likely to condone electricity theft. Also, the more people in one's network cannot afford electricity, the higher the probability that electricity theft is condoned. This makes intuitively sense since this might be the only way to gain access to electricity.

Acceptance of electricity theft might differ for people that are aware that electricity theft can have negative impacts on the wider community since the electricity provider might not be able reliably provide electricity. Thus, we included the question on whether people think that electricity theft causes power outages. We find that trust towards neighbours increases the likelihood of electricity theft condonement among the people that are unaware of the negative effects. If people do not have access to the grid or are financially unable to pay for electricity it does not matter whether people are aware of the negative effects. In both groups the probability of electricity theft condonement is increased. On the question why people engage in electricity theft we see that among the unaware group, all three justifications increase the likelihood of electricity theft condonement. Special attention should be paid to "low quality of service" which increases the likelihood of electricity theft condonement of the unaware group, therefore exacerbating the problem (table A.1.1).

4.4.2. Condonement of electricity theft due to majority behaviour

We run the same model as before in order to identify the factors that determine whether people condone electricity theft if the majority engages in this behaviour. We do not find any impact of socio-economics (Table 5) which is in contrast to the previous results. In regard to trust we find that the higher the trust towards the neighbours, the higher

Table 6
Factors explaining the probability of electricity theft due to poverty condonement.

Dep.Var: Poverty: Electricity theft ok/not ok	(1)	(2)	(3)	(4)	(5)
Female	0.0176	0.00691	0.0130	0.0193	0.0133
	(0.0652)	(0.0645)	(0.0645)	(0.0607)	(0.0584)
Education	−0.0159	−0.0218	−0.0172	−0.0420	−0.0372
	(0.0382)	(0.0370)	(0.0363)	(0.0329)	(0.0317)
Energy appliances: Lowest quartile	−0.100	−0.102	−0.108	−0.0835	−0.0408
	(0.0755)	(0.0754)	(0.0743)	(0.0705)	(0.0711)
Energy appliances: Second lowest quartile	0.00613	−0.0191	−0.0264	0.0382	0.0160
	(0.101)	(0.102)	(0.102)	(0.0946)	(0.0959)
Energy appliances: Second highest quartile	−0.0973	−0.0976	−0.114	−0.0972	−0.0922
	(0.0777)	(0.0776)	(0.0763)	(0.0716)	(0.0684)
Income: Lowest quartile	0.0889	0.101	0.145*	0.126	0.108
	(0.0843)	(0.0844)	(0.0826)	(0.0801)	(0.0779)
Income: Second lowest quartile	−0.105	−0.105	−0.101	−0.0368	−0.0174
	(0.0796)	(0.0793)	(0.0774)	(0.0742)	(0.0726)
Income: Second highest quartile	−0.164**	−0.175**	−0.178**	−0.135*	−0.115
	(0.0779)	(0.0759)	(0.0740)	(0.0727)	(0.0742)
Age	−0.0312	−0.0318	−0.0318	−0.0361*	−0.0393**
	(0.0205)	(0.0200)	(0.0197)	(0.0184)	(0.0183)
Trust: electricity provider		−0.0147	−0.00692	−0.000663	0.00858
		(0.0325)	(0.0327)	(0.0304)	(0.0302)
Trust: neighbours		0.0583**	0.0605**	0.0602**	0.0499*
		(0.0283)	(0.0288)	(0.0275)	(0.0263)
Trust: local government		−0.0693**	−0.0713**	−0.0551*	−0.0604*
		(0.0332)	(0.0329)	(0.0314)	(0.0309)
Electricity theft causes power outages			0.0896	0.111	0.0767
			(0.0781)	(0.0731)	(0.0726)
Satisfaction with electricity service			0.133**	0.0642	0.0581
			(0.0573)	(0.0579)	(0.0567)
Energy poverty is a problem in the community			0.137	0.179	0.171
			(0.125)	(0.119)	(0.107)
People important to me: no connection			−0.0160	−0.00627	0.00422
			(0.0365)	(0.0339)	(0.0338)
People important to me: electricity unaffordable			0.0350	0.0223	0.00779
			(0.0361)	(0.0337)	(0.0350)
Electricity theft reason: low quality of service				−0.107	−0.0827
				(0.0745)	(0.0741)
Electricity theft reason: affordability				0.266***	0.194**
				(0.0764)	(0.0764)
Electricity theft reason: no negative consequences				−0.0960	−0.0985
				(0.131)	(0.137)
Townships					√
Observations	319	318	318	318	317
Pseudo R^2	0.040	0.055	0.077	0.153	0.198

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

the likelihood of condoning electricity theft if the majority does it. This indicates that the contagiousness of social norms is more likely in tight-knit communities. The only other variable that is significant is the idea that not being able to afford electricity is the main driver of electricity theft. When looking at the awareness of negative effects of electricity theft we find that low quality of service and no negative effects as reason for electricity theft are significant in the unaware group. While low quality of service reduces the likelihood of condonement, no negative consequences increases the likelihood of condonement significantly (table A.1.2).

