



# Energy solutions for wellbeing

Galvanising collective action  
to transform energy services in  
informal settlements and camps

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There are more than one billion people living in informal settlements and camps around the world. Electricity access for these marginalised populations is a significant challenge, with energy delivery models failing to consider their aspirations and unique vulnerabilities. This includes discrimination and inequality, inadequate housing, limited access to city infrastructure, greater exposure to hazards and restricted income-generation opportunities. Additionally, in most cases local actors are excluded from decision making and planning processes. This paper calls for a transformative approach to energy planning and delivery that focuses on a more holistic and context-based understanding of wellbeing, recognises communities as drivers of change, and fosters collective action among residents, local institutions, governments, service providers and international organisations.

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# Abbreviations

CBOs	Community-based organisations
EDMs	Energy delivery models
FBE	Free basic electricity
MTF	Multi-Tier Framework
NGOs	Nongovernmental organisations
RE4R	Renewable Energy for Refugees
SDI	Slum Dwellers International
SHS	Solar home systems
TEA	Total Energy Access
UN	United Nations
UNHCR	UN Refugee Agency

# Summary

Globally, more than one billion people — including those who have been displaced — live in informal settlements,<sup>1</sup> while approximately 6.6 million live in refugee camps.<sup>2</sup> The population living in informal settlements is projected to increase exponentially by 2050, with the urban population in sub-Saharan Africa alone expected to triple to 1.5 billion.<sup>3</sup> At the same time, the global displacement crisis has reached unprecedented levels, with more than 122 million people forcibly displaced worldwide,<sup>4</sup> placing even greater pressure on an already insufficient humanitarian response. These populations — informal settlement and camp residents — face systemic barriers in accessing basic services, such as housing, water, sanitation and electricity. This study calls for a transformative approach to electricity access in informal settlements and camps. It advocates for a shift in the agenda that goes beyond basic access to focus on the wellbeing and long-term aspirations of marginalised communities — where residents play a central role as agents of change.

## Connecting informal settlements and camps through common attributes

People living in these marginalised contexts face structural stigma and discrimination from government agencies, service providers, the wider city and host communities, exposing them to greater challenges to meet their immediate needs and longer-term aspirations. For example, to be connected to the grid, legislation requires informal settlement residents to provide proof of ownership or rental contracts,<sup>5</sup> which many do not have. Similarly, camp residents do not have the same rights as others, such as freedom of movement.

With inadequate basic services and limited livelihood opportunities within camps, their inability to seek alternatives elsewhere further deepens their hardship.<sup>6</sup> People living in both these contexts also face greater exposure to hazards such as fires, floods and landslides due to their precarious housing conditions or because settlements are pushed to areas prone to environmental hazards. Job opportunities are often limited; many people have informal jobs or lower incomes. Overall, discrimination and inequality, inadequate housing, limited access to services and city infrastructure, greater exposure to hazards and restricted income-generation opportunities are common challenges across most informal settlements and camps — especially among marginalised groups like displaced people, women and youth.

## The electricity access landscape: a stark reality

Energy is increasingly recognised as an enabler of people's wellbeing.<sup>7,8</sup> It can improve access to essential services and activities, such as healthcare, education, income generation and increased productivity and yields, ultimately enhancing people's quality of life.<sup>9</sup> However, energy access remains deeply unequal in both contexts and many rely on outdated energy sources such as candles, kerosene or gasoline for lighting, or resort to informal connections to gain access.<sup>10,11,12</sup> While we recognise that cooking is another central element of the energy access agenda, this study focuses on electricity.

Electricity access remains a significant challenge in these contexts. For example, some informal settlements are not recognised by governments and are therefore deprived from essential infrastructure.<sup>13</sup> In refugee camps, governments consider displaced people as temporary residents and are reluctant to invest in permanent infrastructure.<sup>14</sup> While humanitarian response is often conceived as short term, most camps continue well beyond the emergency phase and require more long-term planning.<sup>15</sup>

In other informal settlements, energy planning and delivery is typically limited to grid expansion without considering the specific challenges of these settings. For instance, the built environment makes grid connectivity challenging and many remain

disconnected.<sup>16</sup> Housing quality is another issue; some houses are constructed with precarious materials and service providers refuse to connect them to the grid due to safety reasons.<sup>17</sup> Electricity costs are also a recurrent challenge in both contexts, with many people paying above-average prices.

Other challenges include unreliable infrastructure, lack of access to finance, inadequate legal frameworks, government distrust and decontextualised business models.

## Towards a capability approach to energy access

Energy access literature has evolved from focusing on a minimum acceptable level of energy needed to improve people's welfare to studying how energy services can improve wellbeing. However, both approaches tend to overlook the broader, long-term impacts of energy on people's lives. In response, newer frameworks emphasise expanding individuals' real opportunities. Yet, these often neglect specific local contexts and continue to treat communities as passive participants rather than active decision makers. Considering the shortcomings of these theories, we propose the following shifts:

- **From capacity to capability:** energy planning and delivery must understand and address the structural factors that shape marginalised groups' ability to act, aspire and achieve a flourishing life.
- **From needs to aspirations:** efforts to shape energy systems must concentrate on and prioritise people's aspirations, with the ultimate goal of enhancing their wellbeing.
- **From participation to agency:** marginalised communities should have the power to influence the systems that govern energy delivery. This empowers communities not only to participate, but to take ownership of energy solutions, ensuring they are sustainable and aligned with local priorities.

## Agenda and action plan: galvanising collective action

This study aims to inform and influence a transformative approach to energy planning and delivery in marginalised contexts through the proposed wellbeing approach, while shaping a wider agenda for policy, research and practice.

To achieve this, we encourage:

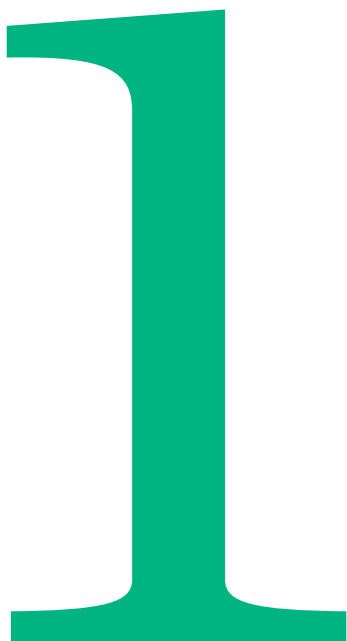
- Governments to create appropriate enabling environments that expand people's capabilities and respond to their aspirations, provide incentives for private companies and others to operate in informal settlements and camps, and meaningfully engage marginalised groups in planning processes
- Service providers to design more responsive business models that do not exclude marginalised groups and ensure that quality technology and its various pre- and after-sales services reach these groups
- International donors to mobilise resources for long-term action rather than solely providing short-term relief, and
- Nongovernmental organisations (NGOs), community-based organisations (CBOs) and communities to develop context-specific solutions that can enhance people's capabilities and create opportunities to achieve what they want or like to do, be or achieve.

These collective efforts will require our work to:

- Engage with communities and grassroots groups in informal settlements and camps from an agent-driven perspective
- Promote equitable partnerships to advance a just energy access agenda, and
- Advocate for policies and energy delivery models that place wellbeing at the forefront.

# Introduction

There are more than one billion people living in informal settlements and refugee camps globally. They face many shared vulnerabilities, including discrimination and marginalisation, challenges accessing housing, exposure to hazards and precarious working conditions. While electricity can enable access to services, enhance food security and improve safety, empowering communities to thrive, energy delivery models (EDMs) often fail in these contexts due to legal, infrastructural and regulatory barriers. This paper argues for a shift toward a wellbeing-focused approach to energy access, that recognises communities as drivers of change.



Globally, more than one billion people live in informal settlements, while approximately 6.6 million live in refugee camps. More than 80% of those living in informal settlements are concentrated in three regions: Eastern and Southeastern Asia, Central and Southern Asia and sub-Saharan Africa.<sup>18</sup> Indeed, in sub-Saharan Africa the prevalence of informal settlements is particularly striking, with about 56% of the urban population living in these contexts. This proportion is expected to rise, as the region's urban population is projected to triple to 1.5 billion by 2050 and the rate of growth in informal settlements is higher than other urban areas.<sup>19,20</sup> Meanwhile, the global displacement crisis has reached unprecedented levels, with more than 122 million people forcibly displaced worldwide.<sup>21</sup> Displaced people live across a variety of marginalised contexts, including camps for refugees and internally displaced people, and informal settlements. It is estimated that around 60% of them live in urban areas, often in informal settlements, where they face severe service deficits and limited humanitarian assistance.<sup>22</sup>

These two settings are often studied separately. However, they share common attributes. For example, people living in both experience high levels of discrimination and marginalisation, face significant challenges to accessing housing and other essential services and infrastructure, are exposed to geographical or environmental hazards and have precarious working conditions.<sup>23,24,25,26</sup> Despite the varying challenges and differing extents of issues faced in informal settlements and refugee camps, these common attributes suggest that it is possible to study these two contexts together.

