Modern Energy Cooking Services: An Urban Perspective

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Working Paper Apr/2021

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ESMAP Energy Sector Management Assistance Program

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Executive Summary

By 2050, it is projected that there will be 2.5 billion more people living in cities compared to today, and 90% of this growth will take place across Asia (1.2 billion) and Africa (1 billion).[1] The challenge of providing universal energy access in urban areas is only increasing, due to the pace of urban growth, limits to distribution networks, and numerous policy and technical challenges.[2] Urbanisation in the global South is said to have revealed "a new face of poverty, one in which urban communities cannot access or afford basic modern energy services for their development and empowerment".[3]

Trends relating to urbanisation, electrification, modernisation and the Covid-19 pandemic all point to the importance of developing city-based solutions to meet the UN Sustainable Development Goals relating to energy access (SDG7), poverty (SDG1), health (SDG2), industry and infrastructure (SDG9), inequality (SDG10), consumption and production (SDG12), climate action (SDG13) and, of course, sustainable cities (SDG11).

In this paper, it is argued that the MECS programme can play an even more significant and wide-ranging role in modern energy transitions in Africa and Asia if it embraces urban studies research into the complexity and nuances of contemporary urban life in the global South.

This paper introduces a range of urban studies concepts that may prove useful in understanding the pace and nature of modern energy cooking transitions in cities. These include socio-technical approaches, urban assemblages, everyday urbanism, southern urbanism, and climate urbanism. These concepts invite development practitioners and analysts to reconsider the cities and towns they are working in, to identify the implicit assumptions being made about what constitutes the 'urban', and to explore how an urban focus can drive a more nuanced understanding of opportunities, challenges and theories of change in cities. The concepts prove particularly important in emphasising the potential value of traditional fuels, urban 'pockets' of opportunity, and urban change processes.

A MECS urban research agenda is proposed towards the end of the paper, comprising of internal, desk-based research as well as field research projects to be commissioned in 2021. The MECS Urban workstream is an opportunity to engage in cities with high potential for modern energy cooking transitions, which will in turn provide new and invaluable insight into the pace and nature of these transitions in urban contexts more broadly. The work packages (WPs) relevant to external consultants and research organisations will focus on the relationship between urban life, energy 'access' and cooking fuel choices (WP2) and repair, maintenance and eWaste infrastructures (WP3).

[1] United Nations Department of Economic and Social Affairs - Population Division (2019, p.23).
[2] IEA et al (2020, p.15).
[3] Singh et al (2014, p.339).

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Figure 2 – Dharavi, Mumbai (credit: erin from Evanston)

"Energy poverty is no longer a rural-only phenomenon, and a concerted effort is needed to find solutions."[4]

[4] Singh et al (2014, p.339).

1 Introduction

Half of the world's population (4 billion) do not have access to 'modern energy cooking services', defined as stoves and devices that are clean, convenient, efficient, affordable, and safe to use.[5] Considering this startling statistic, the authors of *The State of Access to Modern Energy Cooking Services* argue that the needs of low-income and rural households have not been adequately accounted for in efforts related to clean cooking transitions in the global South.

It is important to recognise that low-income households and rural households are not one and the same. Despite having greater access to a wider range of modern energy fuels (electricity, LPG, ethanol), a significant proportion of urban populations in the global South continue to cook with biomass (predominantly firewood and charcoal). And while in some instances this may be due to consumer preferences, **affordable and reliable modern energy cooking services remain out of the reach of the 'urban majority'**, defined broadly here as low-income and precarious middle-class households residing in towns and cities.[6] As urbanisation rates continue at pace across Africa, Asia, and elsewhere, the realities of urban life for significant proportions of society are increasingly insecure, challenging and complex. Patterns of marginalisation and exploitation are often reinforced by the circuitry of financial capital, patterns of urban sprawl, and the governance and reordering of urban space. For the clean cooking sector, this means that – despite significant gains related to electrification in urban areas, and rising incomes for urban populations at an aggregate level – rising urban inequalities are slowing and perhaps even reversing the transition to cleaner, more modern cooking practices. While the *State of Access* report may be right to argue that interventions have not adequately responded to the needs of rural populations, the same is also true for the urban majority.

While development *policy* may have an implicit urban bias, acknowledging cities as the principal drivers of industrialisation and economic growth, development *practice* still tends to target rural populations deemed to be more vulnerable, deprived, and/or marginalised.[7] **This paper responds to the pressing need for development practitioners to engage more deeply in urban life and urban change processes**, with respect to facilitating a shift from biomass to modern energy alternatives for cooking. New areas of enquiry are needed if we are to understand the wide-ranging opportunities and challenges that exist in urban and peri-urban areas throughout sub-Sharan Africa (SSA) and South/South-East Asia (SSEA). Geographical contexts, political economies, and cultural factors all intertwine to make the modern energy cooking landscape different from place to place, and from city to city.

In this paper, it is argued that the MECS programme can play an even more significant and wide-ranging role in modern energy transitions in Africa and Asia if it embraces critical urban research and reflects the insights generated around the complexity and nuances of contemporary urban life in the global South. Insights gained about the potential transition in rural settings as opposed to urban settings needs to be qualified with **grounded, site-specific methodologies** that add detail and nuance to what we think we know about the barriers and drivers of modern energy cooking. A focus on urban settings also presents an opportunity to engage different

[5] Energy Sector Management Assistance Program (2020b).
[6] Simone (2018); Karekezi and Majoro (2002).
[7] Marcus and Asmorowati (2006); Battersby and Watson (2019).

stakeholders to those that are often included in either national-level policy debates or discussions among development practitioners. Understanding the capacities of local government and the influencing role of community leaders will be critical to developing relevant pathways for modern energy cooking services.

Municipalities and regional governments are likely to play an extensive role in energy transitions and climate adaptation[8], and perhaps even more so than national governments. In cities, the priorities of modern energy interventions are likely to be different to national strategies, with different implications for these cities and their inhabitants. Important groundwork for the MECS urban workstream was laid by Gamos, SEA and others during the SAMSET project ('Supporting Sub-Saharan Africa's Municipalities with Sustainable Energy Transitions').[9] Briefing notes for municipalities proved instrumental in localising the problem of biomass cooking and providing local actors with the information to facilitate a local transition. Building on this, the MECS urban workstream will seek to collaborate with municipal stakeholders at every stage of the development research process, from mapping existing fuel networks to understanding local energy needs to co-creating strategies for success. It is important to learn *from* cities as much as it is to target cities. This learning process helps us understand the politics of urban energy access and everyday realities of urban life, and provides an opportunity to detach ourselves from developmental logics that may fail to grasp these realities. It emphasises the notion that, in order to meet the objectives of the MECS programme in cities, we must understand how cooking relates to the aspirations, ingenuity, needs, and priorities of urban majorities.

At the heart of the MECS urban strategy is an emphasis on establishing and deepening ties with institutions in target cities. This is not limited to governmental institutions but also to the religious institutions and civil society organisations that contribute to the sociality of the city. These dynamics require a research agenda that engages local decision-makers and produces local and specific data about the modern energy cooking landscape in these urban environments and their surrounding areas. If done right, this engagement, coupled with a commitment to lived realities and human agency, will help the MECS programme negotiate the challenges of external, top-down development initiatives that have traditionally failed to address the major urban challenges in Africa and beyond.[10]

In exploring the important links between modern energy cooking and the urban, this paper has four main components. Section 2 reinforces the importance of an urban approach to modern energy cooking transitions, while Sections 3 and 4 introduce a range of urban studies concepts and research areas that can help to move the modern energy cooking agenda forward. Finally, the paper puts forward a research agenda for a MECS urban workstream, that attends to the urban dynamics that are vitally important to, but are not fully understood within, the clean cooking sector.

[8] Hammett (2020).
[9] https://samsetproject.net/
[10] Croese (2020).

2 The Urban Imperative

In terms of defending the importance of an urban agenda for modern energy cooking transitions, consider the following four trends:

2.1 Urbanisation

By 2050, it is projected that there will be 2.5 billion more people living in cities compared to today, and 90% of this growth will take place across Asia (1.2 billion) and Africa (1 billion).[11] During this time, the percentage of the world's population living in urban areas will rise from 55% to 68%.[12] Many nations will be faced with the complexity of ensuring that the energy and food security needs are met for urbanising populations. Rapid urbanisation can put pressure on existing urban infrastructures - not only the national grid but also the supply and distribution of wood, charcoal, and LPG, as well as foodstuffs - and has the potential to impact the quality and cost of a range of cooking fuels. However, it is also important to recognise that **the relationship between urbanisation and energy consumption can be radically different**, depending on a) the stage of urbanisation in a given country, b) whether energy infrastructures can keep pace with the rate of urbanisation, and c) the household incomes of the urbanising populations.[13] **For much of sub-Saharan Africa, rapid urbanisation, low incomes, and poor energy infrastructures leads to a *reduction* in household energy consumption, whereas in many Asian countries, energy consumption *increases* with urbanisation due to higher household incomes and a greater willingness to pay for more accessible and more varied fuels.[14]** From an urban planning perspective, energy consumption and efficiency (including cooking) are strongly linked to the nature and extent of land-use planning and infrastructural investment in a given area.[15] These findings suggest that understanding the nature of urbanisation is critical for learning about existing cooking fuel choices and practices and the potential for these to change. It is also important to bear in mind that urbanisation is subject to government policy intervention; many countries in Africa and Asia have implemented policies that will dramatically alter the nature of urbanisation processes.[16] In Nepal, for instance, former rural administrative units have been recategorized as municipalities, and some rural areas have been earmarked as 'cities of the future', leading to rapid and often haphazard forms of urbanisation.[17] In 2013, 17.1% of Nepal's populated lived across 58 different 'urban' areas; as of 2019, 56.5% of the population reside 6 metropolitan cities, 11 sub-metropolitan cities, and 276 municipalities.[18] These changes will have a profound effect on the affected populations, and what this means for modern energy cooking in Nepal is a question that remains unanswered.

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[11] United Nations Department of Economic and Social Affairs - Population Division, *World Urbanization Prospects: The 2018 Revision*.
[12] ibid.
[13] Wang et al(2020).
[14] ibid.
[15] Sadownik and Jaccard (2002).
[16] Agergaard et al (2019).
[17] Timsina (2020).
[18] ibid.

Figure 3 – Kathmandu, Nepal (credit: Peter West Carey)

2.2 Electrification

An emphasis on urban households is also essential because electrification rates across the global South have risen dramatically in recent decades, and it is in urban areas where grid connectivity has largely been concentrated. One important implication of urbanisation and electrification in MECS countries is that it provides the potential for immediate adoption of electric cooking among sub-sections of the population. **A wide range of electric cooking (eCook) appliances exist for grid-connected households, while many eCook solutions for mini-grid or micro-grid communities are still in the process of product development.** This means that significant gains can be made in electrified towns and cities, and by increasing awareness of the benefits of electric cooking and developing markets for these products, an urban-orientated strategy has the potential to benefit both urban and rural communities in the future. The solutions and services available today are most relevant for households that belong to elites and the 'non-vulnerable' middle class, both of which tend to reside in urban areas, and often areas where the quality of electricity supply is highest.

As modern energy demand increases and value chains develop within and across cities, the expectation is that electricity and electric cooking appliances become more affordable for a greater proportion of the urban

population. It is already the case that electricity is cost-competitive in many parts of the global South,[19] and yet many urban households across SSA and SSEA continue to cook with biomass. Utility companies are exploring options to increase electricity demand in order to ensure profitability and the development of better-quality grid infrastructure, and cooking presents a significant additional load for the grid. Increasing electric cooking activity in cities will be fundamental to the long-term quality of electricity supplies.

An urban perspective can also provide insight into the *experience* of energy infrastructures, reflecting the notion that energy access is multi-dimensional.[20] For cities with ageing grid infrastructures, many households with connections nevertheless experience issues with the quality and reliability of their electricity supply, and these issues and their cumulative effects may prevent households from cooking with electricity. However, alongside electrification, it is important to recognise the diversity of modern energy cooking fuels on offer in an increasing number of towns and cities across the global South, such as LPG and ethanol. Given that cooking with biomass persists in many urban environments, and the availability of modern cooking fuels is increasing, more attention needs to be paid on the potential transition pathways for these households.

2.3 'Modernisation'

Figure 4 – Mushin Market in Lagos, Nigeria (credit: Omoeko Media)

A third reason for maintaining an urban focus is that it is predominantly in cities where food systems, eating habits, and consumer preferences shift away from what is often referred to as 'traditional' practices. If 'traditional' in this sense refers to the use of ingredients that are locally sourced, cooked in individual households, on simple stoves, and with freely available or cheap cooking fuels, then it is in cities where people become exposed to a much wider variety of foods, fuels, and appliances, as a result of more complex value chains and systems of production and distribution. This may be associated with the rising middle classes, but it also reflects the fact that urban populations may be away from the home for long periods of the day and may switch their eating habits to consume more convenient options. Modernisation thus comprises both a shift in

[19] Energy Sector Management Assistance Program (2020a).
[20] Bhatia and Angelou (2014).

cultural mindsets as well as changes in daily routines and activities. In a recent paper that focuses on aspects of modernising food systems across urban Africa and Asia,[21] we explore the opportunities for the MECS programme in relation to street food, fast food, restaurants and informal food services; changes in dietary choices and eating habits; and food-related technological innovations. These trends are more pronounced in urban areas as opposed to rural areas, and **although modernising food systems capture the attention of policymakers and development practitioners from the perspective of nutritional value, sustainability, and economic development, the energy implications and the implications for the culture of cooking are rarely acknowledged.**[22] As the MECS programme is geared towards the provision of modern energy cooking services for the masses, it is necessary to recognise the importance of the commercial and informal food sectors in the global South, which are contributing to a reduction in cooking practices at the household level. From an energy perspective, these trends require significant attention and understanding the urban dynamics of these changes is critical.

Figure 5 – Downtown Phnom Penh (credit: Francisco Anzola)

2.4 COVID-19

The African Development Bank (ADB) recently published findings related to the socioeconomic impacts of COVID-19 in Ethiopia, Malawi, Nigeria and Uganda.[23] While the percentage of urban and rural households reporting a loss of income were relatively similar, albeit alarmingly high, there were significant differences in coping strategies deployed by urban and rural households. In 3 of the 4 countries, a higher percentage of urban households reported that they:

- relied on savings
- reduced food consumption
- had help from family members.

[21] Scott et al (2020).
[22] ibid.
[23] Josephson (2020).