4.4.3. Condonement of electricity theft due to poverty

The third social norm refers to the basic rights approach by including poverty as a justification for electricity theft. Most of our socio-economic variables are not significant (Table 6) but we find in model 4 and 5 age becomes significant. The older a person is, the less likely they are condoning electricity theft due to poverty. The effect of income is inconclusive in model 3 and not significant when we control for townships. Regarding trust we find that people that place high trust in the local government are less likely to condone electricity theft. This could indicate that these people trust the government to find a solution to the electricity access problem which would make theft due to poverty obsolete. We also find that trust towards neighbours increases the likelihood of condoning electricity theft due to poverty. This even holds for people who are aware of the negative consequences of electricity theft (table A.1.3). We also see that satisfaction with the electricity service reduces the probability of electricity theft condonement, but this effect is only significant in model 3. Again, we find that people who are unaware of the negative effects of electricity theft, condone electricity theft due to affordability issues more often than those you are aware of the negative effects.

One reason for the lack of significant results on income could be that not income per se is often seen as a factor for engaging in or the condoning of illegal activities but rather it is income inequality (Mimmi & Ecer, 2010). Since income is fairly equal (the whole area is among the poorest in Colombia), we might not be able to detect this effect.

5. Discussion and conclusion

We find that dishonesty levels in Puebloviejo are within the range of reported dishonesty level in the literature. When we test whether social norms on electricity theft correlate with behaviour in the die-in-the-cup game we find that there are significant differences between the group that is accepting of electricity theft (independent of the justification) and the group that is opposed to electricity theft. While we, based on the literature, anticipated that higher dishonesty rates in the game would be found in the group that accepts electricity theft this is not the case. For example, Gächter and Schulz (2016) found that dishonesty rates are higher for people from countries in which prevalence for rule violations is high. In contrast to our study, the relationship between dishonesty and rule violation is measured as average on population level. Thus, it remains unclear whether the students playing the game actually are open towards rule violations or not. By eliciting social norms on an individual level, we are able to differentiate between people condoning or opposing electricity theft. We find that people that accept electricity theft play the game, on average, more honest. The dishonesty rates for the groups opposing electricity theft are fairly stable with 0.52; 0.53; 0.53 and those for the groups accepting electricity theft have a wider range with 0.37; 0.22; 0.37. While the game reports unobserved behaviour, the social norms were elicited via survey questions. Thus, these answers might suffer from a social desirability bias, because people feel it is the socially correct thing to do to strongly condemn an illegal activity. The group that accepts electricity theft could either be more honest in general and therefore less concerned about not conforming towards social desirability or, if they condone electricity theft, they might not even think they are not answering socially undesirable. With our setting we are not able to disentangle which of these explanations is driving responses but it would be straightforward to test this in a follow up study.

We can also not rule out that we do observe a moral licensing effect which is defined as "past moral behavior makes people more likely to do potentially immoral things without worrying about feeling or appearing immoral" (Merritt et al., 2010). People who answer truthfully in the survey that they do not engage in electricity theft, might feel morally entitled to indulge in some cheating in the cup-in-the-die task. At the same time we can also not exclude the idea that we observe a moral cleansing effect (the idea of behaving more morally after an immoral behaviour) in the group that condones electricity theft (Fanghella & Thøgersen, 2022). Individuals may feel the need to morally cleanse themselves by reporting truthfully in the cup-in-the-die task. In a follow-up study the order should be randomised, with half the participants playing the game first, before answering the survey.

While the honesty levels are higher in all groups accepting electricity theft, we also find differences. Electricity theft seems to be accepted conditional on circumstances. We see that electricity theft is supported less if it is not clear, why people engage in this behaviour. In regard to justifications for electricity theft, it is less acceptable to engage in electricity theft just because "everybody is doing it". This in itself is good news. If the justification of electricity theft would be based on the behaviour of the majority, it would be a slippery slope since this could easily lead to an erosion of social norms. If the norm of "do not steal electricity" is violated, it has the highest acceptance if the motivation of electricity theft is poverty. People in Puebloviejo are exposed to poverty on a daily basis. Thus, they seem to judge electricity theft as a necessary evil. One possible explanation is that access to electricity is seen as a basic right, so if people do not have access because they are too poor, stealing electricity can be excused. This could also be an explanation for the honest behaviour in the game for this group. While cheating in the experiment is a self-serving behaviour that only leads to an increase of income, electricity theft due to poverty is ensuring a basic right. So this indicates that people want to be good citizens and engage in honest behaviour but circumstances make it difficult for them to follow the social norm of "do not steal".