Meanwhile, there is a growing recognition of the multidimensional impacts of energy.<sup>27</sup> Indeed, energy can enable access to services, enhance food security and improve safety, empowering individuals and communities to thrive.<sup>28,29,30</sup> It can also improve access to new income-generating activities and increase productivity/yields.<sup>31</sup> However, realising these benefits depends on how energy services are planned and delivered. In other words, how the combination of technology, finance, management processes, policy and legal frameworks, and stakeholder relationships — or EDMs — are designed and implemented. While electricity and cooking energy are crucial components of the energy access agenda, each has unique characteristics that merit separate analysis. Therefore, for the purpose of this study, we will focus exclusively on electricity.

Electricity access in informal settlements and camps remains low, with residents facing multiple and systemic challenges to gain access to a modern, reliable and sustainable source of energy.<sup>32,33</sup> In informal settlements, supply is often scarce, unreliable and unaffordable. Many lack access to the grid and resort to informal means to gain electricity access or rely on polluting

fuels such as kerosene, diesel and gas. Candles or gasoline are still commonly used for lighting.<sup>34</sup> The energy landscape is even less promising in camps. An estimated 80% of camp residents lack access to modern energy solutions,<sup>35</sup> while an estimated 89% only have access to the most basic forms of lighting, such as candles and kerosene lamps, or use nothing at all.<sup>36</sup> This suggests that people living in both contexts are highly vulnerable to energy poverty and its associated risks.

EDMs also often fail to deliver energy services in both settings.<sup>37,38,39,40,41</sup> Typically, EDMs are restricted to creating a connection to the grid and overlook the particularities of camps and informal settlements. For example, many residents in informal settlements lack documents such as written lease agreements or ownership titles and therefore are not legally permitted to connect to the grid.<sup>42</sup> In other instances, connections are substandard and deemed a fire hazard, particularly in camps with makeshift shelters that are prone to fires.<sup>43</sup> Moreover, energy planning often overlooks informal energy models, and in most cases the regulatory environment excludes and penalises people who are not able to formally procure electricity.<sup>44</sup> Political factors also impact mobility, the right to work and equality of work opportunities for local businesses.<sup>45</sup> There are many factors to consider to ensure that the delivery of energy services leads to active energy use, meets the long-term aspirations of marginalised people and ultimately contributes to their wellbeing. For example, if energy service access supports the creation of sustainable livelihoods, one must consider its affordability as well as non-energy factors such as access to capital and skills.

To overcome these shortcomings, some energy literature and practitioners emphasise what energy connectivity provides to people and whether energy services enable people to meet their wider needs.<sup>46,47</sup> Other literature connects with wellbeing to explore different ways that energy can improve people's quality of life.<sup>48,49</sup> However, these contributions often rely on a top-down notion of wellbeing that is typically predefined, paternalistic and decontextualised.

Yet, examples from both informal settlements and camps demonstrate how local actors are adapting to their own complex situations to enhance their wellbeing. For example, in the Dollo Ado camps in Somalia, informal settlement residents navigated restrictive policies by forming local networks to improve access to services such as community-led solar initiatives. Local cooperatives run by camp residents and members of the host communities provide services such as street lighting maintenance, solar home systems (SHS) installation and repair, and maintenance of the mini-grid that powers households in both the camps and the host communities.<sup>50</sup>

In response to this growing evidence, we suggest shifting the focus towards EDMs that view energy through a more holistic and context-based understanding of wellbeing that recognises communities as drivers of change. Our approach builds on Frediani's idea of how to apply the capability approach — originally developed by Amartya Sen — into urban policy.<sup>51</sup> This is structured around three pillars: capabilities, aspirations and agency. The findings of this study form the foundation for our ongoing work to influence governments, energy providers, international organisations and the broader community of practice to improve energy access. In short, the aim is to advocate for a transformative shift that redefines the energy access agenda through a wellbeing perspective that puts the residents' voices at the centre.

The paper is organised as follows: chapter 2 explains the decision to study camps and informal settlements together; chapter 3 explores the energy landscape in these two contexts; chapter 4 addresses the energy literature, including wellbeing scholarship; chapter 5 applies this framing to camps and informal settlements; and chapter 6 outlines conclusions and recommendations.

# Common attributes in informal settlements and camps

There are at least five common attributes of living conditions shared by informal settlements and camps: discrimination and inequality; insecure housing; limited access to services and infrastructure; exposure to hazards; and precarious livelihoods. These factors are deeply interconnected and require integrated, context-sensitive service planning and delivery.



Both informal settlements and camps take many forms and have diverse populations, all facing a spectrum of disadvantages and marginalisation. Informal settlements are often located near economic hubs but are disadvantaged in terms of service provision. Services are often underfunded and provided by small-scale actors, while conventional government planning often overlooks or actively excludes them.

Service provision and livelihood opportunities in camps have varying levels of integration with local communities. Specific support mechanisms for humanitarian emergencies, such as the United Nations (UN) cluster system, largely focus on meeting short-term relief needs for displaced people living in camps, rather than addressing the evolving and diversifying needs of long-term displacement. In turn, displaced people who live in towns and cities, often in informal settlements, are commonly overlooked by humanitarian support.

Despite these differences, development and humanitarian literature show common attributes used to describe living conditions, making it possible to study these two marginalised settings together.

Informal settlements are defined as residential areas where:

- Inhabitants have **no security of tenure** vis-a-vis the land or dwellings they inhabit, with situations ranging from squatting to informal rental housing
- The neighbourhoods usually **lack, or are cut off from, basic services and city infrastructure**, and
- The housing may not comply with current planning and building regulations and is often found in **geographically and environmentally hazardous areas**.<sup>52</sup>

Likewise, displacement literature describes camps based on residents' challenges around tenure, access to services and infrastructure, as well as housing conditions.<sup>53</sup> Other studies concentrate on discrimination and high levels of marginalisation,<sup>54</sup> and job insecurity and poverty,<sup>55</sup> all of which are also typical problems faced by people living in informal settlements. In camps, temporary and inadequate shelters are common, particularly when they become overcrowded and registration of new arrivals is delayed.<sup>56,57</sup> Basic services, such as water and sanitation as well as energy provision, are commonly limited.<sup>58</sup> Camps are also often located in areas prone to extreme weather and climatic degradation.<sup>59,60</sup>

We therefore propose that it is possible to identify five core attributes to investigate the living conditions in informal settlements and camps together.



## Discrimination and inequality

Many residents of informal settlements and camps are often displaced from their places of origin and therefore viewed as 'foreigners' or 'others'.<sup>61</sup> This distinction leads to discrimination in basic service access. Displaced people are often stigmatised because of a perceived link to the causes of their displacement, exacerbating their marginalisation and leading to social exclusion. Similarly, the sudden arrival of displaced people to informal settlements and camps creates strong tensions with host communities.<sup>62</sup> If displaced people are perceived as competition for scarce resources and services, it can cause conflicts, with severe implications for new arrivals.<sup>63</sup> Displaced people and other marginalised groups also suffer discrimination from national and local institutions, based on aspects such as their nationality, ethnicity, income level and gender. For example, in Korail, an informal settlement in Bangladesh, residents feel stigmatised and over-criminalised by police and other formal institutions and have created local committees to resolve internal disputes.<sup>64</sup>

There is also systematic discrimination in camps. For example, in Aysaita camp in Ethiopia, employees who were refugees reported getting paid considerably lower salaries than nationals doing the same jobs.<sup>65</sup> Furthermore, displaced women are more likely to suffer sexual abuse from colleagues or employers. These cases are rarely reported to local authorities because victims know it is unlikely something will be done.<sup>66</sup> In countries that enforce closed encampment, camp residency comes with automatic discrimination. In Kenya, for example, camp residents lack freedom of movement. When basic services or livelihoods are not sufficient within the camp, this is exacerbated by refugees' inability to seek alternative services elsewhere, as any movements out of the camp must be pre-approved by camp management.<sup>67</sup>

These forms of discrimination are systematically ignored by governments and service providers, and in most cases translate into a lack of access to social, cultural or economic rights.



