Cities and Energy Transitions

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Summary

The UK government has set the goal of 78% reduction in CO_2 emissions by 2035 but it is not clear how this will be achieved. Evidence from case studies and policy impact assessments suggest that if we are to meet global emission targets, and want to achieve a truly transformative energy transition in cities, we urgently need:

- Bolder government intervention.
- A wider range of green policy instruments to be in place in 2022.
- Integrated climate, transport and housing policy objectives.
- To tackle the crucial issue of who pays for the bill for decarbonisation in a socially just way.

In the coming decades, 90% of urbanisation will take place in the developing world. It is estimated that in 2030, 40% of the world population will live in informal settlements, needing access to adequate housing and energy infrastructure. Energy transition is an opportunity to rethink the city and to include previously unacknowledged groups, such as informal settlement dwellers, in decision-making.

The context

As his response to the IPCC's sixth assessment report, UK government chief scientific advisor Patrick Vallance wrote in The Guardian in August 2021 that 'nothing short of transforming society will avert catastrophe.[1] Yet current 'changes' appear to be additive to fossil fuel systems rather than real transitions or substitution. The UK government has set the goal of 78% reduction in CO_2 emissions by 2035 but it is not clear how this will be achieved.

Reducing reliance on fossil fuels and mitigating climate change are the main drivers behind energy transitions in cities. There are also other factors: the mitigation of energy poverty and changes in domestic practices in which households are seen to be increasingly demanding larger, better and warmer homes. In the Global South, climate emergency is colliding with migration to cities. According to UN-Habitat, 90% of urbanisation will take place in the developing world in the coming decades and it is estimated that in 2030, 40% of the world's population will live in informal settlements,[2] needing access to adequate housing and energy infrastructure. Cities in the developing world will face the nexus of climate impacts, urban migration and rapid increase in informal settlements, with the expectation to provide affordable and clean energy to all households (UN-SDG 7).

Energy transition is not only a technical challenge but an opportunity **to rethink our cities**, community participation and equality.

The challenge for cities is to move from experimentation to replication and repetition of effective policies, learning from previous case studies and policy impact assessments.[3] The first section of this paper looks at realities in politics of transition, extracting insights from thermal retrofit policies in Germany and the UK. The second section of this paper asks who is included and excluded in decision-making in cities, focusing on global and Southern perspectives.

1 The Guardian, (2021), www.theguardian.com/commentisfree/2021/aug/09/ipcc-report-transforming-society-avert-catastrophe-net-zero, 9 August 2021

2 UN-Habitat, (2016), unhabitat.org/up-for-slum-dwellers-transforming-a-billion-lives-campaign-unveiled-in-europe

3 Van der Heijden., J., (2021), 'Sustainable and Climate Resilient Cities? Stop Experimenting, Start Scaling', *Buildings and Cities,* Available at: www.buildingsandcities.org/insights/commentaries/cop26-scaling.html

Politics of transition

If we are serious about achieving global 2030 emission reduction targets, we need legislation and policy to be in place by 2022 to give enough time for investors to make a decision and then for the impact of those investments to be realised. If we do not have policies in place now, investors will not make decisions on time. **Bolder government intervention** in climate, housing and transport policy is necessary in order to meet global 2030 objectives and to ensure that policies are achieving the desired outcomes.

Policy makers are often risk averse, and there is a need to attract a substantial number of investors - most of those who show some interest do not necessarily invest in the end. There needs to be **a wider range of green policy instruments** in place in 2022. There needs to be more choice in types of policy instruments. Not every policy is going to work and a green policy instrument is not necessarily a good one. In September 2021, UK government's £1.5bn green homes grant program, designed to insulate homes and reach 600,000 households, collapsed after just 6 months due to its rushed implementation, unrealistic timetable and formal complaints, UK Greenpeace blaming 'cowboy politicians' for the policy failure.[4]

Learning from **comparative case studies**, from smart local energy systems[5] to energy and infrastructure pathways,[6] is essential in developing effective policy instruments. For example, comparison between the US Better Buildings Neighborhood Program (BBNP) and the original Green Deal in the UK (2013-15) shows how the BBNP was more successful in converting energy assessments to actual retrofits. The Green Deal failed due to high interest rates (7-10%) and its' 'golden rule' which meant that only those energy efficiency measures that could pay back with energy savings and within their expected life cycle could be funded. The BBNP engaged the workforce to stimulate retrofit supply and demand and included a specific data collection strategy and library. The Green Deal made the general assumption that homeowners act economically rationally and will take up thermal retrofits if these are economically attractive, but the government did little else to drive the policy's implementation.[7]

