

# TARGETING INFORMAL HOUSEHOLDS

DIVERSIFYING ENERGY SUPPLY FOR THE POOR IN CAPE TOWN

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## INTRODUCTION

Urban informal settlements are now estimated to account for almost a third of the remaining electrification backlog (DoE, 2014). These areas present unique challenges to the current approach to electrification. For a range of reasons they remain ineligible for their own connection to the grid. Whilst the grid has historically proved the most technically and economically appropriate option for urban areas of highly concentrated energy demand (Rutter and Keirstad, 2012), pursuing a singular technology supply response lacks flexibility to account for diverse contexts.

Service delivery is a topical issue in South Africa, and the subject of many of the citizen protests the country experiences. These are increasingly disruptive and/or violent in their nature, and the political imperative to service informal settlements is growing. South African policy and practise is increasingly shifting in its stance toward informality. From an initial discourse on eradication or formalisation of these areas, there are increasing moves towards a more nuanced accommodation of different settlement types as part of the urban landscape (Tissington, 2010). To this end, several municipalities in South Africa are experimenting with new ways of energy services to informal settlements. The City of Cape Town, in line with national policy, currently pursues grid electricity as the dominant service delivery option, but it is time to review whether a more diversified supply response would be more appropriate. The intention of this paper is to give an overview of some key issues with the current electrification programme with respect to informal settlements, and to generate some practical recommendations for the City of Cape Town.

## UNDERSTANDING INFORMALITY AND ELECTRIFICATION – POLICY PROVISIONS AND PRACTISES

### INFORMAL SETTLEMENTS

Informal settlements play an ambiguous role in the lives of poor people and urban spaces. They are both important access points to the city for the urban poor, but are also sites of tremendous hardships for their residents (Turok and Borel-Saladin, 2016). Regardless, informal households are expected to remain a prominent feature of South Africa cities (HDA, 2014) and, as such, urban planning and service delivery policies need to engage with these challenging spaces. The emphasis in national housing policy has shifted over time from focussing on the top-structure towards the broader notion of creating human settlements and the delivery of basic services. It is imperative therefore that energy service delivery practises continue to evolve to better respond to this housing segment. This section gives a brief overview of informal settlements

in South Africa, their key features and implications from an energy servicing perspective. This is followed by an overview of key national policy provisions in respect of energy servicing informal settlements.

Quantifying the extent of informal settlements in South Africa is difficult. National censuses and surveys are believed to under-represent this household category for a number of reasons. Firstly survey enumerators tend to undercount informal households, as they are difficult to both identify and get access to (Shapurjee et al, 2014). Secondly the census definition counts households as informal if they are shacks and thus includes those shacks on site and service stands (ie not informal in the legal and services sense) as well as those occupying land illegally (Huchzermeyer, 2008).

Informality is a broad and imprecise categorisation of households that have significantly varying characteristics. In the South African context depending on who is using the term, and for what purpose, it encompasses a wide variation of household types. The term may include informally constructed dwellings located in formalised settlements with their own services, informal densification in formal areas, for example backyard shacks, illegally situated households on land not proclaimed for housing, or illegal occupations of inner-city buildings. These obviously have substantively different characteristics from a service delivery perspective.

Against such diversity in conditions and characteristics, the constraints to electrification are highly variable as well. Investments in electricity infrastructure are influenced by the degree of permanence of a household in a physical space, legality, geophysical and site characteristics, as well as the political and social dynamics of settlements. All of these factors are challenging in informal settings. Furthermore, each factor can vary across different settlements, coming together to produce unique contextual experiences of the 'informal' across different spaces. It is this very diversity in contextual characteristics that is part of the challenge. With no single way of characterising informality (Schmidt and du Plessis, 2013; Huchzermeyer and Karam, 2006; Massey, 2013) the term itself becomes unhelpful in understanding the nature of constraints for electrification which include technical, legal, financial or community dynamics.