## Access to housing

Access to housing is a common challenge and a top priority for residents of informal settlements. Most residents have insecure housing tenure. Many do not have ownership titles of their land or dwellings, lack written lease agreements or have short-term contracts. As a result, they risk eviction, harassment and other threats.<sup>68,69</sup> For example, many people in Korail in Bangladesh are under constant threat of being forced to leave their homes, bringing permanent uncertainty to their lives. This has been described as an "in-situ displacement, a permanent temporariness".<sup>70</sup> Lacking security of tenure has implications beyond

housing status. It also dictates whether residents can formally procure services — simply because providers require documents that many do not have — or whether they can participate in local decision-making spaces.<sup>71</sup> For instance, in Freetown, Sierra Leone, there is a general consensus that early residents — who very likely own their dwellings — are the 'original' settlers of the community and are entitled to participate in most decision-making spaces, while newcomers — who rarely own a house or have formal contract agreements — are excluded from these processes.<sup>72</sup>

For camp-based populations, the most common concern relates to the quality of housing, its location and discrimination between groups. Shelters are typically provided by national government or humanitarian agencies. However, these are usually temporary shelters with precarious and basic housing conditions. Delayed registrations and overcrowding are also common, sometimes causing homelessness even in camps where shelter is provided.<sup>73</sup> Moreover, housing provisions often change over time, leading to an unequal access to housing between populations who arrived at different times. It can even create an internal rental market where earlier residents, who were given houses for free, rent them out to more recent arrivals. In Afghanistan, for example, in the early 2000s the government provided housing for returnees in remote settlements such as Barikab outside Kabul — a housing scheme that has since been discontinued. Current residents of Barikab are a mix of those who have benefited from free housing and those who have not.<sup>74</sup>

These challenges are different and specific for different groups and contexts, and therefore must be locally addressed from an intersectional perspective.



### Access to services and infrastructure

Most informal settlements have limited and/or unreliable access to basic services such as sanitation, water and electricity.<sup>75</sup> They are typically located in marginalised areas out of reach of urban infrastructure, or where unreliable infrastructure affects service quality. In many cases, the density of the built environment means power providers refuse to connect houses to the grid<sup>76</sup> or streets are too narrow for ambulances or firefighters to navigate. Furthermore, many residents of informal settlements are denied access to education, health and other services because they do not have documents to prove their identity.<sup>77</sup> Service providers also require people to have identification documents to contract services, for example mobile phones and internet. Therefore, people are not only marginalised because they lack legal or material access to services and employment, but also due to lack of information. For example, a study in Goma, Democratic Republic of the Congo (DRC),

revealed lower school enrolment among internally displaced people, as adults did not know how to enrol their children at school.<sup>78</sup>

In camp settings, services are provided directly to residents, but often at a sub-standard compared to those offered to the rest of the population. In some contexts, such as Dadaab camp in Kenya, displaced people are not permitted to leave the camps without applying for special permits, which limits their options to what is available within its confines.<sup>79</sup> In other cases, such as Aysaita camp in Ethiopia, camp residents are free to come and go, but economic hardship prevents them from travelling to the nearest towns and cities. Health facilities in camps struggle with inadequate staffing, lack of essential medicine and equipment shortages, severely compromising the quality of medical care available to residents, including maternal care for women.<sup>80,81</sup>

Service planning and delivery in these contexts require a different approach — one that acknowledges the realities of these marginalised groups and prioritises solutions that ensure meaningful access to services.



### Housing adequacy and exposure to hazards

Many homes in informal settlements are precarious and their residents are exposed to various hazards. Some houses are built with improvised or scrap material, which makes them more susceptible to collapse or fire.<sup>82</sup> People are also exposed to health risks associated with housing, such as harmful building materials — for example, carcinogens such as asbestos-cement slabs — or pollution because their homes are close to waste sites.<sup>83,84</sup> Furthermore, many informal settlements are situated in marginal urban areas where people are exposed to geographical or environmental hazards, such as landslides or floods, or have higher chances of suffering accidents as they live next to railways or highways.<sup>85</sup> For example, Quarry Road West informal settlement in Durban, South Africa, is situated on steep slopes and flood-prone zones, leaving residents at significant risk during heavy rainfall and storms.<sup>86</sup>

Similarly, most camps are in remote areas prone to drought and water scarcity. For example, Zaatari camp in Jordan is in a water-scarce area. This was initially addressed by trucking water into the camp and subsequently by building new infrastructure. Yet, the climate and geographical conditions expose camp residents to constant water shortages. Shelters in camps are typically constructed with precarious or non-durable materials, offering little protection from harsh weather conditions. Furthermore, building materials used in camps are highly flammable and several fires have broken out, causing significant destruction and

loss of life. For example, in 2021 a massive fire in one of the Rohingya camps in Cox's Bazar, Bangladesh, destroyed thousands of shelters, leaving many families homeless.<sup>87</sup> The blaze highlighted the vulnerability of the camp infrastructure and the urgent need for safer housing.

Adequate housing is also a central element of urban housing policies, particularly for marginalised groups living in informal settlements and camps, as these are exposed to greater environmental, geographical and health risks.



### Jobs and household expenditure






Informal settlement residents suffer from high rates of unemployment. Many do not have steady incomes, are likely to be employed in lower-income jobs or have low incomes from self-employment. Gender and age are also marginalising factors. Women, youth and elderly people are more likely to work informally and have lower incomes than men.<sup>88</sup> Additionally, accommodation costs are higher for those who do not have proof of residency or citizenship. Landlords generally require these documents and many take advantage by increasing rent prices for those who cannot present them.<sup>89</sup> In some cases, nearly all household income

generated by displaced people living in urban areas goes to pay rent. For example, in Mafraq, Jordan, 86% of Syrian refugees pay on average 136 Jordanian dinars (JOD) a month (US\$190), while the average monthly income is about 140 JOD (US\$195).<sup>90</sup>

Displaced people have even more restricted job opportunities. They are unlikely to be able to access formal jobs without work permits or identity documents.<sup>91</sup> Businesses selling goods on credit cannot always expect to get paid when most customers depend on cash support that can be reduced at any point.<sup>92</sup> Supply chains are also restricted in camps where residents are prohibited from leaving. In Dadaab camp, Kenya, business or livelihoods are not acceptable reasons to obtain a permit to leave the camp, which creates a dependence on middlemen for all refugee-owned businesses. Those who work formally are often employed by NGOs on short-term contracts where they get paid incentives, which are much lower than regular salaries.<sup>93</sup>

Informality in the labour market is a reality for many residents of informal settlements and camps. For some, this means having precarious working conditions, job insecurity, lower wages, and can lead to discrimination and gender-based violence.

Table 1. Common attributes of the living conditions in informal settlements and camps

ATTRIBUTE	INFORMAL SETTLEMENTS	CAMPS	COMMONALITIES
 <b>Discrimination and inequality</b>	Displaced people seen as foreigners/others, stigmatised by institutions	Discriminated due to refugee status; restrictions on rights and movement; tensions with host communities	Stigma, exclusion and institutional discrimination based on legal status, origin or gender
 <b>Access to housing</b>	Insecure tenure; threat of eviction; informal agreements	Temporary and precarious shelters; failure to cope with housing demand	Precarity and insecurity in housing access and rights
 <b>Services and infrastructure</b>	Limited, unreliable or low-quality, exclusionary contract terms deny access	Sub-standard services; restrictions on movement or affordability limit access	Limited or no access; sub-standard provision; barriers due to documentation and infrastructure
 <b>Housing adequacy and hazards</b>	Exposure to floods, landslides; precarious building materials; health risks	Fire-prone, weak shelters; environmental challenges (for example drought)	Unsafe and inadequate housing in high-risk areas
 <b>Jobs and household expenditure</b>	Informal jobs, low income, exploitation; women/youth more vulnerable; high rent and costs	Few formal jobs; dependency on cash aid; work restrictions; lower wages for same roles	Precarious work; limited opportunities; high expenditure relative to income

The five attributes outlined above — also summarised in Table 1 — reveal common structural aspects of informal settlements and camps that allow for an integrated study of both contexts. However, it is important to note that these contexts also have their own specificities, shaped by the characteristics of each type of settlement, their location and their enabling environments, as well as the unique challenges faced by different marginalised groups. It is also crucial to highlight that these attributes are highly interlinked. For instance, residents with insecure tenure arrangements are likely to lack access to certain services or to pay higher rent prices and tariffs, while lacking tenure security may be the result of migration status or discrimination. Understanding these inter-relationships is essential for effective service planning and delivery in these contexts.