It is important to stress that these findings do not diminish the impact of the pandemic on rural areas - after all, fewer rural households may have had savings to rely upon, and may be too remote to receive assistance. What this research does show, however, is that the pandemic has had a significant impact on incomes and food consumption patterns in cities, and it is important to understand the impact of this on modern energy transitions alongside any other protracted effects of the pandemic in cities. In a forthcoming MECS publication**, Brown and Batchelor explain how the interlinkages between gender inequality and energy poverty are magnified in urban areas affected by COIVD-19, due to issues concerning density, constraints on mobility, tenure insecurity, health risks, and a lack of resilience built into the urban system[24].** Across Asia's megacities, the pandemic has shed further light on the inadequacy of basic services, health services, and infrastructure for the needs of the majority of urban residents.[25] The pandemic and subsequent lockdowns have increased rates of poverty, exclusion, and vulnerability,[26] and we must understand how these trends will impact food and fuel choices, in terms of what remains affordable and available**. It is expected that as many as 150 million people will fall into 'extreme poverty'**, which has become less of a rural phenomenon in recent times.[27] Moreover, it is widely assumed that local governments will be vital actors in the recovery and development responses of the post-Covid-19 world.[28]

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Energy transitions play a decisive role in the urban experience and in determining pathways for urban change.[29] No longer understood in binary terms (access/no access), energy access is widely understood to be multi-dimensional, reflecting a range of factors such as availability, capacity, variability, and changing patterns of affordability. **Urban scholarship is positioned to make an important contribution to this re-framing, examining the subjective and highly contextual experiences of energy, energy infrastructures, and energy consuming practices in cities**. An urban perspective helps us understand how cooking technologies and services integrate into the patterns and routines of everyday life, and how they respond to individual and collective needs that change over time, depending on context. Such a perspective is also important in understand how these technologies circulate in a given city, examining networks of supply, distribution and knowledge sharing, and what comes of these technologies amid processes of repair, maintenance, adaptation, appropriation, and reuse.

Overlooking not just the lived realities of urban populations, but also the specific spatial arrangements, modes of governance, urban economies, and relations of power across and within specific cities, is no longer an option for the clean cooking sector and for adjacent development agendas driven by health, poverty, and environmental concerns.

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[24] An early draft is available at https://mecs.org.uk/wp-content/uploads/2020/07/CHEEG-Covid-recovery-strategies-Final.pdf
[25] Nixon et al (2020).
[26] ibid.
[27] The World Bank, 'Food Security and COVID-19', 8 July 2020.
[28] Saiz (2020).
[29] Rutherford and Coutard (2014).

3 A Development Perspective

This section looks at how a development perspective tends to be applied in urban contexts, and specifically in the context of clean cooking. It is important to recognise the potential limitations of a developmental approach in grasping urban realities and urban change processes.

3.1 Urban transitions: energy and cooking

The clean cooking sector, in its bid to transition households away from biomass fuels and towards modern energy alternatives, has traditionally focused on rural rather than urban populations. Like much of the international development sector, a rural focus aligns with a recognised need to reach the most remote, the most vulnerable, and the poorest communities in the global South.

Predominantly intended for rural areas, improved cookstoves (ICS) have been the primary focus of the clean cooking sector over recent decades. ICS advocates argue that these stoves allow communities to cook with locally available biomass fuels but in a more efficient, less polluting manner. However, if we analyse ICS data in urban areas, in terms of usage and household attitudes towards the stoves, we find that ICS are often a poor fit for urban contexts, where access to modern energy (electricity, LPG) is much more widespread (see Figure 6). As electrification rates rise further and modern energy cooking devices become more available and more affordable, ICS will likely become less desirable in urban contexts.

	Cooking fuel, urban households (%)*			Additional Information
	Traditional Biomass	ICS	Electricity /LPG	
Bangladesh	24%	3%	73%	Vast majority of the national population are unwilling to pay for an ICS
Cambodia	15%	35%	66%	97.2% of urban households have access to grid electricity
Myanmar	15%	25%	60%	Two thirds of grid-connected charcoal users are not willing to pay for an ICS
Zambia	67%	0.5%	33%	More than half of the national population are unwilling to pay full price for an ICS. In urban areas, this is largely due to a lack of need.
Rwanda	34%	64%	2%	Access to electricity has increased from 13% in 2012 to 43% in 2018, which is likely to transform the cooking landscape in Rwanda

**Percentage of households that use these fuels for their main cookstove (except Cambodia, where the question was asked in relation to any cookstove used within the household)*

Figure 6 – Limited role of improved cookstoves in urban clean cooking transitions (The table uses data gathered from Multi-Tier Framework reports for the listed countries).[30]

[30] The reports can be found at: https://openknowledge.worldbank.org/handle/10986/17456

Therefore, when thinking about cooking transitions in towns and cities, it is important to look beyond the business-as-usual approach to clean cooking, and instead turn attention to the wide variety of clean cooking fuels available in urban contexts. In recent years, a vital space has opened around the use of electricity, LPG and other forms of clean energy (ethanol, bioLPG) to meet the sector's objectives. These modern energy fuels lend themselves to urban environments, where modern energy infrastructures are more concentrated, better developed, and take on greater complexity through different urban informal economies. Advocates of ICS see the stoves as an essential interim phase of the transition to clean cooking, and particularly in cities where the quality or affordability of modern energy is compromised. However, this view fails to recognise the enormous strides taken by the energy sectors of priority countries towards renewables and grid electrification.

> A focus on improved cookstoves in urban areas compromises the efforts of utility companies to boost demand and improve the sustainability of their energy distribution

A strategy that focuses on expanding the use of ICS may even have a detrimental impact on the future of clean cooking in urban contexts, compromising the efforts of utility companies in SSA and SSEA to boost demand and improve the sustainability of their energy distribution. Funding and investments for improved biomass stoves also reduces the incentive for governments and donors to invest in the expansion and maintenance of the electricity grid infrastructures. Clean cooking strategies should not be limited to the question of whether urban communities can transition to clean energy today, but rather they should focus on *how best* to transition these communities overall, given the availability of different modern energy fuels in different urban contexts.

Just as ICS are seen by some as an integral part of a transitional phase from biomass to modern energy cooking, urbanisation itself is also widely associated with a transition in cooking practices. As stated above, it is in urban centres where households can access a wider variety of cooking fuels and devices. Household incomes in built-up areas tend to be higher on average and deposited more regularly, particularly compared to rural communities reliant on annual harvests for their earnings. However, we have also noted how urbanisation can reduce energy consumption, particularly in contexts with poor energy infrastructure and among low-income urban communities. The same is true for food systems, and it has been documented how urban sprawl can be a contributing factor to food shortages.[31] It is not uncommon for urban households to still suffer the burden of time-consuming fuel collection and stove preparation[32], and urban living can also present challenges that constrain, inconvenience and endanger women.[33] As domestic cooking continues to be a gendered activity dominated by women, these challenges only complicate the transition to modern energy cooking in urban environments.

In the classic text *Expectations of Modernity*, James Ferguson criticises the tendency to equate urbanisation processes in Zambia (and Africa more broadly) with simplistic and somewhat misguided ideas related to

[31] Saghir and Santoro (2018).
[32] Westphal et al (2017).
[33] Salahub et al (2018).

modernisation, industrialisation, de-tribalisation, progress, and African 'emergence'.[34] While the book is two decades old, it remains a valuable resource for thinking through historical and more contemporary urban change processes in the global South. By adopting a historically informed, anthropological view of urbanisation in the Zambian Copperbelt, Ferguson's work shows why a nuanced, localised understanding of urban life is necessary when assessing the potential for modern energy transitions in specific towns and cities:

> *The script of Zambian 'emergence' via industrialisation and urbanisation has been confounded by more than two decades of steep economic decline. According to the World Bank, per capita income in Zambia fell by more than 50 percent from 1974 to 1994 (...), leaving Zambia near the bottom of the World Bank's hierarchy of 'developing nations'.*

Economic decline of this nature is not unique to urban areas, but Ferguson argues that structural adjustment programmes[35] "deliberately aimed to reduce urban living standards, in the belief that "high" urban wages and food subsidies had produced an "urban bias" that had "distorted" the economy".[36] He continues:

> *The so-called rural-urban gap was largely illusory and had in any case been closed before the harsh austerity measures were applied to "correct" it (...). The evidence is overwhelming (...), "not only that urban poor have become much poorer in many countries, but that their lives have become an almost incredible struggle".*[37]

Figure 7 – Lusaka, Zambia (credit: Lighton Phiri)

[34] Ferguson (1999).
[35] All 14 MECS priority countries have experienced structural adjustment programmes, which have sought to reduce national debt through market liberalisation and a reduction in government spending, often impacting investment in energy, infrastructure, and jobs
[36] ibid., p.10
[37] ibid., citing Potts (1995, p.247).

Over the course of the last 60 years, energy infrastructures have become increasingly fragmented and compromised, no longer functioning as completely as originally intended.[38] The 'developmentalist' state has in many places been replaced by or merged with varying forms of the 'neoliberal' state[39], emphasising a reduction in public spending and investment that impacts the maintenance, expansion, and upgrading of energy systems and other urban infrastructures. Energy is also impacted by other structural factors, such as high urbanisation rates, economic and urban decline, and geopolitical insecurity.

In light of this, how can urbanisation processes be interpreted for the purposes of improving access to modern energy cooking services? **Urbanisation does not equate to industrialisation nor modernisation, and income inequality in cities can be so extreme that it renders rural/urban comparisons largely futile**. These perspectives up-end the developmentalist mindset, no longer conceiving of urban areas as the spatial realisation of development and progress, but as sites of enormous, complicated, and compounding development challenges.

In the two decades since Ferguson's book was published, sub-Saharan Africa has emerged in some development circles as "the continent of the future",[40] and many of its urban centres as the "cities of the future".[41] The drivers of this latter discourse reflect three ongoing developments, a) the demographic opportunity represented by the "**youth bulge**", which is argued will lead to a boom in economic activity on the continent while Western countries deal with increasingly ageing populations;[42] b) a growing obsession in business and finance sectors with **emerging markets** as the location of future growth and profit;[43] and c) the "**digital revolutions**"[44] in African cities, that some suggest are leading to better education, health and poverty outcomes.[45] However, such optimism needs to be approached with caution. Contemporary urbanisation processes across much of Africa are unfolding under *different* conditions than those that underpinned the Western experience of urbanisation, through which these ideas of development and progress are formed. Little attention is paid, for instance, to the ways in which digitisation and marketisation may worsen existing inequalities, favouring corporations and urban elites over the wider urban majority. The growth of youth populations also runs into challenges related to insufficient job creation and limited resources, and so the outcomes of these trends remain uncertain and unpredictable. How much one reads into these discourses is thus a matter of debate (see Section 4.3 for more on digital economies), and urban scholarship tells us that new kinds of urban reality are emerging in Africa, and the future of its cities may be far more modest, ordinary, or even troubling than these urban 'fantasies' suggest.[46]. Together, these

Income inequality in cities can be so extreme that it renders rural/urban comparisons largely futile

[38] Stephen Graham and Simon Marvin, *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition* (London: Routledge, 2001).
[39] Sirohi (2017); Gellert (2019); Singh and Ovadia (2018).
[40] Planete Energies (2016).
[41] Zeiderman (2008); Bafana (2016).
[42] see Page et al (2019).
[43] Fokuo and Ochieng (2020).
[44] Ward (2014).
[45] ibid.; Afutu-Kotey and Gough (2019).
[46] Myers (2018).

developmental and urban perspectives **highlight the ever-changing nature of urban political economies, and we must expect these changes to impact the nature and pace of modern energy cooking transitions**.

In recent decades, cities in South and South-East Asia have seen the kinds of infrastructural investment and patterns of urban development that these optimistic visions of urban Africa are predicated on. As Simone and Pieterse argue, "Asia is seemingly prefiguring what the tiny African middle classes are aspiring to, even if the official imaginary is the cleaned cityscapes of Dubai and Singapore".[47] However, the authors go on to argue that, in both African and Asian contexts:

> *"Public investments earmarked for network infrastructure systems will increasingly be captured by urban elites and middle classes whose standards for 'quality access' are rising in tandem with their disposable incomes but always lagging behind their aspirations. The fiscal effect of this dynamic is that* ***fewer resources are available to address the profound lack of infrastructural backbone that should be inserted into popular neighbourhoods and large hunks of the city****".*[48]

Critical urban scholarship points to how economic growth has been largely unequal in cities of the SSEA regions, leaving some 'behind' while others are more directly excluded to make way for the city of the future to emerge.[49] At the same time, others have shown how "emergent urbanisms" in Asia have "progressive potential",[50] where privatised urban development may be less about the eradication of public space and more about increased autonomy and liveability – and not just for urban elites. Pieterse (2015) in fact provides a range of scenarios for urban futures in Africa and Asia and, while insisting that the 'status quo' holds little hope for the urban majority, **the right investments (mini grids, localised economies, appropriate technologies, ecosystem renewal) *can* lead to more affordable and inclusive cities**.[51] What these competing perspectives suggest is that we need to understand the nature and implications of emergent urban processes in priority countries, particularly in relation to energy, clean cooking, and related sectors such as employment opportunities, food system changes, and investment priorities.

3.2 Beyond the urban/rural binary

By highlighting the different possible trajectories of and contextual factors driving urban energy transitions, it becomes implausible to think about cooking transitions according to homogenised 'urban' and 'rural' classifications. An emphasis on urban/rural differences – whether in relation to opportunities or challenges of a MECS transition - often relegates the importance of other important contextual differences, that may be region-specific, nation-specific, or city-specific, or reflect hyper localised interactions between people and the (built) environment. Traditionally in the fields of development and energy, rural communities are classified as having limited income opportunities, requiring off-grid solutions and either subsidised services or highly flexible financing arrangements (or both). In contrast, 'urban' solutions tend to be more 'market-based', as a result of higher average incomes, greater availability of goods and services, and proximity to grid infrastructure. In these

[47] Simone and Pieterse (2017, p.43).
[48] ibid., p.44
[49] Rigg (2016).
[50] Hogan et al (2012).
[51] Pieterse (2015); Simone and Pieterse.

contexts, it is sometimes argued that urban strategies should focus more on marketing and awareness raising, which assumes that urban populations have the means – but not necessarily the incentive or knowledge – to transition towards the intended development outcome. We have already seen that lived realities are far more complicated and diversified than the urban/rural binary allows. **Urban and rural classifications make it difficult to think about differences within and across cities, with respect to fuel choices, energy access, and cooking practices, and thus opportunities to facilitate transition may be overlooked on both sides.**

The concept of the 'peri-urban' is often used to take care of the uncertainty of this middle ground between rural and urban. The 'peri-urban interface'[52] denotes the hinterlands of cities that become resource pools and opportunities for urbanisation, as a result of growth and displacement in the urban centre.[53] From an energy perspective, peri-urban areas may lack the energy infrastructure of the inner city, and settlement in the area may outpace the expansion of formal energy services, and thus informal and ad-hoc solutions dominate. In peri-urban areas, rural lifestyles (broadly defined) are disrupted by a largely irreversible growth of the built environment. But to what extent does the rural, peri-urban, and urban categories hold as a means of understanding urbanisation and urban livelihoods? And how useful are these categories for understanding the potential challenges and opportunities for cooking transitions? Changes to peri-urban areas can take dramatically different forms, and so the term itself tells us little about the opportunities and challenges, drivers and barriers of modern energy cooking transitions in these contexts.