Countries like Germany and the UK have had decades of experience in green policies to learn from. Any policy that fails to deliver its targets needs to reflect on **why people are resisting it**. Policies tend to focus on economically rational solutions but in the UK, some implementation barriers to thermal retrofits have been reported not to be financial at all, such as fearing the disruption created by building work or reluctance to change aesthetics of the building, especially if it has heritage value or is located in a street where a new facade would make it 'stand out'.[8] Germany implemented a comprehensive, mandatory thermal retrofit policy. It offers an interesting case study on why households are reluctant respond and how hard it is to predict policy outcomes.[9] The German policy required a 2% equivalent comprehensive retrofit rate per year to meet its long-term goals but was achieving

4 The Guardian, (2021), www.theguardian.com/environment/2021/sep/08/audit-office-blames-uk-government-for-botched-15bn-green-homes-scheme, 8 September 2021

5 EnergyREV, (2021), www.energyrev.org.uk

6 Sustainable Development Solutions Network/Zero Carbon Consortium, 2020, *America's Zero Carbon Action Plan (ZCAP),* Available at: https://www.unsdsn.org/Zero-Carbon-Action-Plan#

7 A. Gillich, M. Sunikka-Blank, M., Ford, A., (2016), 'Lessons for the UK green deal from the US BBNP', *Building Research and Information,* 45(4): 1-12.

8 Sunikka-Blank, M., Galvin, R., (2015), 'Irrational homeowners? How aesthetics and heritage values influence thermal retrofit decisions in the United Kingdom', *Energy Research and Social Science,* 11: 97-108.

9 Galvin R., Sunikka-Blank M., (2013), *A Critical Appraisal of Germany's Thermal Retrofit Policy: Turning Down the Heat.* Berlin/Heidelberg/New York: Springer-Verlag.

0.2%. German thermal retrofits at their best have produced energy consumption reductions per retrofitted dwelling of around 22-25%[10] rather than the theory-driven 60-80% that policymakers have claimed is the norm.[11] Policy makers often fail to take account of behavioural effects (prebound[12]/rebound[13] effects) that can distort emissions policy planning, as they cause energy savings to be less than expected, sometimes by a very wide margin. Germany's approach of trying to motivate households to retrofit on the basis that it is 'economically viable' – that it will pay back, through energy savings, within the lifetime of the retrofit measures – did not ring true to homeowners and missed the point that many will retrofit for other reasons, such as comfort, environmental concern, or wanting to have a technically high-quality house.

As energy transitions in cities are becoming more urgent, we need to discuss the elephant in the room: **who pays for the bill for decarbonisation** and how this is done in a socially just way. This can be illustrated by looking at the costs of thermal retrofitting existing homes. Based on data from the UK's 'Retrofit for the Future' (RfF) program, deep retrofits aiming to achieve 80% reductions in energy consumption were estimated to cost around £90,000 per home. The successor to RfF, 'Scaling up Retrofit', cost around £15,000 per home with 50% reduction targets.[14] This is a cost that few consumers are willing or able to pay for. In Germany, in order to support thermal retrofits that go beyond the minimum regulatory standards, the German Development Bank (KfW) offered subsidised loans for insulation and window replacement if these exceeded the mandatory standards. But while this was able to drive retrofits deeper, it ended up subsidising the least cost-effective end of retrofitting, since there are rapidly diminishing returns for higher thermal standards.[15]

The pandemic has exacerbated economic policy challenges by undermining revenue streams at a time when increased expenditures are required for public health. It is likely that energy transition in cities will be paid by consumers and taxpayers, including potentially some companies, depending on their expectations of future investment. If taxation is the main solution to finance decarbonisation, and city regions are expected to meet their own climate targets, governments need to ensure that more tax revenue, beyond the council tax, is returned to the city regions. **The carbon fee and dividend model** should be explored further: to place a fee on externalities of carbon emissions and to provide direct dividend to residents. However, it might not solve the problem if we do not put a price on the root cause (i.e. on the polluter) and do so in a way that does not disproportionately impact the consumer and taxpayer.[16]

In the absence of such a model how will poor families afford energy transition?[17] The shift from gas to electricity comes with a price tag. Domestic gas prices in the UK have escalated in 2021. In the UK, some of the poorest households have no other

10 Galvin, R., (2010), 'Thermal upgrades of existing homes in Germany: the building code, subsidies, and economic efficiency', *Energy and Buildings,* 42: 834-844.