# Energy access in informal settlements and camps

EDMs in informal settlements and camps often fail to meet residents' aspirations. Barriers include inadequate housing, high electricity costs, lack of flexible payment options, unreliable infrastructure and exclusionary legal frameworks. Humanitarian approaches are often short term and inadequately coordinated. As a result, many residents lack access to essential energy services, reinforcing cycles of poverty and marginalisation. Energy access is essential for health, livelihoods and wellbeing, highlighting the need for a more holistic approach to energy planning and delivery.



EDMs refer to the combination of the technology, finance, management processes, policy and legal frameworks, and stakeholder relationships necessary to provide energy to a specific group of people.<sup>94</sup> Well-designed EDMs can provide various benefits to communities, such as enhanced access to income-generating opportunities, water, sanitation, health and education.<sup>95</sup> However, the most prevalent EDMs in informal settlements and camps have failed to meet the aspirations of people living there, and many remain without access to electricity.<sup>96,97</sup> This chapter explores the most common EDMs in these contexts and exposes their shortcomings.

## Built environment and inadequate housing

Some informal settlements are not officially recognised by governments and are deprived of essential infrastructure and services such as electricity.<sup>98</sup> This situation creates social exclusion and leaves residents with limited alternatives for energy access. Likewise, camps are excluded from national and international plans to scale up energy access. This is partly because host governments view displaced people as temporary residents and are therefore reluctant to invest in permanent infrastructure for these settlements.<sup>99</sup> Meanwhile, in informal settlements that are officially recognised, governments tend to prioritise grid expansion plans as their main energy access strategy, primarily due to their proximity to large urban centres. However, this model often creates new forms of informality. For example, in some settlements the density of the built environment makes grid connectivity challenging — streets are too narrow to extend distribution lines or for ambulances and firefighters to navigate — and households are excluded due to safety reasons. In these cases, only people living close to the existing grid infrastructure or in the main streets of the settlement may have a formal grid connection.<sup>100</sup> A notable example is Maputo, Mozambique where households living in inaccessible streets are not eligible for connections.<sup>101</sup>

Beyond the built environment, inadequate housing can have direct implications for whether households can use certain fuels. For instance, in Maputo the grid operator rejected most connection requests made by residents of an informal settlement as the conditions of buildings were not considered appropriate, primarily due to safety reasons.<sup>102</sup> These infrastructural problems are particularly sensitive for camps, as they are often located in remote areas where the sudden influx of a large group of people creates an increased demand for services. As a result, camp residents are unlikely to have access to essential infrastructure.<sup>103</sup>

## High costs and unrealistic payment models

Even when it may be technically feasible to connect informal settlements and camps to the grid, grid operators may be reluctant to serve these settings as they are considered high-risk consumers with low purchasing power and low energy demand.<sup>104</sup> In cases where the governments extended the existing grid to informal settlements, electricity tariffs and connection have severe financial implications for households and small businesses.<sup>105</sup> For example, residents of informal settlements in Accra, Ghana reported spending up to 30% of their incomes on electricity. This is due to their low incomes and unaffordable tariffs. These households also indicated they pay up to 500% more than the official connection costs due to the fees paid to middlemen or prices paid for meters in informal markets. Others paid 60% more on their bills because multiple dwellings shared a single meter and they were categorised among the highest energy consumers, for whom tariffs are usually higher.<sup>106</sup> Meanwhile, only a handful of camps are connected to the grid, such as Darashakran and Domiz in Iraq. However, in these camps electricity is restricted to 12 hours a day in summer and 20 hours in winter. Additionally, the power supply suffers constant and prolonged power cuts. To compensate for these problems, private operators run diesel generators and provide electricity when the grid is not working — for an average of three to eight hours a day.<sup>107</sup> However, tariffs paid to these suppliers are much higher than the electricity prices in the rest of Iraq and other countries.

Furthermore, residents of informal settlements usually don't find out how much their electricity bill is until the end of the month. For households who have no — or limited — spare income, this creates uncertainty, because they don't know whether they can afford their electricity bills until the end of the billing cycle. Some residents choose to remain disconnected from the grid because they do not want to be in debt to the electricity company.<sup>108</sup> Some power companies implement prepaid meters, where households buy electricity units according to their economic capacity. But this also creates inequality, since low-income households will only be able to buy the minimum amount of energy to power the most essential appliances.<sup>109</sup>

## Inadequate legal frameworks and distrust

Residents are often required to provide specific documents — for example, proof of residency or identity documents — that many lack, making them ineligible for grid connections.<sup>110,111</sup> In Ghana, electricity connections are considered proof of formal occupancy and power providers refuse to connect households to the grid

without proven ownership of the dwelling or a formal rental contract.<sup>112</sup> As a result, residents of informal settlements often resort to informal grid connections, either by tapping into nearby power lines or sharing electricity from a single metered supply.<sup>113</sup>

There are also sociocultural aspects to consider. The Global Partnership on Output-Based Aid project — implemented by the government of Kenya, the national power company Kenya Power and the World Bank Group — developed a programme to regularise informal connections in informal settlements. The programme introduced a subsidy to reduce connectivity costs from US\$395 to US\$15. In parallel, Kenya Power supported households that rejected formal connections. This included collaborations with CBOs, awareness-raising campaigns and contact points in the communities. Although the programme connected more than 40,000 households, many residents refuse to connect to the grid because they distrust the government or fear reprisal from local cartels. Because of this, informal connections remain the most common type of energy access in informal settlements in Kenya — for example, in Mathara settlement informal connections reach more than 50% of households.<sup>114</sup>

## Unreliable supply

Even when households and small businesses overcome all the above-mentioned challenges and can connect to the grid, infrastructure is often unreliable. Households and businesses in informal settlements suffer more frequent power outages, sometimes lasting several days or weeks. This is due to a lack of maintenance and limited investment in grid capacity and upgrades.<sup>115</sup> For example, in Kibera, an informal settlement in Nairobi, the average power outage per year is seven times higher than the national average for Kenyan customers, at 630.5 hours per year compared to 80.9 hours per year.<sup>116</sup> The example presented above from Darashakran and Domiz camps in Iraq shows that unreliable power supply is also a common problem in camps.<sup>117</sup> For local businesses, power outages have direct economic implications, as they reduce productivity or increase energy costs, with some relying on expensive diesel generators.

Intermittent power also affects other factors, such as:

- Access to medication — for example, local health centres and pharmacies in informal settlements cannot preserve antibiotics or medicines that need refrigeration
- Access to health centres — for example, health centres in marginalised areas cannot function properly without energy supply, and
- Diet and food security — for example, people are unable to buy and eat certain food that needs to be refrigerated, such as meat or milk.<sup>118</sup>

## Humanitarian agency model limitations

In camps, energy services are primarily provided by humanitarian agencies, such as the Moving Energy Initiative, the Global Platform for Action on Sustainable Energy in Displacement Settings led by the UN Institute for Training and Research, or the UN Refugee Agency (UNHCR) Global Strategy for Sustainable Energy and its Clean Energy Challenge.<sup>119</sup> However, the models used by these organisations have their own problems. Humanitarian response is often perceived to be short term while most refugee situations continue well beyond the emergency phase and require long-term planning.<sup>120</sup> Emergency provisions for the initial months tend to evolve into a more diverse set of needs over time.<sup>121</sup> As such, there needs to be a more coordinated approach between humanitarian agencies, government and service providers to plan for longer-term sustainability in energy provision and associated infrastructure. For example, the Renewable Energy for Refugees (RE4R) project deployed a mini-grid project in Jordan's Zaatari camp, home to more than 80,000 Syrian refugees. But even in this project, operational connectivity for staff was prioritised over connectivity for residents.<sup>122</sup> Initially, electricity was restricted to UNHCR camp operations because electricity costs were too expensive. With limited alternatives, residents resorted to informal connections, increasing UNHCR's electricity bill. In response, UNHCR began cutting informal connections, leading to social discontent and increased use of diesel generators. Nearly six years after the camp was opened, residents finally gained access to electricity.<sup>123</sup>