The term informal is used here as an umbrella term to refer to all households currently excluded from energy service delivery. In Cape Town, as in many metropolitan urban areas, virtually all formal households have been electrified, and the electrification backlog is now predominantly within the category of households here referred to as informal. These households consist of two broad categories— illegal land occupations and backyard shacks. The former, officially termed 'informal settlements', include all households located on land that contravenes planning regulations and is not proclaimed for housing. Typical planning restrictions include being located under power lines, on landfill sites, on floodplains or other areas



with health risks, in areas that are too dense or located outside of the urban edge. As such, they are not eligible for formalisation, either because of legal and land-use constraints or because physical characteristics make the land unsuitable for development.

The second category of informal households, backyard shacks, is a form of rental accommodation erected in the backyards of other households. Although condoned, they are not formally accepted in South African planning laws, and there has historically been no provision made for them in service delivery frameworks, although this is starting to change as various municipalities are embarking on servicing pilots and programmes (Rubin and Gardner, 2013).

Without formal access to electricity, households in Cape Town, as elsewhere, either connect informally or use alternative energy carriers such as candles, paraffin, wood, coal and LPG. In many instances, use of alternative fuels is problematic because of inadequate regulation and enforcement surrounding consumer standards, safety regulations and market access. This situation imposes various negative externalities on households, the City and broader society. Risks include increased fire hazards, fume inhalation, respiratory illness, accidental lethal ingestion (mainly children) and increased localised air pollution (SEA, 2014). Illegal and informal electricity connections also produce problematic issues for both the utility in terms of lost revenue and users in terms of safety and reliability.

The implications of having a large un-serviced population are severe on both the state and its citizens. Alternative fuel use imposes significant costs on government, society and individuals, for example through shack fires. Although impacts are dispersed across many sectors and over time, and are therefore difficult to quantify, we know they are significant. Furthermore the political imperative to extend services to all citizens continues to mount in the form of social instability related to service delivery protests. These are frequently violent and disruptive in nature (Lancaster, 2016). Thus there are a variety of compelling reasons why servicing these settlements cannot continue to be ‘grey-spaced’ in policy terms (Yiftachel, 2009).

## NATIONAL POLICY GAPS WITH RESPECT TO ENERGY SERVICES FOR INFORMAL HOUSEHOLDS

Both human settlements and energy national policy contain notable gaps in respect of providing energy services for informal households. This section gives a brief overview of existing policy provisions. The Department of Human Settlements (DoHS) has two key housing programmes designed to cater for informal settlements. These were the Informal Settlement Upgrading Programme (UISP) and the Emergency Housing Programme (EHP). Both were designed to cater for households in situ, with their current designations as informal settlements. Both include provisions for the delivery of *interim levels of basic services* for



households whilst they await either the formalisation or relocation processes. The logic of providing interim services is important because land formalisation and in-situ upgrading can be lengthy and difficult processes. Households can therefore remain ineligible for permanent engineering services for several years even if approved in principle for upgrading. Interim services are more limited than in the formal Free Basic Services package, the EHP for example specifies one tap per 25 families, and temporary sanitation provision of one toilet per 5 families. There are however, no interim service provisions specified for energy in either of these programmes.

Similar gaps in respect of informal settlements exist in energy policy. The national Department of Energy's guidelines for electrifying informal settlements exclude households situated on servitudes, road or rail reserves, flood-prone areas, storm water retention or detention ponds, private land, unstable land or where there may be any other health or safety hazard (DoE, 2011). Since one or more of these issues affects almost all informal settlements, this policy effectively serves as a blanket exclusion for servicing a significant number of households.

Whilst national human settlements policy has made accommodations for informal settlements (in policy, if not in practise), the same has not been true for backyard dwellings. Government's focus on home ownership has neglected the rental market and provision of other forms of social housing. This has created the conditions for informal rental sub-markets to flourish, notably backyard shacks (Shapurjee et al, 2014). Their presence as a housing sub-category continues to be overlooked in policy. At the national level, human settlements policy regards backyarders as an urban backlog problem, leaving it to local governments to address (Rubin and Gardner, 2013). Energy policy does much the same. Whilst acknowledging the issue (e.g. DoE, 2012), appropriate action is left to local municipal electricity distributors. Concessions are made by the Department of Energy to consider applications to fund backyard connections, but these are very limited in the scope of what they will cover. For example the Department of Energy funds only connection costs and not infrastructure upgrades. Therefore they would only consider applications where the local network can already accommodate the additional demand that connecting backyards would impose on it. This limits the scope to areas not previously electrified, or where current network designs could cater for additional demand posed by backyarders. Since network planning is done to absorb load growth over time, it may not always be the case that backbone upgrades need to be done at the time of connections. But this would depend on a case-by-case basis.