As Agergaard et al rightly state, the "nature and pace of urban transitions" also vary considerably as a result of rural-urban migration dynamics and the changing conditions of rural areas.[54] The supposed boundaries between urban and rural can also become blurred by the continuation of traditional practices in urban settings. For instance, in research focusing on cooking fuel choices in a low-income neighbourhood of Kampala, Uganda, Georg and Jones (2016) explain how the urban can often be an extension of the rural for communities that retain a social and cultural connection to it:

> *"Kitintale residents are only a generation of less removed from rural villages, and they have replicated and reproduced many practices from their village life. […]* ***Conventional consumer values are unlikely to be drivers or considerations in the strong family-centred lives of the Kitintale residents****".*[55]
>
> *"Broad statements about the ubiquity and pace of urbanisation across Uganda are shifting the industry away from a relevant fact: in some informal urban settlements, even though individuals and families belong to a growing urban community, they still perform a rural lifestyle****. Migration to the city, in this case, is not symbolic of social mobility, but an indication of the necessity to find a livelihood*** *that provides a largesse to be shared back with families in the villages."*[56]

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[52] Atkinson (1999).
[53] McGee (2005).
[54] Agergaard et al.
[55] Georg and Jones (2016, p.243).
[56] ibid., p.244

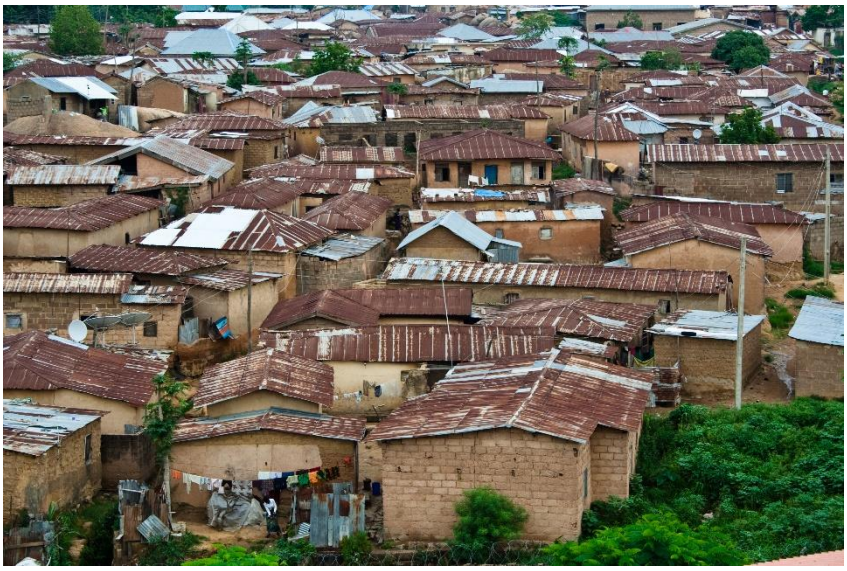

Figure 8 – Jos, Nigeria (credit: Andrew Moore)

Changes to peri-urban areas can take dramatically different forms, and so the term itself tells us little about the opportunities and challenges of modern energy transitions in these contexts

Within urban studies, debate exists as to whether 'the urban' is better understood as a global phenomenon, consisting of a set of practices common to built environments regardless of context, or as an umbrella term for 'urbanisms' of different forms, processes, and contexts. While both sides of the argument may emphasise the points of difference between rural and urban livelihoods, the latter is better positioned to take account of local contextual processes where the boundaries between urban and rural may be blurred. Concepts such as neoliberalism, privatisation and globalisation can provide important explanations for urban changes taking place throughout Africa, Asia and beyond, but these processes can be understood in two different ways: a) by their abstract, fixed definitions, or b) as they are experienced in people's everyday lives. Development discourse tends to favour the former when discussing the dynamics of modern energy in broad terms (e.g. urban vs rural), as it provides a level of clarity when discussing technological solutions, market barriers and opportunities, financial implications, and public/private sector involvement, all of which may seem applicable to very different contexts. However, for the purposes of understanding fuel choices and cooking practices in cities, it is the second perspective that proves the more insightful. Ruddick et al refer to this as "a social ontology of the urban" or, in simpler terms, "urbanisation is an open process determined […] by actual people making the world they inhabit".[57] From this viewpoint, **urban/rural differences are locally produced, rather than economically, politically, or spatially defined.**

Nevertheless, it is important not to ignore the very stark urban/rural differences highlighted by statistical data on modern energy cooking. Electrification rates, charcoal consumption, and modern energy appliance ownership tends to be heavily skewed towards urban areas across MECS priority countries in Asia and Africa. However, an urban studies perspective teaches us to seek qualification of these statistics and how they should (or should not) inform development policies and strategies. Consider the following statistic:

[57] Ruddick et al (2018, p.388; p.399).

60% of urban households in Myanmar use modern energy to fuel their primary cookstove, compared to just 11% in rural areas.[58]

While this rightly suggests that people living in urban areas tend to have far greater access to modern energy fuels and cooking services, is there anything we can say that definitively applies to urban households but not rural households? What incentives do the other 40% of urban households have to transition in the future? How many of the 60% will revert back to biomass alternatives, either out of choice or necessity? How often can these primary cookstoves be used, and are other forms of energy required? In which cities and districts are the 60% located? What do the 60% say to their families, friends, and colleagues about their cooking practices?

Cooking transitions need to be understood in relation to complex, interrelated urban systems: energy, food, water, digital, finance

At the same time, scholars have sought to conceptualise the 'urban experience' as it relates specifically to contexts in the global South. In doing so, urban scholarship has moved beyond definitions of the urban that distinguishes it from the rural, and instead it situates contemporary processes of urbanisation as they relate to low- and middle-income countries, often grappling with complicated legacies of colonial subjugation and post-colonial change, and holding a relatively disadvantaged position in today's global economy. **Southern urbanism**, for instance, distinguishes many of the cities in the global South from cities in 'the West' that developed through empire and industrial and financial capitalism. Schindler argues that Southern cities are more likely to function in "discontinuous, dynamic and contested" ways, in part due to the fact that urbanisation is (in relative terms) a more recent phenomenon, intersecting in complex ways with colonial rule, globalisation, and substantial changes to the global economic system.[59] For instance, it is said that 70% of Africans live below the global poverty line, and yet 40% have access to the internet, leading some to argue that the digital economy may allow African countries to "leapfrog development", while physical urban infrastructures struggle to cope with increasing population sizes.[60] This perspective also holds significant implications for modern energy transitions in these cities. Schindler argues that there is no single point of origin to explain urbanism in these contexts; categories of political economy provide neither the structure nor the context to understand urban realities. This leads us to foreground the complex and embedded nature of existing urban systems, and this makes the notion of 'transition' a difficult one to unravel.

A range of other concepts such as **informal urbanism**,[61] **occupancy urbanism**,[62] **bypass urbanism**,[63] and **climate urbanism**[64] are all distinct from one another and yet they all emphasise the ways in which history, multi-layered agency, and local political economies are all transforming urban environments across the global South. Each of

[58] Koo et al (2019).
[59] Schindler (2017, p.54).
[60] Ajanaku (2021).
[61] Roy (2005).
[62] Benjamin (2008).
[63] Sawyer et al (2021), discussed below).
[64] Castán Broto and Robin (2020).

these concepts have implications for how we perceive of a modern energy cooking transition taking place from city to city. These processes depict **the changing nature of formal/informal boundaries, centre/periphery relations, top-down and bottom-up development approaches, and the contested nature of 'right[s] to the city', today and in the future**. Understanding the logics behind these processes - and their implications for modern energy cooking - inevitably requires a focus on everyday realities in individual cities. A general understanding of the differences between 'urban' and 'rural' will prove limiting, simplistic, and not always applicable to specific contexts.

Bypass urbanism is a recently conceived term that emphasises the inequity of urban change processes, whether it be linked to climate change or other political, financial, and/or cultural logics of urbanisation. Writing about Kolkata, Lagos and Mexico City, Sawyer et al illustrate how urban peripheries become the focus of investment, planning and infrastructural development, while the greater developmental challenges in the urban centres are ignored and (literally) bypassed. Due to issues of poverty, informality and planning complications, bypass urbanism looks to the peripheries to provide more affluent residents with modern urban enclaves (ibid.). This has significant implications for how we understand the potential of a MECS transition in cities experiencing this form of urban development. Namely, it highlights the ability and desire among policymakers to bypass, ignore, and overlook populated urban spaces where the developmental challenge is perceived to be too great. In areas with aging grid infrastructure, or dominated by illegal electricity connections, or even areas deemed too rundown to consider redevelopment, the lack of investment stands only to slow down (if not reverse) the potential transition to modern energy cooking.

Given the wide-ranging conditions of urbanisation detailed above, it follows that there are very few inferences we can definitively make about the boundary between urban and rural, except perhaps the size and density of settlements and the diversification of economic activity**. Localising our understanding of the urban is important if we are to view households as more than just consumers of energy, food, and other goods and services. Social practices and values, cultural norms, and societal power structures all matter when it comes to accessing, consuming, and benefiting from modern energy cooking services.**

3.3 Inequalities and aspirations

Modern energy usage has tended to be most concentrated among urban elites and a cosmopolitan middle class, whose income levels are sufficient to allow for energy-intensive lifestyles, which in turn lead to an increase in demand for reliable, high-quality, clean, modern energy.[65] In contrast, the 'urban majority' tend to live a more precarious existence, relying on a heterogenous mix of networks and everyday practices to mould the city into a way that works best for them.[66] **Low-income households and precarious middle-class households have traditionally been left out of policy agendas dedicated to modern energy transitions**.[67] In comparison to urban elites, these populations have contrasting energy needs, and in order to understand the role of MECS in urban

[65] Castán Broto (2019).
[66] ibid.; Abdou Maliq Simone.
[67] Karekezi and Majoro.

majority neighbourhoods, it is important to understand how these needs and everyday practices affect choices and perspectives around cooking, consumption, and energy access.

In many respects, it is inequality that defines the contemporary city, whether in the global North or the global South. While many cities are experiencing an increase in urban elite populations, conservative estimates put the global 'slum' population total at 1 billion people.[68] It has been argued that such estimations significantly under report the level of deprivation in cities today.[69] The urban poor are not confined to areas typically classified as 'slums', and the research methods and tools used to understand the scale and severity of urban poverty are outdated and inadequate, initially designed with rural poverty in mind.[70] The rate of urbanisation is such that it has revealed "a new face of poverty, one in which urban communities cannot access or afford basic modern energy services for their development and empowerment".[71]

And yet, an explicit focus on 'urban poverty' can be deeply problematic, if it is understood a) as a singular, universal problem, b) without exploring the complexities and highly contextual conditions of contemporary urban life.[72] In addition, we must be cognisant of the fact that limited energy access is never confined to households defined as impoverished, and the social and economic fabric of the city make this a reality for large swathes of the urban majority.

> *"Domestic energy deprivation is an inherently spatial phenomenon: it arises out of the interaction between social inequalities and built formations while extending beyond income poverty".*[73]

Traditionally, urban studies has operated on two planes; one that focuses on modernity and innovation in cities of the global North, and one that concentrates on applying developmentalism in cities of the global South, defined by their levels of poverty, violence, and disorder.[74] While this divide is still present within the discipline, critical urban scholarship has sought to address this imbalance of urban knowledge production, in order to **understand cities on their own terms, and in relation to different forms of modernity, urban sociality, and urban life.**

Efforts to facilitate a transition to modern energy cooking must understand the intellectual limits of developmentalism, and the design of projects should instead derive from a detailed understanding of everyday practices and people's own perspectives.[75] We must focus less on how modern energy (cooking) transitions can help to address the alleged 'ills' of urban society – poverty, slums, illegal activity - and more on how these transitions can be integrated to enhance "human flourishing" in the city.[76] The point here is **that 'flourishing' or 'prospering' are terms that are difficult to define without deep engagement with the communities in question**.

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[68] Kuffer et al (2019).
[69] ibid.
[70] Lucci et al (2016).
[71] Singh et al.
[72] Pieterse (2010, p.205).
[73] Bouzarovski and Thomson (2018, p.696).
[74] Robinson (2006).
[75] Mbembe and Nuttall (2004).
[76] Pieterse (2010, p.206).

Instead of assuming to know how poverty can be "cured" through developmental intervention, it is necessary to ask: do these communities welcome external intervention? What kinds of intervention are desirable? And to what end?

This shift is far from trivial. Imperatives of development such as tackling poverty, expanding energy access and reducing household air pollution, should be used to drive local community engagement**, but it is these local engagements that should shape how we as development practitioners understand local contexts, how we design interventions, and how we implement those interventions.** A more detailed understanding of urban lives and livelihoods allows us to concentrate interventions in areas where the health impact of cooking with biomass is likely to be more pronounced (densely populated areas: high-rise buildings and informal settlements, for instance), where the local demand for modern energy fuels and appliances is strongest, and where modern energy solutions can be integrated into existing routines, livelihoods and institutional arrangements in the city. Identifying these sites should be the first step towards engaging with the communities that reside there.

Naturally, what is aspirational for one country, one city, or one community may be undesirable in other contexts, and will be related to fuel cost, performance, availability, and a host of socio-cultural factors. In the clean cooking sector, there is an existing appreciation that the 'aspirational fuel' for communities tends to differ from place to place. In Myanmar, for example, electricity and electrical appliances are highly sought after, despite relatively low levels of electrification and problems with the quality of grid supply. In contrast, across parts of sub-Saharan Africa, LPG tends to be the aspirational cooking fuel among low-income consumers.[77] But as well as identifying aspirational fuels and appliances, we must ask: what everyday conditions would have to change to allow for the purchase of aspirational fuels and associated products? What are the less familiar technologies that *could* be aspirational if only they were better known? And how do cooking fuels, appliances and practices relate to aspirations in the city more broadly? What is deemed essential for human flourishing, and where do priorities lie?

What is aspirational for one country, one city, or one community may be undesirable in other contexts

Figure 9 – Addis Ababa (credit: Sam Effron)

[77] Bruce et al (2017).

3.4 Community Energy Initiatives

> *"Although most people without access to sustainable energy services live in rural areas, the challenges of energy access in cities should not be overlooked. Providing electricity to 108 million urban dwellers currently without access has been challenging due to rapid urban growth, to fragile distribution networks and because the vast majority of people without energy access in cities live in informal settlements".*[78]

Given the significant challenges involved in providing modern energy services and solutions to low-income and marginalised urban populations,[79] one set of solutions that has gained traction in recent years is the concept of 'community energy'. While it is true that these populations could be served by modern energy cooking fuels other than electricity – such as LPG and ethanol – community energy initiatives tend to revolve around sustainable and affordable forms of community electrification that help to tackle energy poverty as a whole, and not just related to cooking. Electrification provides populations with greater access to lighting, mobile phone charging, modern heating solutions, and modern entertainment (televisions, etc) as well as clean cooking. While diverse in form and scale, community energy initiatives are also designed to decentralise energy provision and thus increase autonomy, independence, and collective action in target communities.

> Urban (and rural) community initiatives have an essential role to play if the goal of universal access to modern energy is to be achieved

Community energy initiatives follow a distributed electricity generation model and, in theory, are designed to optimise generation to suit local needs, protect against failures of weak centralised grid systems, provide opportunities for small investors, and ensure direct customer involvement.[80] These additional benefits are important, reflecting the notion that a 'community' is more than a location or a group of individuals; it signifies a shared sense of local history and a basis for local political expression.[81] Community energy initiatives are therefore often classified as bottom-up approaches to modern energy provision. However, a clear distinction needs to be made between *process* - who owns, participates in, and makes decisions about the system? - and *outcome* - who is the system for?.[82] Without due attention to processes, community energy initiatives can be implemented without understanding local contexts, and thus worsen the conditions they are well-placed to alleviate.