Additionally, the existing humanitarian cluster system does not have a formal administering organisation and structure that deals with energy, and only certain household energy needs are met — overlooking areas such as heating and cooling.<sup>124</sup> While it recognises the importance of energy in providing clean water, lighting for sanitation facilities, and waste management, evidence shows this is not fully integrated within the humanitarian programme. For example, pilot projects converting waste to biogas have failed due to a lack of financing, the challenges associated with competing with donated products and a lack of clarity on private-humanitarian partnerships.<sup>125</sup>

Moreover, the UN cluster system operates in silos, where functions and responsibilities become isolated. For example, the health cluster aims to provide essential healthcare services in humanitarian contexts. While it is recognised that energy is needed in healthcare facilities for lighting, equipment sterilisation and vaccine storage, there is only intermittent action on energy and health under the current cluster system and health-focused agencies lack the support needed in this area.<sup>126</sup>

## Shortcomings of standalone systems

Beside large-scale systems, there are several examples of standalone systems in informal settlements and camps. For example, in camps the insufficient humanitarian response to energy demand has created opportunities for microscale businesses, some of which are owned or run by displaced persons or members of the host community.<sup>127,128</sup> For example, residents from Rhino and Bidibidi camps in Uganda spend part of their limited incomes on products like battery-powered flashlights.<sup>129</sup> However, high-quality off-grid systems are generally supplied by market-driven approaches and focus on urban-centric and middle-class areas.<sup>130</sup> As a result, the most common standalone systems in both contexts are normally low-quality Tier 1 systems, assessed based on the Multi-Tier Framework (MTF) scale.<sup>i</sup> These have low battery storage capacity, limiting their use to basic functions such as lighting and phone charging.<sup>131</sup> This means these systems only provide basic services, while there is an unmet demand for higher-energy appliances such as refrigerators or for energy to support productive activities.<sup>132</sup>

Limited income-generating opportunities remain a pressing issue in informal settlements and camps, making affordability a key element of EDMs. Some standalone system suppliers provide more flexible payment systems, such as pay-as-you-go (PAYGO), enabling low-income households to pay monthly instalments. This model is particularly beneficial for those who may not have the upfront capital to purchase a solar product.

However, there is a notable absence of payment alternatives, such as PAYGO, within camps.<sup>133</sup> Furthermore, as with grid suppliers, PAYGO providers require formal identification or proof of address to be eligible, documents that many lack. Also, low-income groups living in informal settlements or camps may not be perceived as creditworthy or as easy to target by quality service providers compared to more affluent customers.<sup>134</sup> Some social enterprises have developed credit enhancement mechanisms to improve access to finance. In Sierra Leone, Munafa provides small and micro loans to informal entrepreneurs. Munafa supports the community to form groups of 20–30 individuals who act as social collateral for loan repayment.<sup>135</sup> However, these initiatives typically rely on donor funding, raising concerns about their long-term sustainability, while also facing challenges to scale-up and reach a larger number of people. All this makes affordability and access to finance a recurring challenge across informal settlements and camps, limiting the uptake of high-quality standalone systems.

Particularly relevant for camps, bundled energy systems from professional providers usually come with after-sale services, like warranty and maintenance. However, warranty terms are normally 'return to base' and maintenance by the original distributor or a local qualified technician often requires customers to take the products back to the shop where they bought them from. But camp residents are unlikely to be able to utilise these services, either because their movement is restricted or simply because they cannot afford to travel to take their products to the supplier. That means these arrangements are not viable for camp residents and reveal that these EDMs are not conceived for camp contexts.

## In sum

Energy access continues to be a significant challenge in both refugee camps and informal settlements, where EDMs fail to address the unique conditions of these contexts. Access to reliable, affordable and clean energy remains scarce, with many individuals relying on hazardous and unsustainable sources like kerosene, biomass and diesel. These challenges are compounded by the lack of formal recognition of these settings and their residents, inadequate legal frameworks, limited or unreliable infrastructure, high costs and lack of flexible payment models. As a result, many residents lack access to essential energy services, reinforcing cycles of poverty and marginalisation.

Meanwhile, energy is increasingly recognised as a key enabler of various basic human needs, helping to alleviate poverty and improve people's lives by facilitating access to shelter, health, medicine, education, leisure and culture, and income-generating opportunities.<sup>136,137</sup> To achieve this, it is crucial to shift the perspective of the existing EDMs in informal settlements and camps to view energy from a more holistic perspective. The following chapter proposes an approach that frames energy planning and delivery from a wellbeing perspective.

<sup>i</sup> Developed by the Energy Sector Management Assistance Programme (ESMAP), MTF assesses energy access on a five-tier scale across multiple dimensions, including: connectivity, reliability, affordability, quality, legality and safety. For more information, see: [www.esmap.org/mtf\\_multi-tier\\_framework\\_for\\_energy\\_access](http://www.esmap.org/mtf_multi-tier_framework_for_energy_access)

# Connecting energy access with the wellbeing of marginalised groups

Traditional binary definitions of energy access are inadequate to understand how energy contributes to wellbeing, particularly for marginalised groups. We propose moving to a more holistic, context-based and community-led understanding of wellbeing in relation to energy access. This is based on the capability framework, shifting from capacity to capability, needs to aspirations and participation to agency.



## Energy consumption approach

Traditional binary definitions of energy access (access versus no access) have proven inadequate to understand how energy can contribute to improving people's quality of life. Efforts to expand this limited perspective focus on energy consumption, defining a minimum acceptable amount needed for a decent quality of life, known as the energy poverty line. For example, this is the cut-off point for energy consumption<sup>138</sup> above which "energy contributes to greater welfare and increasingly higher levels of income".<sup>139</sup> Below the energy poverty line, people's access to energy is insufficient to help them "sustain normal lives".<sup>140</sup> However, this approach has several limitations. Firstly, the conceptualisation of the energy poverty line is still binary — energy poverty or not — and is based on predefined or objective metrics. More importantly, due to its focus on energy consumption, this simplistic interpretation of energy access overlooks the relevance of energy services people are provided with.

## Energy services approach

To fill this gap, there has been an attempt to understand how energy services contribute to poverty eradication and sustainable development. Two examples are the MTF for energy access by the Energy Sector Management Assistance Program (ESMAP) and the Total Energy Access (TEA) framework, developed by Practical Action. The MTF divides different energy services into levels, from Tier 0 (no access) to Tier 5 (full access), according to factors such as the capacity, duration and availability, quality, reliability, affordability, legality, convenience, and health and safety of energy services, as well as the range of uses supported.<sup>141</sup> The framework further separates energy access into three 'locales' — households, productive uses and community facilities — all of which have specific energy needs. Once energy access has been defined in this multifaceted way, energy poverty can then be analysed in a more nuanced manner, as various levels of deprivation within some, or all, of the above areas. Similarly, the TEA framework assesses the quality, reliability and adequacy of energy services across three spheres: households, productive uses and community services.<sup>142</sup> This is measured by a questionnaire that investigates: the adequacy of energy services for various household needs, determined by comparing responses against predefined minimum standards; and the quality of the service, examined through an energy supply index rated on a 0 to 5 scale.

These two examples recognise that energy services are essential for achieving a range of wellbeing-related outcomes, such as access to education and income-generating opportunities. They also provide a structured

approach to identify and prioritise actions. However, they do not capture the wider impacts of energy access on people's lives and wellbeing. For example, the MTF concentrates on output indicators rather than investigating what the impacts of energy services are on people's lives. Moreover, both frameworks remain technical and predefined around objective levels. For instance, the TEA is criticised for its rigid structure, as it assumes that all energy attributes are equally important — which may fail to reflect end-users' perspectives.<sup>143</sup>

## Wellbeing and capability approach

In turn, both strains of literature (energy consumption and energy services) are rooted in the hedonic school of wellbeing. This school sees things as utilitarian, meaning energy services produce happiness or reduce unhappiness.<sup>144</sup> In contrast, the eudaimonic school of wellbeing takes a broader society-level view and seeks to "enable human beings to reach their highest potential within the context of their society".<sup>145</sup> Sen<sup>146</sup> and Nussbaum<sup>147</sup> are the most well-known representatives of this school of thought and developed the 'capability' approach. This approach relies on two concepts: 'functionings', defined as what a person actually does in everyday life; and 'capabilities', defined as the actual or real opportunities to achieve those things (functioning). Promoting capabilities maximises opportunities while allowing individuals to decide what kind of life they value.<sup>148,149</sup>

Some studies have applied the capability approach to understand where energy and wellbeing meet.<sup>150,151,152,153</sup> Day et al.<sup>154</sup> acknowledge there are various reasons why a person may not be able to achieve what they want, which is not necessarily related to energy — for example, personal differences, such as age, gender, disability, illness, social norms or ways of behaving.<sup>155</sup> What really matters to people, they argue, are basic capabilities — for example, health and education. To reach these basic capabilities, people often need secondary capabilities, which are the building blocks for achieving the basics. Secondary capabilities can, but not necessarily always, include energy services. They state that the capability framework can be approached either as a prescribed list of capabilities or defined through inclusive and deliberative processes, as originally claimed by Sen. A great deal of the literature has relied on a preset list of capabilities — for example, by predefined categories of energy capabilities, such as: physical and biological needs; intellectual and emotional needs; and social and political needs.<sup>156</sup>

Although the literature has arguably engaged with the capability approach, it has overlooked the broader, society-level perspective on energy. Instead, the literature is constrained to the notion of needs or essential capabilities. Even when it is meant to focus

on subjective approaches to energy, it often refers to objective preset needs, rather than context-based specificities. Finally, even if the focus is on capabilities, the literature either says nothing about the role of the communities or still regards them as participants, rather than actors with the potential to run the decision-making process.