Despite energy policy provisions for both illegal land occupations and backyard shacks, their scope does not currently cover the full range of these informal households.

## INFORMALITY AND ELECTRIFICATION IN CAPE TOWN

In the absence of national policy steering, progress has been left to the municipal level – and various municipalities are developing their own pilot projects and strategies to provide energy services to informal households. This section gives a brief overview of informality in Cape Town, the prevailing approach to electrification and the challenges it faces. In Cape Town, the predominant approach to informal settlements has been to electrify, where possible, with the grid. Over the last several years, the City has overcome a range of constraints specific to informal households. This includes for example technical designs to cater for the specificities of informal structures and irregular and unplanned settlement layouts, overcoming institutional constraints around placing infrastructure on private land and wasteful expenditure as well as developing new supportive legislation – such as the relatively recent draft backyarder electrification policy.

There are approximately 146 626 households in 204 settlements in Cape Town<sup>1</sup>. Of the 204 informal settlements, only 12% are eligible for situ upgrading. Some 63% are awaiting budgets for land transfers or site development. The rest (26%) must be relocated. Seventy percent of those awaiting budgetary support, and 60% of those awaiting relocation are older than 15 years. With relocation sites scarce and the upgrading process slow and expensive, the complete elimination of these spaces is almost certainly unlikely (Misselhorn and Zack, 2008). Since neither human settlements nor energy policy makes provision for interim energy services for these informal households, they have remained without any form of energy access. In addition to informal settlements, the City estimates there are approximately 75 500 backyard structures (CCT, 2015). The latest estimates of the electrification backlog were unavailable from City officials at the time of writing. The 2011 Census indicates that 94% of households recorded using electricity – however this is likely to overstate the number of formally connected households as it may capture households who connect via informal means (for example from connecting via neighbours).

The nature of the constraints utilities face in connecting informal households is diverse across different spaces. There are, for example, geotechnical characteristics of settlements that preclude grid electrification, such as high densities that prevent access ways and space for infrastructure, steep slopes or site instability due to dolomitic soils. The infrastructure itself also lacks flexibility to deal with dynamic and changing circumstances. Servicing infill densification may be contingent on the timelines of operational infrastructure upgrades, depending on existing network capacities. This can leave waiting periods of many years if it needs to align with an upgrade. There are also administrative and legal challenges with regards to gaining permissions to service households on private land, and the need to avoid institutional concerns around

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<sup>1</sup> This data comes from the City of Cape Town's Informal Settlement Development matrix and was accessed from [www.ismap.co.za](http://www.ismap.co.za)



wasteful expenditure. In addition there is, at times, social and community resistance to new projects, as has been experienced with the backyarder servicing pilots.

The planning restrictions preventing settlement on floodplains or under power lines reflect very rational considerations of where it is safe and appropriate for people and developments to be located. However the inherent logic driving the growth of informality is one in which people will seek out marginal areas of land. These are, of course, more likely to have adverse development conditions and/or entail higher site development costs for infrastructure. The financial feasibility of funding higher site development costs, even were land use and tenure conditions ensured, is not clear. The planning approach with respect to informal settlements can be mechanistic and inflexible, unable to respond flexibly to diverse realities on the ground. One, of many, examples - where a settlement with one functional identity transverses two different land-use classifications resulting in arbitrary line of exclusion (from the perspectives of communities) with some households receiving electricity and some not. This produces huge social disruptions.

The issue of connecting additional households to the grid cannot be discussed outside of considerations about the financial sustainability thereof. Subsidising electricity for the poor has become an unwritten imperative for the industry. Since poor households in general do not pay a cost-reflective tariff, the question of how and to what extent their service can continue to be subsidised are key. Business models of municipal electricity departments are changing, and thus the ways in which poor households are funded may need to be reviewed.