One caveat is that our sample is not representative for Colombia. Puebloviejo is in many aspects a typical area that suffers from high poverty rates and insufficient infrastructure development which provided a suitable setting for our study. Yet, our results are not be fully generalisable in other contexts given that perception on issues such as fairness concerns and electricity theft could be affected by cultural factors specific to Puebloviejo.

By shedding light on the role of motivation for electricity theft and its impact on social acceptance, whilst also analysing honest behaviour in general we contribute to the policy debate on how to combat electricity theft. Our results indicate, that social acceptance of electricity theft is high if people lack socio-economic means but do not accept electricity theft based on pure opportunity. Thus, policies combating poverty or those providing support to access affordable electricity promise to be more successful than stricter enforcement of the "no electricity theft" rule.

CRediT authorship contribution statement

Esther Schuch: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Maria Apergi:** Writing – review & editing, Project administration, Methodology, Data curation, Conceptualization. **Luis Correa Lindarte:** Methodology.

Acknowledgements

Esther Schuch and Maria Apergi received funding by the Investigating the Systemic Impacts of the Global Energy Transition (ISIGET) project financed by the Federal Ministry of Education and Research (BMBF), Germany under the "Make our Planet Great Again - German Research Initiative", grant number 57429628, implemented by the German Academic Exchange Service (DAAD). The field research was implemented by the Universidad del Magdalena, coordinated by Maria Margarita Carrillo, Luis Alfonso Correa and Lorena López and technically supported by Dr.habil. Alfonso Caiazzo & Dr.-ing. Natalia Realpe from HEDERA Sustainable Solutions GmbH. The research was partially financed by the Klaus Töpfer Sustainability Fellowship Program of the RIFS (former IASS) (Impact-Driven and Action-Based Research Project (IMPACT-R)) and by the ASA Engagement Global Project "Co-developing solutions to improve access to electricity for a community in Colombia" from the TU Berlin, Institute of Energy Engineering (Prof. Tetyana Morozyuk), Universidad del Magdalena and HEDERA Sustainable Solutions GmbH, on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), coordinated by Dr.-Ing. Natalia Realpe, Nadja Hemming and Camila Rueda. The data collection was financed by Mangroves Project of the Association of Biologists of the Universidad del Atlántico (ABIUDEA) and Malteser International, with a team of local collaborators trained by HEDERA, supervised, and coordinated by the ASA project team in Colombia and in Germany.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.socec.2025.102457.

Data availability

Data will be made available on request.

References

Abeler, J., Nosenzo, D., & Raymond, C. (2019). Preferences for Truth-Telling. *Econometrica*, *87*(4), 1115–1153.

AIR-E S. A. S (2020). Le damos la bienvenida a nuestros clientes en Atlántico, Magdalena y La Guajira. URL: https://www.air-e.com/nuestra-empresa/sala-de-prensa/noticias/le-damos-la-bienvenida-a-nuestros-clientes-en-atlantico-magdalena-y-la-guajira.

Andreoni, J., Erard, B., & Feinstein, J. (1998). Tax Compliance. *Journal of Economic Literature*, *36*(2), 818–860.

Arkorful, V. E. (2022). Unravelling electricity theft whistleblowing antecedents using the theory of planned behavior and norm activation model. *Energy Policy*, *160*.

Bicchieri, C. (2005). The grammar of society: The nature and dynamics of social norms. *The Grammar of Society: The Nature and Dynamics of Social Norms*, 1–260.

Bicchieri, C., Dimant, E., & Sonderegger, S. (2023). It's not a lie if you believe the norm does not apply: Conditional norm-following and belief distortion. *Games and Economic Behavior*, *138*, 321–354, URL: https://www.sciencedirect.com/science/article/pii/S0899825623000088.

Bobek, D. D., Hageman, A. M., & Kelliher, C. F. (2013). Analyzing the Role of Social Norms in Tax Compliance Behavior. *Journal of Business Ethics*, *115*(3), 451–468.