## Towards a holistic interpretation of the capability approach

Considering these critiques, we propose shifting towards a more holistic (rather than binary or output-focused), context-based (rather than objective and predefined) and community-led (rather than paternalistic or participatory) understanding of wellbeing in relation to energy access. To do so, we build on Frediani's work<sup>157</sup> on how to apply the capability approach and develop it in relation to energy access. This approach proposes shifting key concepts from simply delivering energy services to satisfy pre-established needs, to an understanding of what these services can add to people's lives, as identified by the communities themselves.<sup>158</sup> This is achieved through three shifts:

**From capacity to capability:** this means shifting the focus from what a person may do or produce because of energy access, towards a more holistic view of what energy enables people to do, be and achieve. This perspective captures inequalities within the energy system, which might otherwise be overlooked. For example, energy interventions that support income-generating activities in marginalised contexts often focus on enhancing the capacities of small-scale entrepreneurs. This typically involves promoting business skills, vocational courses or better access to microfinance. These are essential elements. However, a capability assessment delves deeper into the context and conditions of specific livelihoods. Factors such as personal, social and structural elements shape marginalised groups' ability to use energy services to achieve valued outcomes. For example, regulations affecting street trading, such as the right to use the street to conduct their business, can hinder the economic activities of vendors in informal settlements. This then impacts their ability to generate income and enhance their wellbeing, regardless of their energy-enabled capacity.

We believe that governments, international organisations and other partners should develop EDMs from a capability perspective. This approach will help understand how the structural attributes presented in chapter 2 — discrimination and inequality, access to housing, access to services and infrastructure, housing adequacy and exposure to hazards, and jobs and household expenditure — impact people's ability to use energy services to improve their wellbeing.

**From needs to aspirations:** basic needs approaches tend to predetermine and prioritise certain needs, overlooking other equally important dimensions. Instead, the proposed perspective centres on the various things people value doing and being. This includes what individuals are actively pursuing or have already attained, the things people could achieve if they decide to pursue them, as well as aspirations that remain out of reach — well beyond strict needs — all within a context-based analysis. People's aspirations should be identified through a deliberative process, encouraging people to critically reflect on their aspirations and reach a consensus on their decisions. For example, this approach was used in participatory engagements with residents of Woodstock — a neighbourhood of Cape Town undergoing rapid transformation — to assess their aspirations in relation to urban policies. Firstly, residents agreed that the desire for care and support motivated them to live in Woodstock. While this aspiration was not fully realised, groups had already formed support networks in the area. Retaining public spaces was identified as a potential aspiration, as this could foster inclusive social interactions. However, aspirations for secure, affordable housing were deemed unattainable due to limited government support and the constant threat of displacement, highlighting the need for equitable urban policies. The debate on aspirations and urban policy reflects that residents have multiple aspirations that go beyond a narrow conception of housing. This approach emphasises the importance of engaging with the specific context and people's experiences, critically reflecting on their own aspirations and their visions for the future.<sup>159</sup>

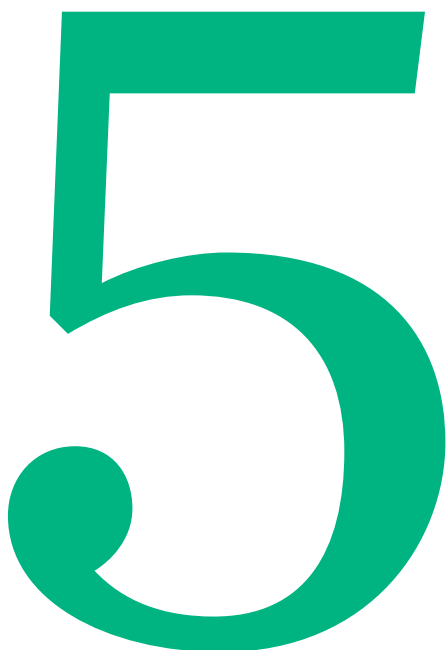
**From participation to agency:** participation in energy delivery and management is considered a cutting-edge notion. However, shifting the focus towards agency can enhance the recognition of the communities and their representation in decision making, creating opportunities to make institutions more democratic.<sup>160</sup> This community-led approach can support wider empowerment and protagonism that goes beyond energy service delivery. Agency is also a critical element to leverage unique skills, knowledge and collective efforts existing in local communities, and to connect place-based solutions with broader policy debates or projects. This is achieved by supporting existing local networks that foster inclusive environments, promoting solidarity and trust to build long-term partnerships, and enabling critical pedagogy to challenge the status quo and encourage critical consciousness. Such efforts strive for emancipatory outcomes and foster valuable capabilities for wellbeing. Rather than simply encouraging participation in energy delivery, fostering inclusion more broadly can contribute to agency in other areas of life. For example, Know Your City is an initiative by Slum Dwellers International (SDI) where residents of informal settlements play a central role in driving change within their communities. This initiative engages with

communities, with a local actor leading interventions. This includes producing and analysing data to better understand the diverse challenges faced by people in their communities and working with service providers and government bodies to develop solutions tailored to their specific context, among others.<sup>161</sup>

For camps, this shift requires further efforts, as different governments have deliberately established political or structural barriers that limit people's ability to shape or influence their environment. In these contexts, it is first essential to identify ways to take action within the current system, leverage informal networks and build coalitions that advocate for greater community engagement.

# Using the capability approach to energy planning and delivery in camps and informal settlements

The capability approach to energy planning and delivery requires three shifts to capability, aspirations and agency. This means understanding the unique and complex socioeconomic factors at play in each context, valuing local knowledge and informal networks. Approaches should go beyond basic needs to a more holistic focus on wellbeing and the broader benefits energy services can unlock. Finally, processes should support community empowerment and protagonism, leverage their skills and knowledge, and connect place-based solutions with broader policies and debates.



## Capability

This involves understanding people's choices, abilities and opportunities to enhance their wellbeing. This can be achieved by:

**Investigating the specific socioeconomic and power dynamics of informal settlements and camps, assessing each on a case-by-case basis:**

as outlined in chapter 2, informal settlements have many complex structural factors that restrict people's

ability to use energy in ways that support their wellbeing and aspirations. While informal settlements and camp residents may appear similar, the underlying drivers of these issues are often distinct and context specific. It is also essential to leverage unique local skills, knowledge and collective efforts to develop place-based solutions. Therefore, it is crucial to investigate each context on a case-by-case basis to gain a deep understanding of its complexities, and reflect how local knowledge and social networks can shape vulnerabilities and strengths (see example in Box 1).

### BOX 1. BUILDING CONTEXTUALISED EVIDENCE FROM THE BOTTOM-UP

An SDI project in Longlands, an informal settlement in Cape Town, shows how community members made a strong case for the introduction of more sustainable and reliable energy solutions linked to their specific needs. In 2018, the informal settlement was severely affected by a sudden fire that spread quickly and left more than 130 residents without a home. The cause of the fire was linked to the energy sources used for cooking and lighting. Members of the community joined forces with South Africa SDI Alliance to explore alternative energy sources and embarked on a community-led data collection process that gathered information about their energy uses and costs. While administering the survey, local researchers realised they needed different communication methods to reach people in the community who did not speak English:

"We learnt that there were quite a number of people living in the community that did not understand English. But we avoided interpreting verbally to people the questionnaire because this could have influenced how they respond. As technical support we translated the questionnaire to Afrikaans. After testing it again, *suiver Afrikaans* (first language dialect) was not properly understood by the community. We then put illustrations in the questionnaire that explained the questions and this was better."