When it comes to literature relating to modern energy cooking solutions, the urban/rural binary can often be used in place of grid/off-grid solutions. However, with a significant gap between grid connection and electric cooking in cities, **community initiatives that allow for distributed electricity generation may have an important role to play in urban cooking transitions, and an essential role if the goal of universal access to modern energy is to be achieved**. Increasingly, mini-grid developers are looking to urban and peri-urban regions as sites of

[78] To (2020, p.213).
[79] IEA et al.
[80] Manfren et al (2011).
[81] Lai (2019).
[82] Wyse and Hoicka (2019).

operation as opposed to rural areas, as a more densely populated community with higher average incomes increases the viability of the business model, and thus the sustainability of mini-grid solutions (Deign, 2020).[83]

CESET (Community Energy and the Sustainable Energy Transition[84]) is a new project operating in Ethiopia, Malawi and Mozambique, and is designed to place local communities at the heart of energy transition strategies. This recognises the importance not only of community participation and buy-in to modern energy interventions, but also of the role of community energy in national energy systems. Crucially, CESET is not limited to rural areas, reflecting the importance of community energy to households without a reliable grid connection. Shirley and Attia refers to such households as "under the grid", as many unconnected or disconnected urban households live near – or even under – grid infrastructure.[85] For these very communities, decentralised energy solutions can be attractive due to lower up-front costs and other attractive consumer financing arrangements, as well as the perception that they are more reliable than the grid.[86] While many of these solutions to date have focused on solar lighting and solar home systems, which are not equipped for electric cooking, the concept of community energy remains relevant and could extend to higher capacity solutions as the price of renewables falls.

Community energy solutions can also include a number of add-on services that make modern energy cooking affordable and sustainable to lower-income households. Community-centred initiatives that allow for **appliance rentals, flexible financing solutions, repair services, bulk purchasing,** and **risk pooling** can lower costs and incentivise the use of energy efficient appliances for cooking and heating. While such a business model is sometimes deemed necessary in remote rural areas, due to the lack of appliance availability and after-sales support, the model also makes sense for urban communities poorly served by centralised electricity services. Overall, it is safe to assume that the mini-grid sector will increasingly look to urban and peri-urban areas for business, challenging these more centralised systems.[87]

Kim and Mah have both reported on community solar energy initiatives in urban east Asia.[88] In Sungdaegol in Seoul, South Korea, Kim writes of the significant successes of solar cooperatives and social enterprises built around solar infrastructure installed in the old suburban neighbourhood, and supported and encouraged by the Seoul Metropolitan Government. Luonan in Foshan, China, provides an entrepreneur-driven approach to community energy, although here the relatively autonomous Villagers' Committee played an important role.[89] In Foshan, the community was able to take advantage of subsidies, well-developed value chains, and active renewable private enterprises.

Figure 10 – Contrasting neighbourhoods in Seoul, South Korea (credit: taylorandayumi)

[83] Deign (2020).
[84] Project aim | CESET (cesetproject.com)
[85] Shirley and Attia (2020).
[86] Bensch et al (2014); Pearl-Martinez (2020).
[87] Energy Sector Management Assistance Program (2019, p.14).
[88] Kim (2017);Mah (2019).
[89] ibids.

Mah (2018, p.28) emphasises the "diversity in transition trajectories",[90] highlighting the fact that community energy solutions can work in different political, institutional and energy environments. However, Mah also argues that five key elements are required for successful community initiatives: **vision, leadership, networking, institutionalisation, and a favourable business environment**. Further work is needed to understand the viability of community energy initiatives beyond major cities, but these examples show how a holistic approach to modern energy cooking and community development can reap significant rewards.

4 Concepts and Approaches

The previous section has highlighted some of the main reasons why modern energy (and modern energy cooking) transitions need to be not only urban-orientated, but cognisant of the particularities and complexities of urban life. **To identify opportunities and barriers for clean energy cooking in urban areas, it is essential to understand situated economic realities, as well as people's aspirations, their daily practices and consumer habits.** It is necessary for developmental and technological strategies to acknowledge differences within cities, as well as across cities. To this end, the dualism of urban/rural needs to be challenged, and it is for this reason we turn to urban scholarship, which has developed a range of conceptual and methodological tools for interrogating the concept of the urban. These insights can be of use to development programmes open to the nuances and contextual specificity of contemporary urban life.

This section introduces a range of concepts that can help develop this way of thinking, which are either derived from or have been developed within urban studies. Southern urbanism, climate urbanism, bypass urbanism and displacement urbanism have been discussed above as a way of challenging the urban/rural binary, and in this section the focus is narrowed to thinking about how cooking practices can be integrated into everyday urban practices and experiences of urban life. While the MECS programme already reflects some of the nuances attached to these approaches, particularly in accounting for local differences and integrating energy transitions with social practices (i.e. cooking), grounding forthcoming research in these approaches and associated methodologies could prove vital in improving the modern energy cooking transition in any one of the programme's targeted countries.

4.1 Socio-technical approaches

A focus on **'urban integration'** – from both a policy and an intellectual perspective – means designing and constructing urban systems that complement one another. Seeking to improve the security or sovereignty of a city's food system, for instance, should start by understanding how that system integrates with water, energy and waste urban infrastructures and related urban economies. However, this understanding of the urban – popular in development and engineering circles – often fails to appreciate how these systems and infrastructures are experienced in practice.[91] In other words, the formal design and planning of urban systems do not always reflect how they function, how people perceive them, and how people decide to act according to their perceptions. To find out about the suitability of modern energy cooking services, the assumptions and hypotheticals of urban systems modelling will only tell us so much. It becomes necessary to understand how

[90] ibid., p.28
[91] Macrorie and Marvin (2019).

these services fit with realities on the ground, in terms of energy access, urban livelihoods, and how the two intersect. What makes a certain modern energy cooking service viable and practical? Does it fit with an individual or community's risk profile? What other value does this service provide, perhaps in terms of productive use, heating, or the ability to multi-task? *How much* value do people attribute to these 'benefits'?

A focus on cooking is itself recognition that energy transitions cannot be disarticulated from the everyday social practices that make them possible

Development research and interventions have become increasingly influenced in recent years by **'socio-technical'** ways of understanding energy transitions. Socio-technical approaches are designed to embed engineering, technological, economic and financial perspectives in the social world, taking account of human activity, interaction and behaviour, while not losing sight of the broader historical, cultural and political contexts that make certain transitions more difficult than others. Transitions are not seen as an inevitable consequence of favourable cost-benefit ratios but reflect complex social dynamics and values,[92] which cannot easily be determined through quantitative methods of enquiry. In fact, a focus on cooking is itself recognition that energy transitions cannot be disarticulated from the everyday social practices that make them possible. Bringing the energy sector in conversation with the clean cooking sector helps to overcome the limitations of silo-ed expertise and presents an opportunity to place people (who cook) at the centre of development strategy.

Ockwell and Byrne write about socio-technical 'regimes', 'niches', and 'landscapes', in an attempt to critically understand the barriers that prevent new technologies from becoming embedded in new markets.[93] **Regimes** refer to the complex interrelation of existing technologies, social practices and institutions that make it difficult for new technologies to compete. In an example relevant to MECS, one may conceive of the urban political economy of charcoal as one such socio-technical regime, with its established networks of producers, distributors and consumers, tied to a range of other urban infrastructures and providing a familiar, cheap, divisible product to the majority of city districts. A regime is constitutive of social processes that are themselves the object of analysis, rather than the underlying technology (/fuel). New technologies are referred to by the authors as **niches**, which require 'nurturing' if they are to disrupt the balance of such regimes. Finally, a **landscape** constitutes a range of external factors that may also destabilise a regime, including economic prosperity or crisis, war, and natural disasters and climate change. Changes in the landscape can dramatically alter existing regimes and may even lead to new technologies (or niches) being promoted as part of the solution to a sudden change in context.[94]

Figure 11 – Ghanaian charcoal sellers (credit: Celestinesucess)

[92] Baptista and Plananska (2017).
[93] Ockwell and Byrne (2016).
[94] Meelen and Schwanen (2018).

An important characteristic of socio-technical *regimes* is that they often create "path-dependency",[95] referring to the ways in which certain fuels and technologies become embedded in the political economy of the city, through vested interest, corporate actors, and perhaps even direct government support. Returning to the example of charcoal, a socio-technical approach emphasises the embedded nature of charcoal networks in the urban fabric, which makes it more difficult for new technologies (niches) to compete. An urban studies perspective can complement this approach, focusing on the wider contexts within which socio-technical approaches are applied. Thinking about communities, spaces, networks, infrastructures, governance, temporality and trajectory simultaneously, it becomes possible to understand the relationship between regimes, niches and landscapes, and the implication of these dynamics for modern energy cooking transitions.

However, it is possible for socio-technical approaches to supplement technological solutions with too simplistic an understanding of social forces and human behaviour, thus failing to anticipate how people perceive and respond to these technologies. Monstadt, for instance, has argued that:

> *"little is known about the place-specific formation of sociotechnical regimes and the contestation, negotiation, and management of urban transition strategies. Instead, the huge spatial variation of sociotechnical regimes and the shaping of technological transitions by urban processes are mostly neglected".*[96]

It is also possible for practitioners to take account of socio-technical dynamics in their analysis, while falling back on technology-orientated solutions for the challenges that arise. An urban studies perspective can help to avoid these specific limitations.

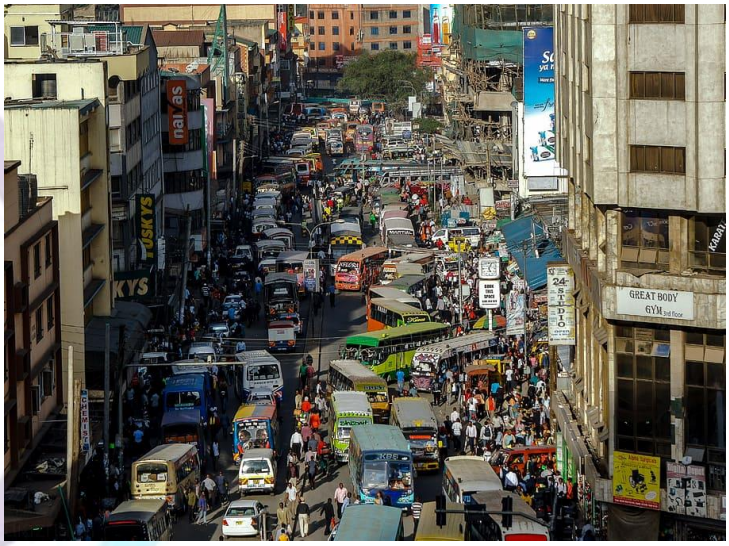

Figure 12 – Nairobi, Kenya (credit: ninastock)

[95] ibid.
[96] Monstadt (2009, p.1930).

4.2 Assemblage

Socio-technical approaches have also been criticised for emphasising the stability and rigidity of *regimes*, and particularly when this comes at the expense of an appreciation for the politics of change. For instance, energy policy frameworks and markets 'travel' between cities and nations, change in form and application, and thus play a role in transforming the places in which they are introduced. To better account for how social forces, technologies, and change processes interact with one another, it is useful to consider 'assemblage' approaches to researching urban energy transitions. Haarstad and Wanvik use the concept of assemblages to concentrate on the *instabilities* and *transformational possibilities* within the "energy-society relationship" and focus in part on both energy infrastructures and urban space.[97] The authors state that:

> *"While socio-technical transitions literature is quite helpful in understanding cities as sites for low carbon transitions and changes in the sphere of consumption, it is not without problems. In particular, its systemic orientation prioritises broad and long-term changes rather than specific ruptures and instabilities in cities and elsewhere.*[98]
>
> *[...] Urban spaces are typically resistant to change,* ***but they may have emergent capacities for transformation*** *and are not determined by the longevity of [urban] infrastructures."*[99]

If socio-technical approaches emphasise the stability and rigidity of energy systems, an assemblage approach emphasises the temporariness of these 'systems'.[100] In other words, a range of actors, networks, policies, social forces and economic structures 'assemble' in different times, in different contexts, and in different compositions, making the notion of a 'regime' too static and removed from reality. Assemblage recognises that any snapshot of energy infrastructures and related activities will be incomplete, due to continuous change and dynamism within the system. This shift in approach has the potential to identify new ways for a modern energy cooking transition to take hold in any given place, and the potential for a wider range of stakeholders and environmental factors to continually shape such a transition.

Assemblage recognises that snapshots of energy infrastructures are incomplete, due to continuous change and dynamism within the system

Returning to the example of charcoal, an assemblage approach forces us to consider potential instability and points of weakness within the *regime*. One point of weakness often cited in development circles is the increasing cost of charcoal, in many countries where biomass cooking is the norm. However, what other weaknesses exist within the regimes that are differently 'assembled' in each city and at different times? Are informal charcoal vendors constantly under threat from the authorities, causing disruption to the supply and distribution of the fuel? How frequently do weather conditions and seasonality affect production and supply? How have power dynamics among competing

[97] Haarstad and Wanvik (2017).
[98] ibid., p.437
[99] ibid., p.444
[100] Meelen and Schwanen.

charcoal sellers changed in recent weeks, and what impact has this had? How are modern energy alternatives positioned to take advantage of any of these points of weakness?

Assemblage thinking provides us with a dynamic way of interpreting socio-technical regimes, and this allows us to identify crucial, nuanced points of entry for modern energy cooking technologies. In time, this will help us develop a transition theory of change that is more sensitive to local dynamics and more precise avenues for exploration and possible intervention. Without an appreciation for local context, we simply cannot grasp the variability and dynamism than an assemblage approach requires. Change is not just about the influence of niches and landscapes on socio-technical regimes; change is a geographical process where local and global dynamics interconnect and produce what 'the urban' entails in different settings and places.[101]

Families and local communities do not necessarily remain the primary support mechanisms and social structures that they often are in rural areas, and thus urban dwellers are forced to seek out, build and maintain other forms of social infrastructure.

4.3 Everyday urbanism

Socio-technical and assemblage approaches provide a nuanced sense of how people and technologies co-exist and reproduce one another. But what can we learn from urban scholarship if we temporarily remove the focus on technologies and energy infrastructures, and replace it with a focus on urban life and livelihoods in a broader, more general sense? This may seem counterintuitive at first, as the purpose of the MECS programme is to integrate energy and cooking technologies with human behaviour, but doing so is an important step in understanding the urban contexts that are relevant to development interventions of these kinds, and in understanding existing behaviours and practices that define life in the city.

The challenge for the MECS programme is to take these abstract concepts and apply them to everyday urban realities and already-existing modern energy cooking services. In order to understand the opportunity for these services in urban contexts, we must understand how people's lives are already co-dependent and co-evolving with different fuels, energy infrastructures, and food systems. Furthermore, urban studies also teaches us that cooking and other aspects of everyday life in the city are bound up with "flows, exchanges, chains of events and decisions that seem to occur more widely [than within] immediate energy-fuelled livelihoods."[102] It is not enough to concentrate on national innovation systems and policy frameworks. After all, everyday life for the urban majority can often be defined in terms of circumnavigating rules and systems, gaining access to whatever is valuable, affordable, practical. An urban agenda for the MECS programme must attend to the different social practices and consumption behaviours of urban communities at large, and account for a wide range of urban political economies and power structures, urban trajectories and urban change.

[101] McFarlane (2009).
[102] Rutherford and Coutard, p.1355.