11 BMVBS/Bundesminsterium für Verkehr, Bau und Stadtentwicklung, (2014), *Maßnahmen zur Umsetzung der Ziele des Energiekonzepts im Gebaudebereich e Zielerreichungsszenario.* Berlin: BMVBS.

12 Sunikka-Blank, M., Galvin, R., (2012), 'Prebound effect, the gap between performance and the actual consumption', *Building Research and Information,* 40(3): 260-273.

13 Galvin, R., (2016), *The rebound effect in home heating.* London: Routledge.

14 Galvin, R., Sunikka-Blank, M., (2017), 'Ten questions concerning sustainable domestic thermal retrofit policy research', *Building and Environment,* 118: 377-388.

15 Rosenow, J., Galvin, R., (2013), 'Evaluating the evaluations: evidence from energy efficiency programmes in Germany and the UK', *Energy and Buildings,* 62: 450-458.

16 Notes from the British Academy roundtable on Cities and Energy Transitions, 28 July 2021.

17 Madlener, R., (2020), 'Sustainable energy transition and increasing complexity: Trade-offs, the economics perspective and policy implications'. In R. Galvin (Ed.) *Inequality and Energy: How extremes of wealth and poverty in high income countries affect CO2 emissions and access to energy use.* London: Elsevier Academic Press.

option than to rely on pre-paid energy meters with high tariffs - whereas in countries like Finland electricity is considered as a fundamental right and energy companies cannot refuse to sign contracts with consumers with bad credit history. Household fuel bills are likely to increase further, while individuals will be encouraged to improve the energy envelopes of their houses. In the UK, there is a push for heat pumps in decarbonisation of heating. But low-come households do not usually own their property: they rent. **Lack of affordable housing** has led to renting as norm in UK cities. This exacerbates the landlord-tenant dilemma, where retrofitting is avoided because the landlord would need to invest and the tenant would get the benefits. Low-income single parent families are one of the most vulnerable groups exposed to fuel poverty. 90% of UK single parents are women and due to their disadvantaged economic situation, single parents are less likely to own their own property and therefore have little control over improving its condition.[18] Climate policies need to consider, and they often forget, that in reality people's choices are always influenced by wider structural factors in society.[19]

18 Sunikka-Blank, M., (2020), 'Why are women always cold? Gendered realities of energy injustice'. In R. Galvin (Ed.) *Inequality and Energy: How extremes of wealth and poverty in high income countries affect CO2 emissions and access to energy use.* London: Elsevier Academic Press.

19 Galvin, R., (2020), 'Power, evil and resistance in social structure: A sociology for energy research in a climate emergency'. *Energy Research & Social Science,* 61.

Urgency vs. justice debate: who is involved and excluded in urban planning decisions in the city?

While a global perspective is essential in tackling the climate emergency, it is important to understand how geography and regional opportunities shape decision-making in cities. The material capacity for new energy systems, local and municipal governance and civil society are significantly different across cities. Delhi or Durham are very different places called 'cities'. Technical solutions such as appropriate electricity grids depend on the context: where we are, what already exists. This puts emphasis on **local governments and civil society** in energy transition.

We need to make use of local knowledge to ensure integrated policy objectives and just outcomes in terms of distributive energy justice. For example, in slum transition housing projects in India, residents are subject to distributive energy injustice in terms of inaccurate billing and high tariffs. Feedback mechanisms exist but energy distribution companies do not take them seriously, partly because these clients represent low-come, marginalised households.[20] In cases such as this, state intervention is needed to convince energy companies to listen, including practical measures such as official energy auditors sent to low-income communities. **ICT based tools such as smart meters** can help local communities to defend their rights but their rollout is usually designed for middle income households.

Investing in citizen activism is useful for policy makers: people may lack understanding of government processes and what governments can do, which can lead to unrealistic expectations and possibly resistance to energy transitions. Inclusion of local communities can help to create the right political climate for change. An important question is **how community groups could be more fully represented and engaged in local decision-making.** This is an area where countries like the UK can learn from practices in the Global South. For example, in South Africa where housing and energy access are considered as citizen rights but the government has not delivered, community based organisations and NGOs, such as Development Action Group/DAG, have developed models for community activism that address the discrepancy between policy intent and reality. In addition to the need for budgeting, training, and one-stop citizen advice offices, the models call for recognition of community-based organisations and civil leadership by local governments.[21] They offer a set of tools for community profiling: local governments may take for granted that they know their community but there can be serious misconceptions. This can be overcome by social audits, neighbourhood analysis and asset mapping. Their community participation models could offer frameworks for including previously underrepresented groups in decision-making in cities.