In parallel, residents of the community participated in an exchange process with members of two other informal settlements from Cape Town to learn from their experiences with off-grid energy systems. They also engaged with an SHS provider to find one to fit the needs of their community. Through these exchanges, the community discovered the iShack project implemented in the nearby Enkanini settlement. This was attractive because Enkanini had received a Free Basic Energy subsidy, reducing the SHS installation costs.

This led to a pilot project that installed solar panels on the roof of 26 households. These solar energy projects provided a safer, more reliable and cost-effective energy alternative for the residents. The community continued exploring alternatives to expand energy services to more residents and investigated alternative cooking and water heating systems.

Overall, this approach represents a remarkable change in energy planning. Members of the community played a central role by assessing their specific energy uses, rather than being subjects of external assessments. This collective effort enhanced people's capacity to engage more deeply in decision-making processes, to negotiate with external stakeholders and to demand better services and policies.<sup>162</sup>

**Acknowledging the importance of informality and exploring how it co-exists with formal service delivery — rather than trying to eliminate it:**

as discussed previously, people living in informal settlements and camps largely rely on informal systems for income generation and accessing services, including housing and energy. Informality improves people's economic and social conditions in contexts where governments, private companies or international

organisations have failed to provide suitable alternatives. In these cases, informal systems quickly respond to people's needs and adapt to changing circumstances, often proving to be more efficient than rigid formal structures. Governments, international organisations and energy providers must therefore acknowledge the strengths of informal systems and understand how they interact with existing service models. For this purpose, interventions must:

- **Advocate for co-production models, where local communities work alongside formal service providers to design and implement solutions:** local actors and residents are well-positioned to understand how various cultural and socioeconomic dimensions interact in their communities, how to prevent increasing inequalities produced by energy services and how to address them. Therefore, it is imperative that CBOs, NGOs and others working in development and humanitarian services champion inclusive approaches that engage with and are driven by local actors, recognise the value of local knowledge and networks, and fully integrate their inputs into service delivery models.
- **Leverage informal networks:** informal settlements and camps often have robust social networks. These can be used to circulate information and deliver services. Governments, international organisations and energy providers must recognise the crucial role played by social networks. This involves understanding their strengths and limitations, and how they interact with formal services.
- **Foster equitable collaboration and partnerships:** collective efforts among multiple stakeholders — public sector, private companies and CBOs — can help mobilise resources and expertise to improve service delivery. Yet, it is essential to ensure that there is a balanced and fair environment where these different stakeholders can effectively work together. This includes ensuring that the burdens and benefits of collaborative efforts are equally distributed, considering the different interests and capabilities of each actor. It should also allow for meaningful engagement with marginalised communities and grassroots organisations.
- **Adapt enabling environments:** policy and legal frameworks should be adapted to acknowledge and support the operation of informal systems, including the rigorous requirements for accessing public services like electricity. This involves governments adapting, relaxing or simplifying regulations, and creating space for informal markets to operate. The wider community of practice should also advocate for inclusive policies that reflect the realities of these marginalised settings (see example in Box 2).

## BOX 2. ENERGY SYSTEMS AND INFORMALITY

The iShack project in Enkanini, South Africa addressed the challenges of energy access in informal settlements by designing a solution tailored to the specific context. The project provided SHS that offered a clean and affordable energy source for lighting, phone charging and other small appliances. To achieve this, iShack embraced the strengths of informality and recognised that informal systems often co-exist with formal service delivery in ways that are crucial for improving people's wellbeing. For example:

- **Co-production models:** in line with co-production principles, Enkanini's residents were actively involved in deploying and managing the solar systems, ensuring the solutions responded to the needs of the community. The project trained residents as installation and maintenance agents to provide customer service for the SHS. This tapped into informal labour networks and created employment opportunities within the community. The community's engagement and ownership over the project further ensured the systems' longevity and reduced instances of theft.
- **Leveraging informal networks:** iShack works closely with savings groups to support the financing and sustainability of the SHS. Households contributed small weekly amounts to these groups to cover maintenance costs. Word-of-mouth communication through social networks was also crucial for raising awareness and encouraging adoption of the solar systems. These informal spaces also helped build trust and legitimacy for the project among residents.
- **Fostering equitable collaboration:** the iShack project was supported by a partnership involving South Africa's Green Fund, Stellenbosch Municipality and the community. The Green Fund contributed capital grants for purchasing solar panels, while a monthly subsidy from the government — lower than the cost of maintaining a grid connection — and an affordable contribution from the community covered installation and maintenance costs. This operating model ensures the sustainability of the project while making energy accessible and affordable to the informal settlement residents.
- **Adapting enabling environment:** Stellenbosch Municipality revised its 'indigent policy' to extend the use of free basic electricity (FBE) funds for subsidising SHS for households not connected to the grid. The indigent policy was originally designed to help low-income households by providing free basic services, such as water and electricity. Qualifying households typically received 100 units of free electricity per month. However, in settlements where households could not access grid electricity, the municipality restructured the policy to allow these FBE funds to subsidise SHS installations.

These efforts allowed the iShack project to provide more than 1,600 households in Enkanini with modern, clean, affordable and reliable energy.<sup>163,164</sup>

## Aspirations

This requires moving from basic needs approaches to what people value doing and being, ultimately leading to improved wellbeing. This can be achieved by:

**Understanding people's aspirations:** shifting from a purely energy supply approach to a more holistic approach that centres on multiple dimensions

of wellbeing. Energy services are more than just a commodity; they can be a fundamental enabler of various socioeconomic dimensions. By adopting a wellbeing-led perspective, energy services can unlock new livelihoods opportunities, improve education and health outcomes and enhance food security. This approach contributes to the long-term wellbeing of the community and generates broader benefits (see example in Box 3).

### BOX 3. RENEWABLE ENERGY FOR REFUGEES (RE4R) IN RWANDA

The RE4R project in Rwanda's Kigeme, Nyabiheke and Gihembe refugee camps represents a shift from a basic needs approach (access to energy) to one that addresses residents' multiple aspirations (for example, access to energy, jobs, training and financial resilience).

In the targeted camps, refugees lacked electricity and relied on candles and torches to light their homes, and used three-stone fires or other stoves for cooking, causing severe health issues from smoke inhalation. Local businesses and shops did not have access to electricity and some used costly diesel generators to power their businesses. Also, social spaces and activities were restricted to daytime hours due to safety reasons.

In response, RE4R worked closely with camp residents to investigate their local context and developed four interventions:

- 1. Access to energy:** RE4R partnered with two SHS suppliers to provide affordable solar products, increasing household electrification for lighting, phone charging and entertainment. In total 4,279 SHS were installed. The initiative also created employment opportunities, hiring camp residents as technicians, customer service agents and sales representatives. A community fund with 707 participants provided loans, savings schemes and business support, fostering financial resilience.
- 2. Clean cooking and health improvements:** to address health concerns due to cooking, RE4R collaborated with two clean-cooking suppliers to introduce improved stoves and sustainable fuels. Awareness-raising campaigns and training sessions were conducted to promote the use of the cleaner cookstoves and explain how people could reduce their exposure to indoor air pollution.
- 3. Solar street lighting and safety enhancements:** the project installed solar streetlights to improve mobility and address safety concerns in the camps. Residents decided the locations of the lighting poles, prioritising health centres, water and sanitation facilities, markets and access routes. As a result, 99% of residents reported feeling safer at night. Moreover, businesses extended their opening hours and children gained additional time for recreation.
- 4. Solar power for institutions and business development:** Nyabiheke camp benefited from solar-powered electricity for institutions and businesses, reducing dependence on expensive fuels like diesel. This provided a more stable energy supply, supporting essential services and economic activities.

Altogether, the RE4R project moved beyond basic energy access needs to understand how the project could improve people's quality of life and address other diverse aspirations — for example, improved safety, health, leisure time and income-generation opportunities. However, despite its multidimensional approach, RE4R could do more to overcome the top-down implementation structure. While surveys, interviews and focus group discussions engaged residents, decision making remained centralised.<sup>165,166,167,168</sup>

## Agency

This means communities leading and influencing energy service planning and delivery to enhance their wellbeing. This can be achieved by:

**Fostering new governance structures:** moving from top-down hierarchical structures — for example, government agencies implementing top-down agendas

or providers delivering services or products addressing a single need — to inclusive and equitable governance bodies, ensuring active participation of marginalised people in decision making. However, it is crucial to acknowledge that national agencies may not want to cede power to regional agencies or local organisations. In these contexts, continuous and longstanding efforts from local stakeholders are essential to reach a compromise. Governance bodies must also be diverse

and equitable so that women, people with uncertain migrant status and other marginalised groups feel entitled to present their perspectives and can equally participate in decision making.