'Everyday urbanism' is an approach that seeks to capture the realities of urban life for what the authors refer to as 'marginalised urban dwellers'.[103] In the context of the urban majority, marginality can take many different forms and applies to a significant (and often expanding) segment of the urban population. In contrast to approaches that equate urban life with higher disposable incomes, greater cultural and economic diversity, and greater access to the 'perks' of modernity, relative to rural areas, everyday urbanism attends to the spatial flows and configurations that determine everyday realities in the city for the vast majority. Families and local communities do not necessarily remain the primary support mechanisms and social structures that they often are in rural areas,[104] and thus urban dwellers are forced to seek out, build and maintain other forms of social infrastructure. To make urban life more secure, manageable, and beneficial, urban communities "navigate" the city through different coping mechanisms, collaborative and collective activities, seeking out opportunities, exerting effort, and negotiating risks and challenges.[105]

> Development initiatives need to understand these everyday dynamics and power relations within the city and interpret 'ungovernability' as a desire for autonomy over energy services.
>
> (Castan Broto, 2019)

Figure 13 – Douala, Cameroon (credit: Guaka)

Everyday urbanism teaches us that cities are constantly being reconfigured, and everyday activity in the city often reflects a perceived need for flexibility and adaptation. This concept, along with assemblage thinking, blurs the lines between 'formal' and 'informal' urbanism. Rather than seeing formality as the norm (urban planning, formal energy infrastructures), we can reinterpret formality as that which emerges when the informal "is seen as a problem that needs to be fixed".[106] This has implications for the MECS programme in that **it emphasises the limitations of formal planning and the importance of engaging with informal and everyday activities, through which opportunities for transition may emerge**. It also makes us conceive of urban life not as the backdrop for linear progress towards a given developmental outcome (i.e. to exclusive modern energy use). Instead, urban life is conceived as a repeated, daily struggle to 'make it' in the city,[107] ensuring that such an outcome remains elusive, impractical, and a luxury rather than a realistic priority.

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[103] McFarlane and Silver (2017).
[104] Kim.
[105] McFarlane and Silver.
[106] Dovey (2012, p.385).
[107] Simone (2015).

This perspective suggests that the transition rate concerning cooking appliances cannot be reduced to a simplistic equation of affordability, availability, convenience, as it may have been in the West during the 1950s and 1960s, when modern energy cooking appliances hit the mainstream.[108] It is important that we think about transitions in context, and for the urban majority in many cities in the global South, **ameliorating or optimising home cooking methods may simply not register, given the wide-ranging demands of urban life**. A modern, electric cooking appliance my not symbolise social advancement or progress that it might once have done in more materialistic, Westernised settings. This may be particularly so when advancement is less to do with the domestic sphere and practices of homemaking, and more about the desire to move onwards from one's current situation or circumstance. 'Making it', in these contexts, involves visions of the good life that are outward looking as opposed to inward looking. As a result, it is important to understand urban livelihoods, aspirations, preferences, struggles and challenges, and how these perspectives relate to cooking practices. Doing so requires recognition of how people choose to structure their lives, as well as an awareness of the fact that they may not align with the assumptions intrinsic to development practice.

Figures 14 and 15 – Chittagong, Bangladesh (credit: Bruno le Bansais; Angshuman Roy)

While development initiatives may seek to gain authority over a population, through various forms of incentivisation and marketing and awareness initiatives, it is common for people to avoid such efforts and organise their daily lives in ways that have already been figured out, and that make practical and logical sense. **Urban residents are likely to be resistant to intervention and prefer to rely on established and trustworthy support mechanisms and infrastructures**.[109] Incrementalism is likely to trump transformation,[110] and programmes attempting immediate, high-profile and transformational change could prove detrimental to genuine progress. Development initiatives need to understand these everyday dynamics and power relations within the city and interpret 'ungovernability' as a desire for autonomy over energy services.[111]

[108] e.g. see Shove and Southerton (2000).
[109] Simone (2004).
[110] Silver (2014).
[111] Castán Broto, p.96.

But to what extent is this desire for autonomy being undermined by the so-called "digital revolutions"[112] taking place in the continent's urban spaces? Cheap phones, locally relevant apps, mobile banking, social media and other forms of digital connectivity are argued by some to be 'modernising' populations across the urban South. It is hoped that digitisation will lead to improvements in education and health, and it could be argued that a shift towards more 'modern' lifestyles[113] could have a positive impact on modern energy cooking transitions. While the rising influence of digital economies in urban Africa has been viewed by some to alleviate poverty[114] and by others to reinforce existing inequalities,[115] **everyday urbanism understands digitisation as yet another means for people to negotiate and navigate the challenges of contemporary urban life**. Amankwaa et al, for instance, describe how Ghanaian youths use digital technologies to perform urban 'hustle' – for different forms of social and economic activity – precisely because of the persistence of uncertainty and the significant challenges that everyday life in the city presents.[116] This suggests it is important to understand (rather than assume to know) the relationship between digitisation and modern energy (cooking) transitions.

BY DAY, the population of Nairobi is approximately 6 million. At night, it is home to only 3 million, and to even fewer during national holidays. In a recent episode of the *Urban Political Podcast*, Steve Ouma Akoth explains that Nairobi is a city of houses, rather than homes. A history of governmental neglect has contributed to the continued association of home with places of historical lineage and cultural affiliation, and the city is instead a place of transiency, and for the search for economic opportunity.

In more recent years, Nairobi has attracted the attention of international donors seeking to improve the city's transport and energy infrastructures. According to Akoth, these organisations struggle to grasp the city and the everyday lives of its population. While numerous neighbourhoods in Nairobi are subject to "perpetual upgrading", to use Akoth's terminology, where questions of 'upgrading to what?' and 'for whom?' remain unresolved, much of city life is the work of the inhabitants engaging in everyday experimentation. More and more low-income households are pushed to the peripheries of Nairobi. By day, workers from these areas enter the city, and some are tasked with maintaining the electricity infrastructures of higher-income neighbourhoods, while their own houses remain unconnected to the pylons and wires that pass over them. At night, illegal connections are made incrementally, as these workers put their skills to use in order to better the living conditions of the local neighbourhood.

Everyday urbanism points us towards these kinds of energy access dynamics, and to the people responsible for realising the modern energy transition for the urban majority. How can a development programme like MECS learn from these sorts of vignettes, and position itself in ways that do not undermine, depoliticise, or inequitably capture the energies of everyday urban residents?

[112] Ward.
[113] ibid.
[114] Afutu-Kotey and Gough.
[115] Carmody (2021).
[116] Amankwaa et al (2020).

What does this mean for people's fuel choices and cooking practices in the city? It suggests that these decisions are far more complicated than a simplistic cost-benefit analysis. This is also what socio-technical approaches teach us, and it is useful to understand people's everyday struggles and aspirations in a general sense, in order to establish the context in which consumers choose to purchase, consume, and stack their cooking fuels. According to this view, stacking behaviour appears to result from a desire for flexible and adaptable solutions to everyday tasks, reflecting the unpredictability of everyday life and, in some cases, varying access to cooking fuels. The focus on social infrastructures within everyday urbanism poses a series of important questions for the MECS programme: how does the use of modern energy cooking fuels and appliances reflect wider everyday concerns, such as the possibility of blackouts, price hikes, loss of income, or unpredictable working hours or family commitments? How do modern energy cooking services capture the imagination in already complicated and fraught contexts, where a community's priorities lie elsewhere? Finally, who (or which institutions) yield influence in demonstrating the viability and benefits of such services? Community leaders? Religious institutions? Women's groups?

Everyday urbanism helps to contextualise energy practices and aspirations and presents an opportunity to engage with communities and adapt solutions to better suit local needs and experiences. Everyday urbanism reinforces the fact that **target communities are not just consumers of energy, but can also be designers, developers and innovators**. Through community engagement in cities, it becomes possible to assess the suitability of modern energy cooking solutions and financing arrangements, and holds the potential to adapt solutions to local contexts. It is difficult to pre-empt the kinds of information that will come of sustained community engagement, and hence it is necessary to rely more on open-ended interviews and ethnographic methodologies than socio-technical surveys.

Figure 16 – Nasi Goreng in Jakarta, Indonesia (credit: Gunawan Kartapranata)

These approaches provide an alternative way of thinking about cooking practices, as the focus within the sector to date has remained at the household scale and nuclear family unit, where cooking is associated with domestic work, home-making practices, and prolonged settlement in a particular place. It is important to consider this alternative context, where residents may require modern energy cooking services that are more flexible, adaptable, shareable, and thus not out of the reach of large swathes of the urban population. Energy supplies are not always stable, and nor are urban livelihoods always settled and rooted in a particular place.

4.4 What does this all mean for MECS?

Sections 3 and 4 have detailed a range of concepts used within urban studies that relate to transitioning urban populations to modern energy and modern energy cooking. The objective has been to invite development practitioners and analysts to think again about the cities and towns they are working in, to identify the implicit assumptions being made about what constitutes the 'urban', and to explore how a more nuanced understanding could lead to a more valuable understanding of opportunities, challenges and theories of change in cities. The concepts outlined above – socio-technical approaches, assemblage, everyday urbanism, climate urbanism – all hold the potential to impact future research in the modern energy cooking space. Below is a selective list of learning points that can contribute to the research projects being undertaken in MECS priority countries.

Figure 17 – Dhaka, Bangladesh (credit: Aminur Rashid)

The value of traditional fuels

Charcoal and firewood have a wide range of properties and take on different forms of value in urban contexts. The focus on biomass within the clean cooking sector tends to be limited to the fact it is hazardous to health, inefficient, increasingly expensive, and contributing to deforestation. However, applying an urban lens requires us to also consider how charcoal and other traditional fuels may be embedded in the urban fabric, and may even hold value in the sense of employment within biomass industries, the convenience of established distribution networks and the familiarity and cultural value of cooking with the fuel. Charcoal is also divisible, providing consumers with the flexibility to purchase fuel according to their changing financial circumstances and needs. Fuel stacking may provide energy security to low-income populations, and the continued use of biomass may provide a sense of cultural familiarity that is otherwise absent in a rapidly changing urban environment. Of course, these characteristics are known within the sector, but research in specific cities and towns will allow us to understand how these different value mechanisms interrelate in specific contexts according to local dynamics. Furthermore, a critical urban perspective requires a deeper understanding of contextual factors, and the points of differentiation that are unique to that context and yet vitally important to the prospect of transition. What are the visible and hidden dynamics of change in a given place, and how should we as a programme respond?

'Pockets' of opportunity in cities

Statistics related to modern energy cooking in urban areas provide insight at an aggregate level. From the World Bank's Multi-Tier Framework series, for instance, we know that 73% of cookstoves in urban Bangladesh[117] use

[117] Samad et al (2019).

clean fuel (77% in urban Cambodia[118]), and in Zambia[119], 75% of urban households use high-capacity electrical appliances (over 2kW). And while these data sets provide rich and nuanced details about the different attributes feeding into modern energy transitions, we are left asking: what do these statistics tell us about the transition in specific cities, and in specific areas within individual cities? Do rapidly urbanising areas have a similar level of uptake when compared to the large metropolises, or are these younger cities the place to target interventions and tap into a new and promising market? At present, energy consumption data does not exist for the majority of cities in Africa and Asia, but innovative methodologies are being deployed to provide approximate models for selected urban areas.[120] An urban focus within the programme will complement these efforts and – in the absence of already-existing granular data - provide us with the opportunity to assess local dynamics and opportunities, and to consider how particular types of interventions could have the greatest impact in those areas. To understand these pockets of opportunity, we must reassess how we select our research sites, and what drives these choices in the absence of city-specific data. What opportunities are we missing? And what challenges are we not yet engaging with?

Responding to urban change

Data collected over recent years provides us with vital information about the availability and affordability of different cooking fuels and appliances. Electricity is already cost-competitive in a number of MECS priority countries, or at least will be within the next five years.[121] But to what extent are these insights accounting for ongoing urban change, not just in rapidly urbanising areas, but in the cities and towns most at risk of climate change, and the urban areas hit hardest by the Covid-19 pandemic and responses to the crisis? How stable are the conditions that make modern energy cooking affordable at any given time? How frequently does 'access' to modern energy fluctuate, and what impact does this have on the choices and preferences of urban consumers? An urban focus will provide an opportunity to understand the changes taking place in cities in real time, and see how recent changes to fuel supply and affordability, purchasing power, and other shifts in urban life are impacting the uptake of modern energy.

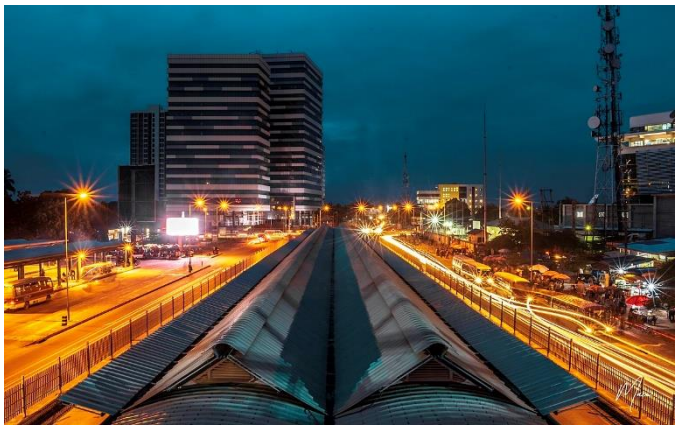


Figure 18 – Dar es Salaam (credit: Mazupixel)

This literature review has also revealed a need to consider how the modern energy transition in cities is counterbalanced by patterns of displacement, dispossession, and rising inequality and energy poverty. The humanitarian workstream within the MECS programme focuses on the energy and cooking needs not just of displaced populations but also host communities, particularly in urban and peri-urban settings.[122] In this workstream, urban areas are both a location for opportunity – with better established infrastructures than rural

[118] Dave et al (2018).
[119] Luzi et al (2019).
[120] Chowdhury et al (2020).
[121] Energy Sector Management Assistance Program (2020a).
[122] Tran et al (2020).

and remote areas – as well as being challenging contexts in their own right, depending on issues of social exclusion and land ownership.[123] The urban workstream is well-placed to complement this line of enquiry by expanding the focus beyond humanitarian displacement settings, to energy security challenges more broadly that affect low-income households, migrant communities, and those adversely impacted by urban planning and development processes.

Identifying scalable innovations for urban populations

Many of MECS' priority countries face one of the two following challenges: a) demand for electricity has not grown at a high enough rate relative to electrification, thus putting pressure on the power and utility companies, and b) the electricity supply is compromised due to inadequate investment and/or environmental factors. In both of these contexts, where demand and supply are poorly matched, innovative solutions are required to overcome the challenges of integrating modern energy into everyday life. A MECS Challenge Fund project in Myanmar, delivered by AMPERES, demonstrated the technical and economic viability of creating battery packs out of e-Waste that can support electric cooking.[124] While the pilot study was carried out in a rural context where electricity is not widely available, the model can easily be applied to urban contexts with compromised electricity access, and where a much greater amount of e-Waste is generated. The urban workstream is well positioned to engage in innovations of this kind, to understand how the business model can be embedded within existing urban economies, and how the solutions embed themselves within people's everyday lives. Does this innovation disrupt existing socio-technical regimes, and set in motion an entirely new 'assemblage' of e-waste to e-cook circular economies? Or is this 'niche' too removed daily life that its impact remains limited?