There has been a technocentric narrative in energy policies that side-lines questions of issues such as gender, which should be central. Policies tend to overlook **women as key agents in domestic energy transitions**. In developing countries women's traditional role at home leads to them having far more influence than men on domestic energy consumption. Yet women are often excluded in decision-making.

20 Debnath, R., Bardhan, R., Darby, S., Mohaddes, K., Sunikka-Blank, M., Villaça Coelho, A.C., Isa, A., (2021), 'Words against injustices: A deep narrative analysis of energy cultures in poverty of Abuja, Mumbai and Rio de Janeiro', *Energy Research and Social Science,* 72.

21 The Development Action Group/DAG, (2019), *Community Activism and Social Justice,* Available at: www.dag.org.za/wp-content/uploads/2020/02/dag_community-activism-and-social-justice-_actpweb.pdf

Public participation processes do not yet guarantee that all community groups' voices are heard or that women's priorities are implemented. In slum rehabilitation housing in Mumbai, female representation on housing co-operative management board did not make a change but a fully female housing co-operative was able to implement their set of priorities such as cleaning up the area, organising regular maintenance bills, installing rooftop solar and introducing a children's play area.[22] In Colombia, as part of PEAK project,[23] a group of 40 women influenced a municipal plan to better reflect the needs of low-income residents in *Itagüí*. The group was named *Dimú*[24] (dialogue with entrepreneurial women) to give them identity and they gave feedback on local development plans on issues related to transport, environmental policy, and access to health services. The input was gathered through non-traditional methods such as WhatsApp, voice message, video or in writing. The final plan, published in June 2020, reflected key points raised by *Dimú* including pledges to invest in pedestrian walkways in their neighbourhood, recover the local environmental leaders programme, support development of farmers markets, and recognition that participatory processes should engage rather than 'educate' citizens. As a result, the relationship between the community and municipal authorities became stronger and should lead to more inclusive developments in the future. In SUNRISE project in rural India, community engagement showed that local health workers and *anganwadi* pre-school teachers were in key roles to build trust in village communities in their transition to solar energy - especially among women.[25] It should not be forgotten that women are generally underrepresented in the energy sector, technology development and academic publications.[26] The survey of 4500 research papers recently published in key energy journals indicated that less than 16% of authors were women.[27]

Justice, access and inclusion in public space is an overlooked aspect of justice debate. As much as we build high-performance buildings, or increase the number of electric vehicles, the impact is not satisfactory if we do not consider the way cities are designed. There is a debate between 'compact city' and 'sprawling city', or more fundamentally, 'compact city' and 'sustainable city' and what a sustainable city should look like. The reality is that in 2030, the majority of cities will be in the Global South with large pockets of informal housing. Benefits of community-led, in-situ regeneration are well known, contributing to UN-SDG 11 of sustainable communities. Millions of households will need to move from informal to formal housing – but how to mitigate lifestyle change and increased energy demand that comes with this transition?[28] Urban densification has been used as a strategy to develop sustainable cities through the compact city model but can densifying already hyper-dense cities of the Global South produce the desired effect? Densification can have unintended consequences if it is based on typologies that kill the street and public space in cities and draw domestic practices indoors to be reliant on energy services. Examples of this can be seen from Mumbai to Jinan.[29] For example, Indian policy makers have a mission to build 20 million rural and urban homes by 2022, under the government of India's 'Housing for All' agenda. This volume of construction must not have the unintended consequences of creating environments that are habitable only with AC,

22 Bardhan, R., Sunikka-Blank, M., Nasra Haque, A., (2019), 'Sentiment analysis as tool for gender mainstreaming in slum rehabilitation housing management in Mumbai, India', *Habitat International,* 92.
23 Orjuela, J.P., Schwanen T., (2021), *Communities, Accessibility and healthy living in Itagui,* www.peak-urban.org/project/communities-accessibility-and-healthy-living-itagui
24 Orjuela J.P., (2020), *What's in a name? Belonging!* www.peak-urban.org/blog/whats-name-belonging
25 SUNRISE project symposium, 22 September 2021.
26 A. Elnakat, J. Gomez, (2015), 'Energy engenderment: an industralised perspective assessing the importance of engaging women in residential energy consumption', *Energy Policy,* 82: 116-177.
27 B.K. Sovacool, (2014), 'What are we doing here? Analyzing fifteen years of energy scholarship and proposing a social research agenda', *Energy Research and Social Science,* 1.
28 Sunikka-Blank, M., Bardhan, R., Abdie, D., (2021), ''We Need Ground Space': Urban Densification and Transitional Housing in Ethiopia', *Journal of the British Academy,* 9(8).
29 Li, X., Sunikka-Blank, M., 2021, 'Urban densification and social capital: neighbourhood restructuring in Jinan, China', *Buildings and Cities,* 2(1).