Borja, D. F. O., & Ojeda, S. V. (2020). *Plan municipal de desarrollo 2020–2023 Pueblovieljo - Magdalena*: *Technical report*, URL: http://www.puebloviejo-magdalena.gov.co/noticias/plan-de-desarrollo-municipal.

Briseño, H., & Rojas, O. (2020). Factors associated with electricity losses: A panel data perspective. *International Journal of Energy Economics and Policy*, *10*(5), 281–286.

Briseño, H., & Rojas, O. (2020). Factors associated with electricity theft in Mexico. *International Journal of Energy Economics and Policy*, *10*(3), 250–254.

Briseño, H., Rubiano, J., García, R., & Rojas, O. (2021). Factors associated with electricity losses in Colombia. *International Journal of Energy Economics and Policy*, *11*(6), 465–470.

Burgess, R., Ryan, N., & Sudrashan, A. (2020). The consequences of treating electricity as right. *The Journal of Economic Perspectives*, *34*(1), 145–169.

Chen, X., Lupi, F., He, G., & Liu, J. (2009). Linking social norms to efficient conservation investment in payments for ecosystem services. *Proceedings of the National Academy of Sciences*, *106*(28), 11812 LP – 11817.

Cialdini, R. B., & Jacobson, R. P. (2021). Influences of social norms on climate change-related behaviors. *Current Opinion in Behavioral Sciences*, *42*, 1–8.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, *58*(6), 1015–1026.

Cohn, A., Fehr, E., & Marechal, M. A. (2014). Business culture and dishonesty in the banking industry. *Nature*, *516*(729), 86–89.

Dai, Z., Galeotti, F., & Villeval, M. C. (2018). Cheating in the Lab Predicts Fraud in the Field: An Experiment in Public Transportation. *Management Science*, *64*(3), 1081–1100.

Depuru, S. S. S. R., Wang, L., & Devabhaktuni, V. (2011). Electricity theft: Overview, issues, prevention and a smart meter based approach to control theft. *Energy Policy*, *39*(2), 1007–1015.

Diekmann, A., Przepiorka, W., & Rauhut, H. (2015). Lifting the veil of ignorance: An experiment on the contagiousness of norm violations. *Rationality and Society*, *27*(3), 309–333.

Fanghella, V., & Thøgersen, J. (2022). Experimental evidence of moral cleansing in the interpersonal and environmental domains. *Journal of Behavioral and Experimental Economics*, *97*, Article 101838.

Fergusson, L., Molina, C., & Riano, J. F. (2019). Consumers as VAT "Evaders". *Economía*, *19*(2), 21–68.

Fischbacher, U., & Föllmi-Heusi, F. (2013). Lies in disguise-an experimental study on cheating. *Journal of the European Economic Association*, *11*(3), 525–547.

Fjeldstad, O. H. (2004). What's trust got to do with it? Non-payment of service charges in local authorities in South Africa. *The Journal of Modern African Studies*, *42*(4), 539–562.

Gächter, S., Gerhards, L., & Nosenzo, D. (2017). The importance of peers for compliance with norms of fair sharing. *European Economic Review*, *97*, 72–86.

Gächter, S., & Schulz, J. F. (2016). Intrinsic honesty and the prevalence of rule violations across societies. *Nature*, *531*(7595), 496–499.

Ganesan, K., Bharadwaj, K., & Balani, K. (2019). *Electricity Consumers and Compliance: Trust, Reciprocity, and Socio-economic Factors in Uttar Pradesh*: *Technical Report February*, (p. 3). New Dehli: New Delhi: Council on Energy, Environment and Water.

Gaur, V., & Gupta, E. (2016). The determinants of electricity theft: An empirical analysis of Indian states. *Energy Policy*, *93*, 127–136.

Hanna, R., & Wang, S. Y. (2017). Dishonesty and selection into public service: Evidence from India. *American Economic Journal: Economic Policy*, *9*(3), 262–290.

Jamil, F. (2018). Electricity theft among residential consumers in Rawalpindi and Islamabad. *Energy Policy*, *123*(C), 147–154.

Kroher, M., & Wolbring, T. (2015). Social control, social learning, and cheating: Evidence from lab and online experiments on dishonesty. *Social Science Research*, *53*, 311–324.

Krupka, E. L., & Weber, R. A. (2013). Identifying social norms using coordination games: Why does dictator game sharing vary? *Journal of the European Economic Association*, *11*(3), 495–524.

Lammers, J., Stapel, D. A., & Galinsky, A. D. (2010). Power increases hypocrisy: Moralizing in reasoning, immorality in behavior. *Psychological Science*, *21*(5), 737–744.