A second and quite different type of innovation that lends itself to urban areas is the production of bioLPG, a cooking fuel that can be generated from municipal solid waste. Establishing bioLPG production can be integrated into the development of a city's waste management system, and can incur benefits not just in relation to clean fuel provision, but also in reducing dependency on imported energy, and contributing to a country's green development agenda. A recent report[125] by the Global LPG Partnership recommends pilot studies in Kigali, Rwanda and Kumasi, Ghana – large cities with sufficient institutional and infrastructural environments. While these developments might be some way off, the urban workstream needs to understand how such adaptations can serve fuel and cooking needs in urban environments, and what impact a domestic source of clean energy may have on local urban economies. How resilient are the economic and social structures that have formed around more traditional forms of energy? To what extent is this innovation perceived to better meet community and family energy needs?

[123] ibid.
[124] Ketelsen et al (2020).
[125] GLPGP (2020).

5 A MECS Urban Research Agenda

5.1 Initial analysis and review

For all of the work currently taking place in cities across Asia and Africa to promote modern energy cooking services, whether within or external to the MECS programme, it is important to reflect upon our understanding of life in the cities of SSA and SSEA, and on our strategy for the regions' urban populations. Urban political economies differ from one city to the next. We must take account not only of the wide-ranging trajectories of cities today, from those that are rapidly growing to those entrenched in a localised urban crisis, but also of the significant inequalities that exist within each city.

The MECS urban workstream is designed to answer two broad questions related to the transition to modern energy cooking in urban areas:

1. **How does urban life impact household cooking practices?**

- What does it mean to live in and negotiate the city, and what are the repercussions of this on home life?
- What are the informal economies that organise urban life and shift the dynamics of food consumption and cooking practices in particular spaces?
- How do trends in household income levels and electricity access in cities break down into sub-populations, and how do disadvantaged communities (minority groups, low-income groups, Covid-19-impacted groups) feature in these trends?

2. **How does urban governance impact access to electricity and, consequently, people's energy expenditure and cooking practices?**

- What is the institutional landscape in cities in terms of policy, finance, and project implementation?
- How is electricity access governed, in terms of price-setting, meter distribution, and grid connectivity?
- How differently are these governance mechanisms constituted between cities/regions/countries?

Having highlighted several key areas for further research into the opportunities for MECS in urban areas, it will be necessary to engage in-country urban research institutions to a) provide local expertise, and b) carry out research that produces new insight into the state of modern energy cooking in different urban environments. This will provide a solid basis upon which to engage municipalities and local decision-makers, and to encourage and support localised initiatives for the adoption of modern energy cooking services.

Before conducting primary research, a review of secondary data is needed in order to gain insights into the modern energy cooking landscape within specific cities of interest. Until now, data analysis has tended to focus on the difference between urban and rural areas. However, there is a need to look deeper into the urban dynamics of modern energy cooking, and to understand differences within and between cities. Phase One will start by exploring the potential for disaggregation within the Multi-Tier Framework survey data, and look into a

range of other data sets and modelling opportunities[126]. This analysis will also allow MECS to disaggregate data on energy access for urban refugees and displaced populations, who tend to be either amalgamated into or altogether excluded from data sets that focus on displacement in rural areas or refugee camps. This process will also lead to insights that are relevant to the Gender-Inclusive Leave No One Behind agenda, where there are likely to be different dynamics at play across a wide range of urban centres. Alongside this research, it is important to start engaging in urban-centred climate discourse, and to highlight the role of clean cooking in debates around just and equitable urban futures.

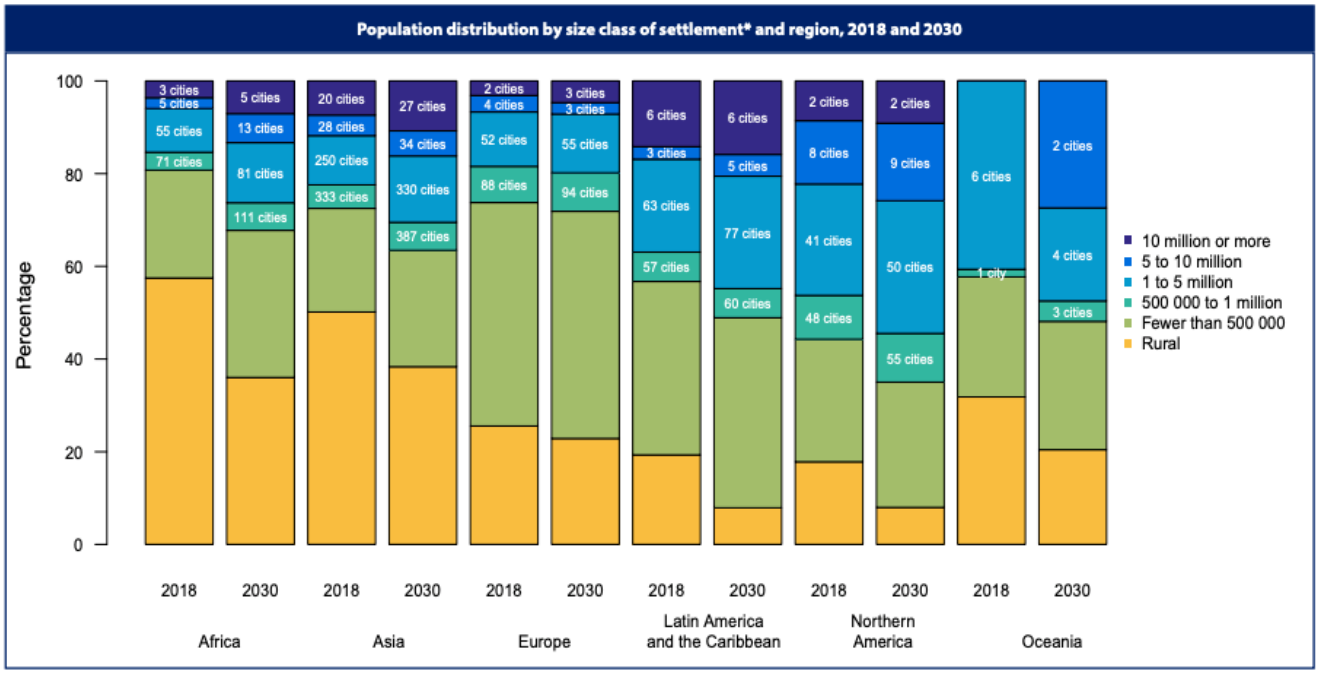
5.2 Learning from different urban contexts

The MECS programme is interested in scale; how can modern energy cooking services be extended to reach as many of the 4 billion people worldwide who currently lack access? It is understandable that many clean cooking interventions in urban contexts will be targeted in the capital and major cities of priority countries. Not only do these cities have the largest populations, they are also likely to be more-densely populated, increasing the impact of biomass cooking on household air pollution. Furthermore, these cities are also more likely to attract the attention of policy makers, investors and the private sector, and from a logistical perspective, it is in these cities that utility companies and development/research institutes tend to be formally based. It is often the case that countries become defined by their largest or most famous city, and it is perhaps inevitable that they become the primary targets of energy policies and urban clean cooking initiatives.

It is also the case that large, densely populated cities may provide the most complicated cases, when it comes to facilitating the clean cooking transition among population segments not deemed to be 'low-hanging fruit'. Uptake of modern energy cooking services may be relatively high for those who can easily afford the appliances and energy bills, and who live in affluent areas with reliable and high-capacity grid connections. But for the rest of the population of a large, mega-, or rapidly urbanising city, uptake may be constrained by the sheer complexity of urban life, and the dynamism and evolution of the city. Among a more heterogenous population, too, we are likely to encounter a wide range of perspectives relating to the modern energy cooking transition, due to cultural differences, social networks, informal practices, economic outlooks, and transient modes of city life. More needs to be done to understand these dynamics, in order to transition urban populations more broadly towards modern energy cooking.

Additionally, we must be cognisant of the fact that most urbanites do not live in the world's megacities and capital cities, and this will remain the case in the coming years. Figure 19 below shows that in 2018, half of urban dwellers in Africa lived in towns and cities with less than 500,000 inhabitants. By 2030, this figure will rise to approximately 60%. A focus on medium-sized and emerging cities is therefore fundamental to the goals associated with an urban-led modern energy transition, and this provides an additional opportunity for cities of similar sizes and trajectories to share knowledge and apply best practice thinking. This helps make the case for expanding modern energy cooking services in urban areas outside of the national capitals and megacities.

[126] This work will make use of the databases and modelling work from the SAMSET project, which pre-dates the MECS programme. See: http://samsetproject.net/online-resources/



*The population of cities with fewer than 500,000 inhabitants is estimated by taking the difference between the total urban population and the population in cities with 500,000 inhabitants or more. The number of cities with fewer than 500,000 inhabitants is not estimated.

Figure 19 - By 2030, it is estimated that 40% of the total population in Africa (35% in Asia) will be living in towns and cities of less than 500,000 inhabitants[127]

One may be tempted to dismiss this argument, based on a theory of change that emphasises the ability of large cities to attract investment and reach economies of scale,[128] and this could help spread energy access and services to regional and smaller cities. However, it is important to recognise the significant challenges these cities face in providing services and employment opportunities to their inhabitants. As outlined in the previous section, many rely on the informal sector for their livelihoods and/or reside in informal neighbourhoods, where both the reach of local authorities and access to modern energy can be limited. In turn, informality places limitations on tax revenue and holds back public investment in improving modern energy access and services.

Reliant upon visionary local leadership, decentralised institutions, and sound financing arrangements, regional cities provide an opportunity to implement MECS solutions in nuanced and targeted ways that reflect local political, economic, environmental, and cultural contexts.[129] This is particularly important in the context of large-scale development programmes:

> *"The tendency to overlook certain cities is not just a concern for scholars. Political, economic and cultural logics within individual nations and across regions will inevitably look to certain cities over others. It is inevitable that growth strategies, development agendas, fiscal transfer arrangements, and restructuring and reform processes are designed with certain places and*

[127] United Nations Department of Economic and Social Affairs - Population Division (2018, p.6).
[128] Toesland (2019).
[129] See Foster (2016), Siba (2018).

cities in mind, implemented unevenly across vast territories and with unresolved questions of equity and justice at their core".[130]

The MECS urban agenda is designed to take advantage of the enormous opportunity and potential for modern energy cooking in medium-sized cities. This approach will help to provide nuance to national policy discussions and help invigorate the local urban economies of the future. A prospective list of urban case studies is detailed below, and opportunities for engagement could be sought through existing and future research partnerships within these countries. When reading this list, we invite the reader to consider the following questions: what do you know about these cities? What do you know about the potential for a modern energy transition in these cities? What assumptions are we making about these cities when we help to formulate plans for such a transition? In instances where existing research is being conducted in these cities, to what extent are the unique and complex dynamics of the city being taken into account?

Kumasi, Ghana	**Benin City**, Nigeria	**Garoua**, Cameroon	**Bahir Dar**, Ethiopia
Mbarara, Uganda	**Kisumu**, Kenya	**Iringa**, Tanzania	**Mzuzu**, Malawi
Ndola, Zambia	**Bharatpur**, Nepal	**Myitkyina**, Myanmar	**Rajshahi**, Bangladesh

Overlooked cities will be prioritised in the four work packages and proposed challenge fund outlined in the sections that follow. This research agenda will produce new and influential data that can be used by policymakers, producers and consumers, in targeted MECS cities and beyond.

Figure 20 – Accra, Ghana (credit: Muntaka Chasant)

[130] Ruszczyk et al (2021, p.2).

5.3 WP1: Urban Lives [Internal]

Much of this paper has focused on the highly contextual and dynamic nature of urban life, and in doing so it emphasises the importance of localised strategies in facilitating modern energy cooking transitions. In order to understand urban life and urban governance in MECS priority countries, we need to understand the political economy of individual cities as they relate to energy, food, and cooking.

Work Package 1 (WP1) – Urban Lives reflects these sentiments, and consists of desk-based data analysis and urban studies research, which will provide MECS country research teams with contextualised and disaggregated insights into the urban dynamics of modern energy cooking transitions. First, all current MECS initiatives in urban environments will be reviewed, in order to understand the locations and demographic make-up of existing project participants, as well as the strategies and fuel choices being promoted in these areas. This process will help to identify the geographical and energy-related gaps in the programme, in relation to urban areas, and this will guide the internal, desk-based research that will supplement ongoing activities in the priority countries. Briefing notes and ongoing support will be provided to MECS research teams and partner organisations concerning a range of topics, including:

- fuel choices and cooking practices in peri-urban areas
- stacking behaviour among urban populations
- urban-orientated stakeholder engagement.

It will be important to review stakeholder mapping and engagement activities to ensure MECS partners are sufficiently focused on local policy makers and development practitioners in a given city. The MECS programme offers municipal and regional governments an integrated strategy for dealing with a range of important policy challenges, ranging from energy provision to climate change adaptation, and from population health and wellbeing to job creation and the development of private and social enterprise. The FAO's Urban Food Agenda explains the importance of municipal collaboration in this space:

> *"Urban areas provide strategic entry points to reconfigure broader socio-economic and environmental processes in more resilient, sustainable, inclusive and equitable ways. Indeed, it is at the urban governance level that we have recently witnessed the most innovative efforts to developing synergies between diverse stakeholders and between traditionally disjointed policy domains."*[131]

With the support of Southern partners and link researchers, desk-based research will be carried out across MECS priority countries concerning decentralised governance and the implications for modern energy. Link researchers and Southern partners will be asked to engage more directly with municipalities, who will be invited to participate as collaborators and partners in MECS activities. Where possible, WP1 will produce information packs for specific municipalities, and will support the country teams on developing city specific MECS strategies.

It is noted here that power structures within the city are not solely determined by local authorities. 'Stakeholder networking' presents an opportunity to understand different ways of influencing the modern energy cooking

[131] FAO (2019, p.7).

transition in each city, from influential families and individuals to religious institutions and welfare and food programmes, to other forms of community affiliation.

Figure 21 – Marrakesh, Morocco (credit: Stefan Bernsmann)

5.4 WP2: Cities in Transition [External]

Case Studies: Bangladesh, Ghana, Nepal, Uganda, Zambia

Work package 2 is designed to reflect the highly contextual and dynamic nature of urban life, and in doing so it emphasises the importance of localised strategies in facilitating modern energy cooking transitions. At present, energy consumption data does not exist for the majority of cities in Africa and Asia, but innovative methodologies are being deployed to provide approximate models for selected urban areas, e.g. combining settlement type mapping with night-time light emissions data, serving as a proxy for electricity consumption.[132] Quantitative and qualitative methodologies will be needed in order to map, analyse, and tell the story of modern energy cooking transitions in specific urban neighbourhoods and districts, in order to help the MECS programme establish transition theories of change[133] that are relevant to different urban contexts.

WP2 is an exploratory study of the cooking fuel landscape in different cities. This study is designed to focus on population segments and urban contexts that may challenge or help to qualify our understanding of modern energy cooking transitions at the macro level. Therefore, it is expected that research projects will explore the cooking fuel landscape in/among i) **low-income households**, ii) **rapidly urbanising peri-urban areas**, iii) **recently upgraded urban areas**, iv) **migrant communities**, and/or v) **displaced/refugee communities**. While projects will not be expected to address all five categories, it is important to recognise that these populations and contexts often overlap, and thus cannot be viewed in isolation. Drawing on both primary data collection and a review of relevant secondary data, the research will map the supply and usage of cooking fuels (electricity, LPG, charcoal, and others) in carefully selected urban and peri-urban areas, in at least two cities. Field research will contribute to this mapping exercise in order to reveal the localised realities of both access to, and consumption of, various

[132] Chowdhury et al.
[133] Theories that explain the factors behind households transitioning from cooking with biomass to cooking with modern energy alternatives.

cooking fuels. The overall objective of the project is to produce a detailed and visual analysis of the cooking fuel landscape in the above urban contexts, for the purposes of stakeholder engagement at the municipal level and to feed into localised transition theories of change.