There are two key categories of costs with respect to adding new poor households to the grid – capital and operational costs. Although there are national grant allocations to cover capital costs of new infrastructure, the capital costs of servicing sites with geotechnical complexities can far exceed available subsidies. This may call into question the financial viability of doing so. The operational costs of supplying the poor will however far outweigh the initial capital outlays for infrastructure. For a long time the distribution industry has been able to keep retail prices for the poorest consumers relatively low due to various favourable business conditions. These have included:

- cheap bulk electricity from Eskom,
- a substantial base of residential and business consumers to cross-subsidise lower income households, and
- a revenue model linked to sales and an energy intensive economy that has, until recently, produced a stable demand growth for electricity,



Nearly all of these baseline conditions are changing. Prices of bulk electricity from Eskom are rising steeply. Total electricity demand in Cape Town has declined since 2007. In particular, sales to the most profitable market segment have declined most rapidly, whilst sales with the lowest profit margins (during peak periods) have remained strong. Municipalities are charged higher bulk electricity prices by Eskom during peak periods, and yet charge their customers a flat tariff rate. The decline in sales over the last 8 years has been occurring in the most profitable times of the day for municipalities. This trend is likely to continue as more mid to high income residential and business customers invest in self-supply options such as solar PV. The interaction of all these factors are jeopardising the future business models of electricity departments in general, but for the interests of this paper, may also jeopardise the ability to produce surpluses with which to cross-subsidise the tariffs of poor consumers. Even the current cross-subsidy burden is considered unsustainable going forward. Adding more poor households to the grid will be even more challenging.

With respect to energy servicing, it is key that informality be reframed from ‘the housing backlog’, or ‘temporary whilst awaiting relocation’, towards a category of households that must be serviced in-situ. Informal settlements in the City of Cape Town are proving far from temporary. Most informal households are older than 15 years. At the current rate of upgrading, it is quite possible that they will continue to remain in their current locations for many more years to come. Practical service modalities therefore need to be developed that can cater for these households in their current space and state. Many of the advances made in extending the grid to previously excluded informal households, especially more recent ones, are producing progress at the margins, rather than representing solutions that are able to deal systemically with the nature of informality. If the grid, as a supply option, cannot systemically address the range of legal and technical barriers that these households present in-situ, then alternative supply options should be considered.

## **DIVERSIFYING SUPPLY OPTIONS - RECOMMENDATIONS FOR ENERGY SERVICE DELIVERY**

Given the nature of the challenges related to extending the grid to all informal households, it is recommended that a more flexible and diverse planning and technology supply response is considered. An integrated suite of supply options may be able to more comprehensively account for issues of tenure, differing degrees of permanence, relocation plans, physical conditions, as well as social contexts. Experimentation with diversifying supply options has been progressing in different municipalities, with both City of Johannesburg’s City Power and Nelson Mandela Bay municipality’s electricity department embarking on new technology supply offerings to address servicing backlogs in the informal sector.



The distinction between the notion of delivering *energy services* versus a specific energy carrier, namely grid electricity, is important. ‘Modern energy access’ does not have to mean grid electrification. The objectives underpinning energy access policies are not necessarily about access to a technology itself, but rather in the associated improved social and economic outcomes. Like all infrastructure therefore, what matters is the service provided rather than the physical means to do so. A modern energy service is one that is “adequate, affordable, reliable, high-quality, safe, and environmentally benign” (UNDP, 2000: 44). The definition is, notably, independent of fuel or technology and focuses instead on the desired attributes that an energy service should convey. An end-user service like lighting or cooking can be delivered through a variety of fuel and technology supply options. International literature and practise by international donor agencies employ a discourse of *energy access*, acknowledging the diversity of usage patterns and fuel and technology options. By contrast in South Africa, the discourse has for many years firmly centred on electrification as a means of servicing the poor.