Lewis, F. B. (2015). Costly 'Throw-Ups': Electricity Theft and Power Disruptions. *Electricity Journal*, *28*(7), 118–135.

Magdalena, D. d. (2016). *Plan Municipal de Desarrollo Puebloviejo - Madgalena "Equidad Social con Fuerza Popular" 2016 - 2019*: *Technical report*, Departamento del Magdalena, URL: https://puebloviejomagdalena.micolombiadigital.gov.co/sites/puebloviejomagdalena/content/files/000042/2052_plan-de-desarrollo-20162019.pdf.

Merritt, A. C., Effron, D. A., & Monin, B. (2010). Moral self-licensing: When being good frees us to be bad. *Social and Personality Psychology Compass*, *4*(5), 344–357.

MICS (1995). *Multiple-Indicator Survey Handbook, Chapter 6*: *Technical report*, URL: https://mics.unicef.org/sites/mics/files/chap06.pdf.

Mimmi, L. M., & Ecer, S. (2010). An econometric study of illegal electricity connections in the urban favelas of Belo Horizonte, Brazil. *Energy Policy*, *38*(9), 5081–5097.

Min, B., & Golden, M. (2014). Electoral cycles in electricity losses in India. *Energy Policy*, *65*, 619–625.

Nadeem, A., & Arshad, N. (2021). A data-driven approach to reduce electricity theft in developing countries. *Utilities Policy*, *73*, Article 101304.

Never, B. (2015). Social norms, trust and control of power theft in Uganda: Does bulk metering work for MSEs? *Energy Policy*, *82*(1), 197–206.

Ojedokun, U. A., Dinne, C. E., & Buhari, M. T. (2021). Social context of energy theft among electricity consumers in Lagos and Ibadan Metropolis, Nigeria. *Security Journal*, *34*(4), 802–819.

Ostrom, E. (2014). Collective action and the evolution of social norms. *Journal of Natural Resources Policy Research*, *6*(4), 235–252.

National Department of Planning, D. (2020). *Puebloviejo-Magdalena: Perfil socioeconomics municipal*: *Technical report*, (p. 2). National Department of Planning DNP..

Potters, J., & Stoop, J. (2016). Do cheaters in the lab also cheat in the field? *European Economic Review*, *87*, 26–33.

Razavi, R., & Fleury, M. (2019). Socio-economic predictors of electricity theft in developing countries: An Indian case study. *Energy for Sustainable Development*, *49*, 1–10.

Rimal, R. N., & Real, K. (2003). Understanding the Influence of Perceived Norms on Behaviors. *Communication Theory*, *13*(2), 184–203.

Romero-Lopez, D. J., & Vargas-Rojas, A. (2010). Modelo de incentivos para la reducción de pérdidas de energía eléctrica en coloMbia. *Revista de la Maestría En Derecho Económico*, *6*(6), 221–257.

Rustagi, D., & Kroell, M. (2022). Measuring honesty and explaining adulteration in naturally occurring markets. *Journal of Development Economics*, *156*, Article 102819.

Sharma, T., Pandey, K. K., Punia, D. K., & Rao, J. (2016). Of pilferers and poachers: Combating electricity theft in India. *Energy Research & Social Science*, *11*, 40–52.

Smerdon, D., Offerman, T., & Gneezy, U. (2020). 'Everybody's doing it': on the persistence of bad social norms. *Experimental Economics*, *23*(2), 392–420.

Smith, T. B. (2004). Electricity theft: a comparative analysis. *Energy Policy*, *32*(18), 2067–2076.

Wikipedia (2015). Mapa del área metropolitana de Santa Marta. URL: https://de.wikipedia.org/wiki/Datei:Mapa_del_\'area_metropolitana_de_Santa_Marta.svg.

Winther, T. (2012). Electricity theft as a relational issue: A comparative look at Zanzibar, Tanzania, and the Sunderban Islands, India. *Energy for Sustainable Development*, *16*(1), 111–119.

Wong, J. C. Y., Blankenship, B., Urpelainen, J., Ganesan, K., Bharadwaj, K., & Balani, K. (2021). Perceptions and acceptability of electricity theft: Towards better public service provision. *World Development*, *140*.

Yakubu, O., Babu C., N., & Adjei, O. (2018). Electricity theft: Analysis of the underlying contributory factors in Ghana. *Energy Policy*, *123*, 611–618.

Yurtseven, Ç. (2015). The causes of electricity theft: An econometric analysis of the case of Turkey. *Utilities Policy*, *37*, 70–78.