Hypothesis: *Cooking fuel choices among urban populations cannot be reduced to the relative availability and affordability of different cooking fuels, and are tied to the much wider experience of urban life reflected in different daily routines, patterns of work and community, and individual priorities and aspirations.*

The research activities in the **inception phase** are designed to prove whether or not the above hypothesis is indeed correct. In order to do so, the following core research question needs to be addressed:

What are the cooking fuel choices of low-income/rapidly urbanising/migrant/displaced urban households, and how do these choices relate to broader experiences of urban life?

The programme of research should further explore the following questions:

- What are the patterns of supply, distribution and consumption of different cooking fuels among the urban and peri-urban populations (and areas) under study?
- As a multi-dimensional phenomenon, what does "access" to various cooking fuels entail in these urban contexts?
- How much importance is placed on the use of modern energy cooking fuels and appliances in these urban contexts?
- What prevents these urban communities from transitioning to modern energy cooking fuels?
- What would incentivise different urban communities to use modern energy cooking fuels more regularly or more exclusively?

The **action phase** will follow the inception phase, and it will take a case study approach. In collaboration with residents, local organisations and community leaders, the case study will focus on how to address the barriers preventing a modern energy cooking transition, in one or two of the contexts explored in the inception phase. and provide recommendations for action that may be applicable to other, yet similar urban contexts. The action phase will culminate in a final research report that will include recommendations for future research and possible interventions that are applicable to urban contexts of a similar nature.

5.5 WP3: Circular Economies [External]

Case Studies: Bangladesh, Ghana, Zambia

As shown by the numerous market assessments commissioned under the MECS programme, a wide range of electrical cooking appliances are becoming increasingly accessible and affordable to (predominantly urban) populations across SSA and SSEA. As these markets continue to attract the attention of appliance manufacturers and distributors, the MECS programme is working pro-actively to understand the economic and environmental implications of these trends in priority countries.

The increasing availability and circulation of electrical appliances has implications for systems of distribution, repair, and waste in urban environments. The market for modern cooking appliances is shaped in part by linear

production models ('take, make, waste') and the 'throw-away' culture of mass consumerism, both of which shorten the life spans of products and contribute to higher emissions and larger volumes of waste. The concept of the 'circular economy' attempts to limit the impact of wasteful economic activity, primarily through the '4R strategies' of reduce, reuse, remanufacture and recycle. It therefore follows that the growing supply of (and demand for) modern cooking appliances is not solely an indicator of progress, innovation and development, but also an indicator of eventual technological breakdown and waste, repair and restoration. Appliances are not simply produced, sold, used, and disposed of; value is generated through circular processes of repair, recycling, and reuse. Focusing on these circular urban economies, Cross and Murray argue that 'energy justice' rests not only on the fair distribution of clean energy, but also on support for the various repair economies that exist where formal recycling infrastructures are lacking.[134]

The circular economy model is not limited to products in need of repair, as it also generates economic activity at the end of the product life cycle. Globally, an estimated 53.6 megatons (Mt) of e-Waste was produced in 2019, generated mostly in cities and in part as a direct result of urbanisation processes.[135] While e-Waste generation is highest per capita in Europe (16.2kg), Oceania (16.1kg) and the Americas (13.3kg), Asian countries were responsible for almost half of global e-Waste production in absolute terms (24.9 Mt). By contrast, Africa generates the least amount of e-Waste per capita (2.5kg) when compared to these four geographical areas.[136] However, e-Waste management systems in African countries tend to be far less developed, and the sector is dominated by informal collectors and recyclers. Large port cities in Africa are also major destinations for e-Waste produced in the global North, although trade patterns are increasingly inter-regional. Growth of the modern energy cooking appliances market will therefore have an impact on both repair and waste economies in priority countries, posing both economic opportunities and policy challenges.

Figure 22 – eWaste at Agbogbloshie, Ghana (credit: Muntaka Chasant)

[134] Cross and Murray (2018, p.108).
[135] Forti et al (2020).
[136] ibid.

By engaging with research into repair infrastructures and e-Waste economies, the MECS programme seeks to understand the state of circular economy practices relevant to modern energy cooking, and to understand how a modern energy cooking transition may impact these practices and economies. From after-sales and end-of-life points of view, we must ask: what urban economies may emerge with the uptake of electric cooking appliances? How might electric cooking appliances be re-purposed in the urban economy? And what are the e-Waste implications (including health implications, from hazardous materials such as lithium-ion batteries, magnetrons, etc) of providing modern energy cooking services to cities that lack 'formal' repair, maintenance, and recycling infrastructures?

Based on the above, we propose work package 3 as an in-depth exploration of the current state of urban circular economies, with respect to modern energy cooking devices. This work package consists of two separate themes, which relate to different stages of the product life cycle and circular economy model. These themes centre on electrical repair economies (Theme 1) and e-Waste economies (Theme 2) in urban environments.

Hypothesis 1 (Theme 1): *In increasingly consumer-driven urban economies, new business and entrepreneurial practices emerge around the repairing, re-purposing, and re-selling of electrical (cooking) appliances and components, enhancing economic opportunities and limiting the environmental impact of modern energy (cooking) transitions.*

Hypothesis 2 (Theme 2): *In the absence of centralised or municipal e-Waste management systems, the disposal of electrical cooking appliances and components pose a significant risk to the environment and to human safety, particularly for those involved in the e-Waste economy.*

In the **inception phase** of WP3, the following core research questions will be addressed:

Theme 1: What are the scenarios in which urbanites seek to repair, re-purpose, or dispose of an electric cooking appliance, and how are these activities carried out in practice?

Theme 2: How are cooking and other kitchen appliances implicated in e-Waste urban economies?

Both themes: How can the principles of the circular economy, along with already-existing practices in urban contexts, be harnessed in order to ensure a fair and just transition to modern energy cooking?

The programme of research will further answer the following questions:

Theme 1:

- How do consumers respond when an appliance fails?
- How do consumers prefer to have an appliance repaired?
- How readily available are parts needed to make the necessary repairs?
- What are the different typologies of appliance repair workers and second-hand appliance dealers operating in urban environments?
- What do consumers do with an appliance when it is beyond the point of repair?

Theme 2:

- What networks, economies, and material flows derive from e-Waste sites in a given city?

- How do e-Waste activities relate to cooking practices (e.g. discarded appliances) or electricity provision (e.g. upcycled lithium-ion battery powerpacks)?
- How do e-Waste activities diverge from e-Waste policy and regulatory frameworks, at the national and/or regional levels?

The **action phase** (case study) will follow the inception phase. Projects should focus on one of two options per theme:

Theme 1:

a) Investigate the extent to which unfamiliar electrical appliances (e.g. newest models of electric pressure cooker) can be broken down, repaired and/or repurposed by existing technicians based in the cities
b) Train new, local technicians for electrical cooking appliance repair, making use of existing social networks (e.g. hosted by religious institutions, educational institutions, commercial centres, etc)

Theme 2:

a) Working with individuals and organisations involved in the e-Waste economy, explore how e-Waste activities can be made safer, as well as more commercially viable. This work should reference relevant e-Waste management policy and regulatory frameworks.
b) Identify how local e-Waste is/can be transformed into makeshift devices and solutions, such as re-purposed electrical cooking appliances, or battery packs that can support electric cooking.

6 Concluding Remarks

The rationale for this paper stems from a concern for urban populations and urban energy transitions within the Modern Energy Cooking Services (MECS) programme. One of the simplest and often one of the most illuminating ways of analysing energy and cooking transitions is to explore cooking fuel choices and modern energy access in urban vs rural areas. Towns and cities are thought to have better energy infrastructures, greater availability of modern energy fuels and devices, more developed value chains, and higher income populations. However, as this paper has attempted to show, there are significant and complex challenges unique to urban areas that require deep engagement, if the nature and potential of these transitions is to be understood and incubated.

Cities across Asia, Africa and elsewhere are increasingly unequal sites of habitation and work. Energy poverty is increasingly an urban as well as rural concern, and projected rates of urbanisation suggest that the pressures on existing energy infrastructures is only going to increase. Renewable energy has the potential to relieve centralised energy systems of this pressure, lower import dependency, and diversify energy systems away from a reliance on fossil fuels. However, the potential success of modern energy (cooking) transitions lies not only in the success of these technologies, but also in the ability to foster demand for related products and services across a large population range. Modern energy (cooking) services need to be affordable, reliable, and considered suitable not just to affluent and modernising urban households, but to the urban majority, whose priorities and concerns may lie elsewhere. The persistence of biomass use in urban areas cannot be reduced to a simple cost-benefit analysis in relation to household finances, and also reflects concerns over energy security, preferences for simple, convenient and familiar solutions. As the cost of biomass rises and the cost of

renewables falls, the modern energy cooking transition will take many different forms in different national, regional, and city contexts. To facilitate these transitions, more work is needed to understand these local contexts and conditions.

This is the central objective of the urban workstream within the MECS programme. The workstream plans to provide renewed impetus to engage with a wider range of city governments and community leaders, to ensure theories of transition and implementation strategies are tailored to local environments. The workstream focuses on a diversity of urban contexts – both in terms of urban political economies and urban population groups – as recognition that 'urban' and 'rural' classifications are limited in their ability to capture the realities of transition. Furthermore, the urban workstream will engage new areas of enquiry, and commission much-needed research on matters of repair, maintenance and waste, as they relate to modern energy cooking transitions. This will help the MECS programme achieve its goal not only in facilitating the transition of modern energy cooking services across sub-Saharan Africa and South/South-East Asia, but to do so in ways that are environmentally responsible and sensitive to local demands, perceptions, and contexts.

7 Bibliography

Afutu-Kotey, R. L., & Gough, K. V. (2019). Bricolage and informal businesses: Young entrepreneurs in the mobile telephony sector in Accra, Ghana. *Futures*. https://doi.org/10.1016/j.futures.2019.102487

Agergaard, J., Tacoli, C., Steel, G., & Ørtenblad, S. B. (2019). Revisiting Rural–Urban Transformations and Small Town Development in Sub-Saharan Africa. *European Journal of Development Research*, *31*(1), 2–11. https://doi.org/10.1057/s41287-018-0182-z

Ajanaku, L. (2021, January). Economy: Leveraging Digital Infrastructure. *The Nation*. https://thenationonlineng.net/economy-leveraging-digital-infrastructure/

Amankwaa, E. F., Esson, J., & Gough, K. V. (2020). Geographies of youth, mobile phones, and the urban hustle. *The Geographical Journal*, *186*(4). https://doi.org/10.1111/geoj.12354

Atkinson, A. (1999). *Principles and Components of a Strategic EPM Process Relevant to the Peri-Urban Inferface (PUI)*. https://discovery.ucl.ac.uk/id/eprint/39/1/DPU_PUI_Atkinson.pdf

Bafana, B. (2016). Africa's Cities of the Future: Proper Planning Key to Sustainable Cities. *Africa Renewal*, *30*(1), 4–5. https://www.un.org/africarenewal/sites/www.un.org.africarenewal/files/Africa_Renewal_EN_April_2016.pdf

Battersby, J., & Watson, V. (2019). Introduction. In J. Battersby & V. Watson (Eds.), *Urban Food Systems Governance and Poverty in African Cities* (pp. 1–26). Routledge.

Bensch, G., Grimm, M., & Peters, Jj. (2014). *Why Do Households Forego High Returns from Technology Adoption*. https://doi.org/10.2139/ssrn.2561216

Bhatia, M., & Angelou, N. (2014). Capturing the Multi-Dimensionality of Energy Access. In *Livewire*. https://openknowledge.worldbank.org/bitstream/handle/10986/18677/886990BRI0Live00Box385194B00PUBLIC0.pdf?sequence=8&amp%3BisAllowed=y

Bouzarovski, S., & Thomson, H. (2018). Energy Vulnerability in the Grain of the City: Toward Neighborhood Typologies of Material Deprivation. *Annals of the American Association of Geographers*, *108*(3). https://doi.org/10.1080/24694452.2017.1373624

Bruce, N. G., Aunan, K., & Rehfuess, E. A. (2017). Liquefied Petroleum Gas as a Clean Cooking Fuel for Developing Countries: Implications for Climate, Forests, and Affordability. In *Materials on Development Financing* (Issue 7).

Carmody, P. (2013). A knowledge economy or an information society in Africa? Thintegration and the mobile phone revolution. *Information Technology for Development*, *19*(1). https://doi.org/10.1080/02681102.2012.719859

Castán Broto, V. (2019). *Urban Energy Landscapes*. Cambridge University Press. https://doi.org/10.1017/9781108297868

Castán Broto, V., & Robin, E. (2020). Climate urbanism as critical urban theory. *Urban Geography*. https://doi.org/10.1080/02723638.2020.1850617

Chowdhury, P. K. R., Weaver, J. E., Weber, E. M., Lunga, D., LeDoux, S. T. M., Rose, A. N., & Bhaduri, B. L. (2020). Electricity consumption patterns within cities: application of a data-driven settlement characterization method. *International Journal of Digital Earth*, *13*(1), 119–135. https://doi.org/10.1080/17538947.2018.1556355

Croese, S. (2020). Introduction: Africa's Urban Challenge. In N. Marrengane & S. Croese (Eds.), *Reframing the Urban Challenge in Africa: Knowledge Co-production from the South* (pp. 1–17). Routledge.

Cross, J., & Murray, D. (2018). The afterlives of solar power: Waste and repair off the grid in Kenya. *Energy Research & Social Science*, *44*. https://doi.org/10.1016/j.erss.2018.04.034

Dave, R., Keller, S., Koo, B. B., Fleurantin, G., Portale, E., & Rysankova, D. (2018). *Cambodia - Beyond Connections: Energy access diagnostic report based on the Multi-Tier Framework*. https://openknowledge.worldbank.org/handle/10986/29512

Deign, J. (2020, December 21). *Why Cities Are the Growth Market for African Minigrids*. GTM.

Energy Sector Management Assistance Program (ESMAP). (2019). *Mini Grids for Half a Billion People: Market Outlook and Handbook for Decision Makers*. https://openknowledge.worldbank.org/bitstream/handle/10986/31926/Mini-Grids-for-Half-a-Billion-People-Market-Outlook-and-Handbook-for-Decision-Makers-Executive-Summary.pdf?sequence=1&isAllowed=y

Energy Sector Management Assistance Program (ESMAP). (2020a). *Cooking with Electricity: A Cost Perspective: Vol. September*. http://documents1.worldbank.org/curated/en/920661600750772102/pdf/Cooking-with-Electricity-A-Cost-Perspective.pdf

Energy Sector Management Assistance Program (ESMAP). (2020b). *The State of Access to Modern Energy Cooking Services*. http://documents1.worldbank.org/curated/en/937141600195758792/pdf/The-State-of-Access-to-Modern-Energy-Cooking-Services.pdf

FAO. (2019). *FAO framework for the Urban Food Agenda: Leveraging sub-national and local government action to ensure sustainable food systems and improved nutrition*.