This report offers the following recommendations in respect of Cape Town’s energy service policy going forward:

#### Define an ‘interim energy service category’ for informal households

The idea of an interim service category would be to introduce an additional degree of flexibility into the system to overcome current challenges where permanent services cannot be delivered. This already exists in human settlements policies for water and sanitation. The logic would be to offer breadth rather than depth of service, providing a lower level of service for an interim period to mitigate the worst impacts associated with not having access to safe and modern energy services. In so doing, the interim service offering would be displacing dangerous energy carriers, such as candles and paraffin, and improving welfare from using more efficient energy sources than are currently used.

Interim service offerings could be achieved in different ways in different spaces, depending on the context. There are two conceivable technology options, either a load limiting electricity supply together with a safe cooking option, or a bundle of alternative off-grid energy solutions to provide a specific range of energy services. Both have their pros and cons. The former will still not address many of the legal and site specific constraints preventing installation of grid infrastructure. Alternatively decentralised supply options that can be easily moved, and do not have a permanent physical footprint may be more aligned with the current illegal and ‘temporary’ status of settlements that must be relocated, or where site constraints (such as shack density) prevent grid infrastructure.

### Diversifying technology options for long-term service delivery

It is recommended that long-term energy servicing options be diversified to offer different technologies suited to different demand contexts. A bundle of alternative energy carriers and technologies could include LPG or gel fuel stoves with fuel supply, wonder bags, solar lanterns, solar home systems, battery or other storage options, dwelling improvements for insulation and thermal comfort, and energy efficiency measures. Alternative supply options may face social resistance from communities, and this will have to be dealt with proactively and sensitively through participatory planning processes.

### Developing a socio-spatial typology of informal households to plan for energy servicing

Switching from a supply oriented to a more situationally responsive planning paradigm requires more detailed planning information. This requires more a detailed energy-specific socio-spatial typology of informal households to be developed, one that goes beyond the current formal/informal dichotomy. Categorisations of households should be based on the substantive characteristics of households/settlements relevant to energy servicing. This might include existing grid capacity in the area, timeframes for operational network upgrades, geotechnical and site characteristics, settlement densities, land-use specifications, legal status and relocation plans. Based on this mapping and categorisation exercise a more thorough recommendation of supply options can be made – whether interim or permanent services, grid or a bundle of off-grid options etc.

### Reducing peak time electrical load

It is most expensive to supply poor customers at peak periods. A key way in which to improve the financial sustainability of supplying poor households with electricity is to reduce peak time electrical load. This could be through energy efficiency or alternative cooking technologies and fuels, such as LPG – depending on the comparative supply costs to the utility and consumption costs to users.

### Flexible and situationally responsive planning

Informal settlements are complex social spaces and services are highly politicised. Dealing with excluded and marginalised communities produces spaces that are often highly reactive in ways that can be difficult to anticipate. Infrastructure, or the lack thereof, is part of the social fabric and caught up in various conflicts and contestations. It is essential that more flexibility be incorporated into systems approaches of servicing settlements. The rigidity of planning and allocation criteria can, and all too often does, create divisions in communities that can lead to explosive and detrimental outcomes.

## CONCLUSIONS

The electrification programme is based on the foundational assumption that grid electrification, as a supply option, will be suitable for all contexts. However there are currently a range of financial, technical and planning reasons why it can't reach all households. In looking at the nature of the backlog and the constraints these households present, this report suggests that, going forward, it is unlikely that grid electrification will ever be able to deal *systemically* with the full spectrum of challenges that informal households present.

Diversifying both planning and technology responses are recommended. Key recommendations include introducing an interim service category, diversifying supply options to grid and off-grid delivery options, developing a more detailed planning typology of informal households, reducing peak time load and introducing more flexibility into planning responses. Diversifying energy supply options will of course necessitate institutional adaptations. There is an electricity rather than energy department; national subsidies for poor households in urban areas are for electricity connections, and exclude consideration of other supply options. Household energy, as an integrated concept, is an inter-departmental policy problem, requiring involvement of a diverse range of departments including human settlements, electricity, disaster risk management, economic development, health and environmental resource management. It will necessitate a diverse and coordinated response.

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