fans and electric lights.[30] Street, communal spaces and public space design should be considered as a wild card in climate policy, especially as regards behavioural patterns.[31]

It should not be forgotten that 'urban' beyond cities is also seeing a lot of lifestyle changes and increase in energy consumption. We need to ask what responsibilities cities have towards **rural areas** in energy transitions. Urban migration in the developing world is largely driven by lack of livelihoods and economic opportunities. Yet agricultural productivity, for example, can be improved by solar powered water pumps, refrigerators for products that otherwise would not reach the market on time and solar thermal systems to dry food products. Energy transitions in rural and peri-urban areas can mitigate excessive urban migration and release pressure on cities. Climate policies need to think more widely on the 'city', expanding into the surrounding rural areas, local knowledge, resources and labour flows.

Fig. 1 Energy transition is a moment to rethink the city and to ensure integrated housing, transport and climate policy objectives, when millions of households move from informal for formal.
Left: Dharavi, Mumbai. Right: housing built by Slum Rehabilitation Authority/SRA, Mumbai

30 Sunikka-Blank, M., Bardhan, R., Haque, A.N., (2018), 'Gender, domestic energy and design of inclusive low-income habitats: A case of slum rehabilitation housing in India'. *Energy Research and Social Science,* 49: 53-67.

31 Notes from the British Academy roundtable on Cities and Energy Transitions, 28 July 2021.

Towards better integration of climate change goals and decision-making about transport and energy in cities

In the last 20 years we have seen many states of emergency – usually declared from above. School strikes have allowed the climate emergency to be defined more broadly by others. Energy transition is an opportunity to redefine and **reconceptualise the city,** drawing from the involvement of previously unacknowledged community groups and their local knowledge. For example, 'informality' in cities should not be seen as inferior or as separate from the formal sphere of governance; it is produced by and intimately connected to formality.[32] Solutions for low income settlements do not need to be seen as separate from grid-connected areas. Discussion on energy transitions in cities and regions, resources and labour flows, needs to be expanded to a wider perception of 'urban': it should focus on city-regions, rather than seeing cities cut off from their regions.

It is often forgotten in climate policy that we can **learn from the past**. An example of this is Glasgow's previous energy transition, its' impact on the community - and its political relevance that continued to resonate until the 2014 Scottish Independence referendum.[33] The 19th and 20th century coal economy, and the proximity to Clyde and Lanarkshire/Ayrshire coal fields, were crucial to the making of modern Glasgow and its surrounding urban fabric. The city's development was influenced by power relations in the energy sector, canal and rail network transport, steel manufacturing technology, deep water resources and urban power stations. Transition to oil threatened Glasgow's coal-based system and prosperity, linked with suburbanisation, changes in transport and population decline. The geography of power moved from Glasgow and Clydeside capital to state administrators in Edinburgh and London and multinational headquarters in the United States. Scotland's last coal mine in closed in 2002 and renewables manufacturing has not taken hold, despite wind power being presented as a way for Scotland to achieve 'reindustrialisation' in the 2014 referendum and world-leading advances in renewable electricity generation.[34] Questions for clean energy transition emerge from this: does proximity or privileged access to natural resources determine outcomes of the transition and how much does the extent of investment in previous infrastructures determine outcomes in clean energy transitions?[35] Will clean energy transitions in city-regions lead to changes in local identities among carbon stakeholders and if so, what is the political relevance?

Clean energy transition needs local action in the path to net zero and to reach global 2030 targets. Housing or transport policy cannot have unintended consequences that offset climate policy targets. Local government authorities often work in siloes but climate policy in cities needs to work with planning, transport and housing policy and, most important, with local communities, to avoid incoherence and to ensure **integrated policy objectives**.

32 Notes from the British Academy roundtable on Cities and Energy Transitions, 28 July 2021.
33 Gibbs, E., (2021), *Coal Country: The Meaning and Memory of Deindustrialization in Postwar Scotland.* London: University of London Press.
34 Gibbs, E., (2021), 'Scotland's faltering green industrial revolution', *Political Quarterly,* 92(1): 57-65.
35 Notes from the British Academy roundtable on Cities and Energy Transitions, 28 July 2021.

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