Ferguson, J. (1999). *Expectations of Modernity: Myths and Meanings of Urban Life on the Zambian Copperbelt*. University of California Press.

Fokuo, I. K., & Ochieng, A. (2020). *How Emerging Markets will Shape Africa in 2020*.

https://www.bothogroup.com/blog/research/2020/2/23/op-ed-how-emerging-markets-will-shape-africa-in-2020

Forti, V., Balde, C. P., Kuehr, R., & Bel, G. (2020). *The Global E-waste Monitor 2020: Quantities, Flows and the Circular Economy Potential*. https://www.itu.int/en/ITU-D/Environment/Documents/Toolbox/GEM_2020_def.pdf

Foster, G. (2016, October 11). Africa's Future is in its Secondary Cities. *Devex*. https://www.devex.com/news/africa-s-future-is-in-its-secondary-cities-88887#:~:text=When most people think about,%2C Lilongwe%2C Kigali and Abuja.&text=Projections show Africa will have,over the next 30 years.

Gellert, P. K. (2019). Neoliberalism and altered state developmentalism in the twenty-first century extractive regime of Indonesia. *Globalizations*, *16*(6). https://doi.org/10.1080/14747731.2018.1560189

Georg, W. S., & Jones, P. H. (2016). What is a Sustainable Innovation? Cultural and Contextual Discoveries in the Social Ecology of Cooking in an African Slum. *Ethnographic Praxis in Industry Conference Proceedings*, 235–248.

GLPGP. (2020). *Assessing Potential for BioLPG Production and Use within the Cooking Energy Sector in Africa*. https://mecs.org.uk/wp-content/uploads/2020/09/GLPGP-Potential-for-BioLPG-Production-and-Use-as-Clean-Cooking-Energy-in-Africa-2020.pdf

Graham, S., & Marvin, S. (2001). *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*. Routledge.

Haarstad, H., & Wanvik, T. I. (2017). Carbonscapes and beyond: Conceptualizing the instability of oil landscapes. *Progress in Human Geography*, *41*(4), 432–450. https://doi.org/10.1177/0309132516648007

Hammett, L. (2020). *The Role of Cities in a Climate-Resilient Future*. UNDP. https://www.undp.org/content/undp/en/home/blog/2020/the-role-of-cities-in-a-climate-resilient-future.html

Hogan, T., Bunnell, T., Pow, C.-P., Permanasari, E., & Morshidi, S. (2012). Asian urbanisms and the privatization of cities. *Cities*, *29*(1). https://doi.org/10.1016/j.cities.2011.01.001

IEA, IRENA, UNSD, World Bank, & WHO. (2020). *Tracking SDG 7: The Energy Progress Report*.

Josephson, A., Kilic, T., & Michler, J. D. (2020). *Socioeconomic Impacts of COVID-19 in Four African Countries* (Issue 6th October [Presentation]).

Karekezi, S., & Majoro, L. (2002). Improving modern energy services for Africa's urban poor. In *Energy Policy* (Vol. 30).

Ketelsen, T., O'Hanlon, M., Sawdon, J., & Htay, U. T. (2020). *e-Waste to e-Cook: Piloting a scalable, modular powerpack using upcycled lithium-ion technology for affordable and reliable e-cooking in Myanmar*. https://mecs.org.uk/wp-content/uploads/2020/12/MECS-TRIID-AMPERES-Final-Report.pdf

Koo, B. B., Yoo, H. K., Keller, S., Rysankova, D., & Portale, E. (2019). *Myanmar - Beyond Connections: Energy Access Diagnostic Report Based on the Multi-Tier Framework*.

Kuffer, M., Persello, C., Pfeffer, K., Sliuzas, R., & Rao, V. (2019). Do we underestimate the global slum population? *2019 Joint Urban Remote Sensing Event (JURSE)*. https://doi.org/10.1109/JURSE.2019.8809066

Lai, H.-L. (2019). Situating community energy in development history: Place-making and identity politics in the Taromak 100% green energy tribe initiative, Taiwan. *Geoforum*, *100*. https://doi.org/10.1016/j.geoforum.2019.01.006

Lucci, P., Bhatkal, T., & Khan, A. (2016). *Are We Underestimating Urban Poverty?*

Lucia, L., Lin, Y., Koo, B. B., Rysankova, D., & Portale, E. (2019). *Zambia - Beyond Connections: Energy access diagnostic based on the Multi-Tier Framework*. https://openknowledge.worldbank.org/handle/10986/32750

Macrorie, R., & Marvin, S. (2019). Bifurcated urban integration: The selective dis- and re-assembly of infrastructures. *Urban Studies*, *56*(11), 2207–2224. https://doi.org/10.1177/0042098018812728

Mah, D. N.-Y. (2018). *Community solar initiatives in urban energy transitions: a comparative study of Foshan, China and Seoul, South Korea* (No. 20).

Manfren, M., Caputo, P., & Costa, G. (2011). Paradigm shift in urban energy systems through distributed generation: Methods and models. *Applied Energy*, *88*(4). https://doi.org/10.1016/j.apenergy.2010.10.018

Mbembe, A., & Nuttall, S. (2004). Writing the World from an African Metropolis. *Public Culture*, *16*(3). https://doi.org/10.1215/08992363-16-3-347

McFarlane, C. (2009). Translocal assemblages: Space, power and social movements. *Geoforum*, *40*(4). https://doi.org/10.1016/j.geoforum.2009.05.003

McFarlane, C., & Silver, J. (2017). Navigating the city: dialectics of everyday urbanism. *Transactions of the Institute of British Geographers*, *42*(3), 458–471. https://doi.org/10.1111/tran.12175

McGee, T. (2005). Distinctive Urbanisation in the Peri-Urban Regions of East and Southeast Asia: Renewing the Debate. *Journal of Regional and City Planning*, *16*(1), 39–55.

Meelen, T., & Schwanen, T. (n.d.). *Assemblages and diffusion in transitions: a case of electric vehicle users*. 1–18.

Monstadt, J. (2009). Conceptualizing the Political Ecology of Urban Infrastructures: Insights from Technology and Urban Studies. *Environment and Planning A: Economy and Space*, *41*(8). https://doi.org/10.1068/a4145

Myers, G. (2018). The Future and Africa's Cities. In *The Routledge Handbook of African Development* (pp. 465–476). Routledge.

Nem Singh, J., & Ovadia, J. S. (2018). The theory and practice of building developmental states in the Global South. *Third World Quarterly*, *39*(6). https://doi.org/10.1080/01436597.2018.1455143

Nixon, N., Surie, M., & McQuay, K. (2020). *Covid Lays Bare the Flaws in Asia's Booming Megacities*. https://asiafoundation.org/2020/08/19/covid-lays-bare-the-flaws-in-asias-booming-megacities/

Ockwell, D., & Byrne, R. (2016). Socio-technical innovation systems: A new way forward for pro-poor energy access policy and practice. In S. C. Bhattacharyya (Ed.), *Routledge Handbook of Energy in Asia*. Routledge.

Page, J., Wallace, L., Altenburg, T., Grunewald, A., & Fox, L. (2019). *Harnessing Africa's Youth Dividend*. https://www.brookings.edu/wp-content/uploads/2019/01/BLS18234_BRO_book_007_CH3.pdf

Pearl-Martinez, R. (2020). Global Trends Impacting Gender Equality in Energy Access. *IDS Bulletin*, *51*(1). https://doi.org/10.19088/1968-2020.103

Pieterse, E. (2010). Cityness and African urban development. *Urban Forum*, *21*(3), 205–219. https://doi.org/10.1007/s12132-010-9092-7

Pieterse, E. (2015). Reaching for adaptive urbanism. In M. Holm & M. Kallehauge (Eds.), *Africa: Architecture, Culture, Identity*. Louisiana Museum of Modern Art.

Pilo', F. (2021). Negotiating networked infrastructural inequalities: Governance, electricity access, and space in Rio de Janeiro. *Environment and Planning C: Politics and Space*, *39*(2). https://doi.org/10.1177/2399654419861110

Planete Energies. (2016). *Is Africa the Continent of the Future?* Editorial Report. https://www.planete-energies.com/en/medias/close/africa-continent-future

Potts, D. (1995). Shall we go home? Increasing urban poverty in African cities and migration processes. *Royal Geographical Society Journal*, *161*(Nov).

Rigg, J. (2016). *Challenging Southeast Asian Development*. Routledge.

Robinson, J. (2006). *Ordinary Cities*. Routledge. https://doi.org/10.4324/9780203506554

Roy, A. (2005). Urban Informality: Toward an Epistemology of Planning. *Journal of the American Planning Association*, *71*(2). https://doi.org/10.1080/01944360508976689

Ruddick, S., Peake, L., Tanyildiz, G. S., & Patrick, D. (2018). Planetary urbanization: An urban theory for our time? *Environment and Planning D: Society and Space*, *36*(3). https://doi.org/10.1177/0263775817721489

Ruszczyk, H. A., Nugraha, E., de Villiers, I., & Price, M. (2021). Introduction. In H. A. Ruszczyk, E. Nugraha, & I. de Villiers (Eds.), *Overlooked Cities: Power, Politics and Knowledge Beyond the Urban South* (pp. 1–18). Routledge.

Rutherford, J., & Coutard, O. (2014). Urban Energy Transitions: Places, Processes and Politics of Socio-technical Change. *Urban Studies*, *51*(7), 1353–1377. https://doi.org/10.1177/0042098013500090

Sadownik, B., & Jaccard, M. (2002). Shaping Sustainable Energy Use in Chinese Cities. *DisP - The Planning Review*, *38*(151). https://doi.org/10.1080/02513625.2002.10556819

Saghir, J., & Santoro, J. (2018). *Urbanization in Sub-Saharan Africa: Meeting Challenges by Bridging Stakeholders*. https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/180411_Saghir_UrbanizationAfrica_Web.pdf

Saiz, E. (2020). *Local and Regional Governments are Ready to Carry into a Post-COVID-19 World that Cares for All of Us*. https://sdg.iisd.org/commentary/guest-articles/local-and-regional-governments-are-ready-to-carry-us-into-a-post-covid-19-world-that-cares-for-all-of-us/

Salahub, J. E., Gottsbacher, M., & de Boer, J. (2018). *Social Theories of Urban Violence in the Global South*. Routledge.

Samad, H. A., Koo, B. B., Rysankova, D., & Portale, E. (2019). *Bangladesh - Beyond Connections: Energy access diagnostic based on the Multi-Tier Framework*. https://openknowledge.worldbank.org/handle/10986/35267

Sawyer, L., Schmid, C., Streule, M., & Kallenberger, P. (2021). Bypass urbanism: Re-ordering center-periphery relations in Kolkata, Lagos and Mexico City. *Environment and Planning A: Economy and Space*. https://doi.org/10.1177/0308518X20983818

Schindler, S. (2017). Towards a paradigm of Southern urbanism. *City*, *21*(1). https://doi.org/10.1080/13604813.2016.1263494

Scott, N., Barnard-Tallier, M., Clements, A., Inston, R., Lapworth, S., & Price, M. (2020). *Landscaping Study - Modern Foods* (Modern Energy Cooking Services). https://mecs.org.uk/wp-content/uploads/2020/08/Landscape-Study-Modern-Foods-and-Eating-Habits.pdf

Shove, E., & Southerton, D. (2000). Defrosting the Freezer: From Novelty to Convenience. *Journal of Material Culture*, *5*(3). https://doi.org/10.1177/135918350000500303

Siba, E. (2018, June 21). Can Secondary Cities Bridge Urban and Rural Economies in Africa? *Brookings: Africa in Focus*. https://www.brookings.edu/blog/africa-in-focus/2018/06/21/can-secondary-cities-bridge-urban-and-rural-economies-in-africa/

Silver, J. (2014). Incremental infrastructures: Material improvisation and social collaboration across post-colonial Accra. *Urban Geography*, *35*, 788–804. https://doi.org/10.1080/02723638.2014.933605

Simone, A. (2015). The Urban Poor and Their Ambivalent Exceptionalities. *Current Anthropology*, *56*(S11). https://doi.org/10.1086/682283

Simone, A. M. (2004). People as Infrastructure: Intersecting Fragments in Johannesburg. *Public Culture*, *16*(3). https://doi.org/10.1215/08992363-16-3-407

Simone, A. M. (2018). The Urban Majority and Provisional Recompositions in Yangon: The 2016 Antipode RGS-IBG Lecture. *Antipode*, *50*(1), 23–40. https://doi.org/10.1111/anti.12344

Simone, A. M., & Pieterse, E. (2017). *New Urban Worlds: Inhabiting Dissonant Times*. Polity.

Singh, R., Wang, X., Mendoza, J. C., & Ackom, E. K. (2014). Electricity (in)accessibility to the urban poor in developing countries. *Wiley Interdisciplinary Reviews: Energy and Environment*, 339–353. https://doi.org/10.1002/wene.148

Sirohi, R. A. (2017). Alternate paths to economic development:a comparative analysis of Brazil and India in the era of neoliberalism. *Revista de Economia Política*, *37*(2). https://doi.org/10.1590/0101-31572017v37n02a03

The World Bank. (2020, July 8). *Food security and COVID-19*. Webinar Presentation.

Timsina, N. P. (2020). *Trend of Urban Growth in Nepal with a focus on Kathmandu Valley: A Review of Processes and Drivers of Change* (No. 1; Tomorrow's Cities: Urban Risk in Transition). https://era.ed.ac.uk/bitstream/handle/1842/37436/Tomorrow%27s Cities Working Paper %231.pdf?sequence=1&isAllowed=y

To, L. S. (2020). Community Energy Resilience for a New Climate Urbanism. In *Climate Urbanism*. Springer International Publishing. https://doi.org/10.1007/978-3-030-53386-1_13

Toesland, F. (2019). Africa's Megacities a Magnet for Investors. *Africa Renewal*, 24–25. https://www.un-ilibrary.org/content/journals/25179829/33/1/11/read

United Nations Department of Economic and Social Affairs - Population Division. (2018). *The World's Cities in 2018 - Data Booklet*. https://www.un.org/en/events/citiesday/assets/pdf/the_worlds_cities_in_2018_data_booklet.pdf

United Nations Department of Economic and Social Affairs - Population Division. (2019). World Urbanization Prospects: The 2018 Revision. In *ST/ESA/SER.A/420*. https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf

Wang, Q., Lin, J., Zhou, K., Fan, J., & Kwan, M.-P. (2020). Does urbanization lead to less residential energy consumption? A comparative study of 136 countries. *Energy*, *202*. https://doi.org/10.1016/j.energy.2020.117765

Ward, M. (2014). *Africa's Digital Revolution: Full Speed Ahead*. World Policy. http://worldpolicy.org/2014/03/04/africas-digital-revolution-full-speed-ahead/

Westphal, M. I., Martin, S., Zhou, L., & Satterthwaite, D. (2017). *Powering Cities in the Global South: How Energy Access for All Benefits the Economy and Environment*. https://files.wri.org/s3fs-public/powering-cities-in-the-global-south.pdf

Wyse, S. M., & Hoicka, C. E. (2019). "By and for local people": assessing the connection between local energy plans and community energy. *Local Environment*, *24*(9). https://doi.org/10.1080/13549839.2019.1652802

Zeiderman, A. (2008). Cities of the future?: Megacities and the space/time of urban modernity. *Critical Planning*, *Summer*, 23–39. http://eprints.lse.ac.uk/44870/