**Shifting the focus of delivery outcomes**, changing design and delivery approaches, moving from numbers-driven results to those that focus on the process. Numbers-driven approaches often overlook other

important aspects of projects, such as how they are implemented and the impacts they have on the people involved. This is particularly relevant for projects dealing with energy infrastructure, as outcomes typically concentrate on aspects such as the number of new connections. Instead, more process-oriented approaches focus on other relevant factors with intrinsic benefits, such as community participation, strengthening local capacities and project sustainability (see example in Box 4).

## BOX 4. AN AGENCY-DRIVEN PERSPECTIVE IN PARTICIPATORY ENERGY PLANNING

In 2017, the Nairobi city county government designated Mukuru — a collection of informal settlements in Nairobi — as a 'special planning area', acknowledging the need for an integrated development plan that fully engaged residents in shaping their own future. This marked a significant shift towards an agency-driven perspective in participatory planning, prioritising the active involvement of local communities in decision-making processes.

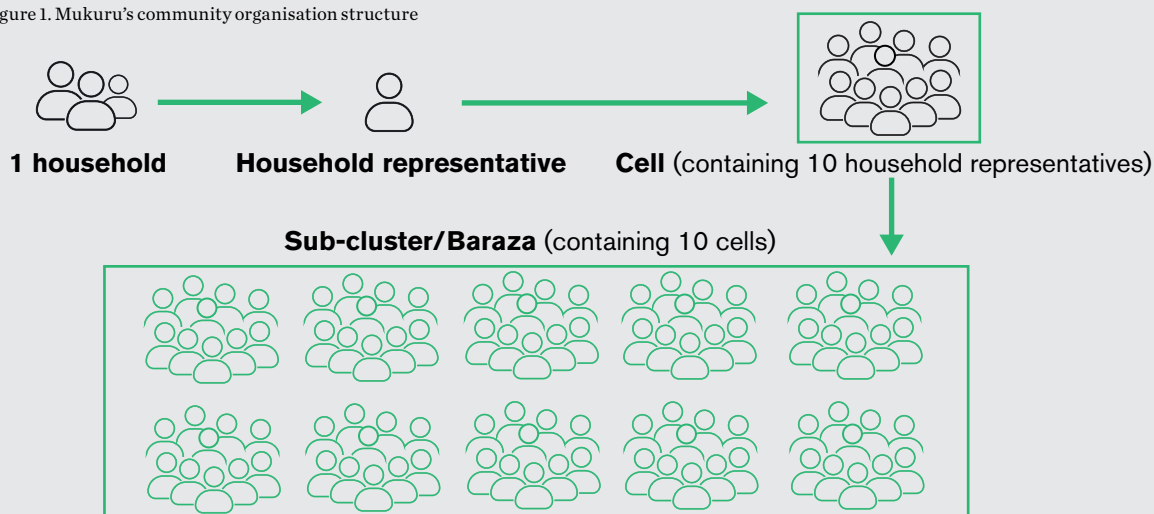
To ensure meaningful and diverse representation, Mukuru's 30 villages were organised into 13 planning segments, each containing approximately 80 sub-clusters called 'barazas'. These barazas were grassroots-level community units where residents could discuss their specific challenges and aspirations. Each baraza was further divided into ten cells, with ten household representatives per cell. (See Figure 1.)

From these discussions, the community elected two local representatives per baraza, who were responsible for conveying the community's concerns and agendas to higher-level thematic planning groups. These groups included a diverse range of participants, such as technical experts, local stakeholders, government officials and community members.

The thematic groups worked across multiple sectors (such as housing, energy, water and health) to formulate sectoral plans for the integrated development plan. The representatives from the barazas played a critical role in ensuring the views of their local communities were directly integrated into the broader planning process. This multi-tiered participatory framework enabled Mukuru's residents to actively contribute to shaping policies and plans that directly impacted their lives. More than 5,000 residents were involved in this process, reflecting the project's success in engaging a diverse and representative segment of the population, including marginalised groups such as women and youth.

This experience reflects a crucial shift in focus in service delivery planning, from purely numbers-based outputs to bottom-up governance structures that channelled the diverse voices of community members. As a result, the integrated development plan reflected the realities, priorities and aspirations of Mukuru's residents.

Figure 1. Mukuru's community organisation structure



Source: Slum Dwellers International (2018) SDI Annual Report 2017. Cape Town; Muungano Alliance (2018) Mukuru Special Planning Area: Integrated Development Planning Process — Draft.

# Looking forward

Informal settlements and camps present distinct and complex challenges rooted in the various forms of marginalisation experienced in both contexts. Residents often face discrimination, inequality and challenges in accessing essential services like electricity, sanitation and housing. They also suffer from insecure tenure, poor infrastructure, exposure to environmental and geographic hazards, and limited employment opportunities. These compounded attributes must be central to any energy planning process, ensuring that energy systems address the specific challenges faced by different groups of people living in each specific context.

Traditional approaches to planning and delivering energy services in informal settlements and camps have often failed to address the complex needs and aspirations of the marginalised communities living there. This study highlights the urgent need for a paradigm shift in how energy solutions are developed and delivered in these contexts. To achieve this, this paper provides a holistic, context-based and community-led wellbeing framing on energy access. This study not only presents this shift as a necessary transformation for the sector, but also forms the basis for our ongoing and future work. By framing energy access through a comprehensive wellbeing lens, we aim to inform and influence energy planning and delivery approaches while shaping a broader agenda for policy, research and practice. To drive this transformation, our work will prioritise the following:

- We will engage with communities and grassroots groups, recognising their essential role in decision making, planning and delivery. We believe that residents of camps and informal settlements must play a central role in shaping their own service delivery models and policies. This will ensure that energy services and policies are designed and tailored to meet the unique aspirations of marginalised groups living in informal settlements and camps. It will also strengthen social cohesion and empower communities to take ownership of energy projects, all of which contribute to the long-term sustainability and resilience of energy systems.
- We will promote equitable partnerships to advance a just energy access agenda, where benefits and burdens reflect the different capabilities of all partners. By embracing collective action and being responsive to the different capabilities of stakeholders, we can foster trust and long-term

commitment. Moreover, shifting the power dynamics will enable marginalised groups to influence energy access debates and policies in ways that genuinely improve their quality of life and align with their long-term aspirations.

- We will advocate for policies and enabling environments that place wellbeing at the forefront of energy planning. This includes championing regulatory frameworks that recognise the capabilities, aspirations and agency of the communities. This includes the vital role of informality in providing access to essential services and livelihood opportunities to marginalised communities living in informal settlements and camps. We will also promote, alongside the communities, energy delivery models that serve the unique capabilities and aspirations of these groups, such as easing conditions for accessing electricity and other critical services. This approach will foster a more equitable and just energy access agenda, ensuring that marginalised communities play a central role in the decision-making process.

To achieve this, we encourage:

- Governments to create appropriate enabling environments that respond to people's realities and provide incentives for private companies and others to act
- Service providers to design more responsive business models that do not exclude marginalised groups and ensure that quality technology and its various pre- and after-sales services reach these groups
- International organisations to mobilise resources for long-term action rather than solely providing short-term relief, and
- NGOs, CBOs and communities to leverage their knowledge and expertise to develop context-specific solutions that can enhance people's capabilities and create opportunities to achieve what they want or like to do, be or achieve.

Only through this shift can energy become a genuine enabler for improving people's wellbeing in informal settlements and camps.

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There are more than one billion people living in informal settlements and camps around the world. Electricity access for these marginalised populations is a significant challenge, with energy delivery models failing to consider their aspirations and unique vulnerabilities. This includes discrimination and inequality, inadequate housing, limited access to city infrastructure, greater exposure to hazards and restricted income-generation opportunities. Additionally, in most cases local actors are excluded from decision making and planning processes. This paper calls for a transformative approach to energy planning and delivery that focuses on a more holistic and context-based understanding of wellbeing, recognises communities as drivers of change, and fosters collective action among residents, local institutions, governments, service providers and international organisations.

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