



## De-centering transitions: Low-carbon innovation from the peripheries

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### ABSTRACT

Socio-technical transitions have garnered significant attention in recent years. Both in theory and practice, however, concerns have been raised about the elitist character of low-carbon transitions. Such dynamics are predominantly imagined through core-periphery relationships. More recently, calls to ‘decentre’ transitions draw attention to the social and spatial dynamics of transitions in the peripheries. Recognizing and fostering transitions from the peripheries offers important opportunities for progressing low-carbon innovation in practice and opens the door to deeper structural transformations. This perspective must nevertheless acknowledge the risk of transitions creating new core-periphery dependencies and reinforcing the strength of elites.

### Transitions: an elite agenda?

Low-carbon energy transitions unfold as uneven processes of socio-technical change that rearticulate pre-existing socioeconomic asymmetries and generate their own forms of disparity and disadvantage. Recent research, for example, highlights the negative impacts of low-carbon transitions on vulnerable populations through lenses such as ‘dispossession by decarbonisation’ (Sovacool et al., 2021), low-carbon transition ‘victims’ (Sovacool, 2021) and ‘low-carbon gentrification’ (Bouzarovski et al., 2018). Similarly, income-related differences in access to renewables and energy efficient technologies suggests unequal decarbonisation landscapes and hints at the appropriation of low-carbon technologies by the most affluent (Carley and Konisky, 2020). Not by chance, rich regions lead the deployment and uptake of transition technologies such as solar PV or electric cars.

There are also concerns about the ‘capture’ of low-carbon agendas by corporate energy actors through multi-stakeholder initiatives such as the UNFCCC, while fossil fuel regime incumbents such as coal, oil and gas producers exercise their elite power to hinder transitions (Sovacool and Brisbois, 2019). Overall, as global energy elites both resist and appropriate low-carbon transitions, they (re-) create conditions for action on climate targets.

Despite these issues, socio-technical transition theories have been slow to engage with the multiple inequalities associated with low-carbon innovation. These frameworks have proven instrumental for explaining the co-evolutionary, multi-dimensional and non-linear nature of socio-technical technological change and innovation. Yet they have also been criticised for overstating the importance of technological artefacts and for being naïve about matters of power and justice (Murphy and Smith, 2013) as well as for over-emphasizing the voice and agency of elites directly involved in technical and economic policy changes (Lawhon and Murphy, 2012).

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## De-centering transitions

Transition theories have traditionally understood the diffusion of innovations through a core-periphery lens by which new technologies emerge from the center and deployment and uptake on the peripheries takes place in later stages of development and at a faster pace (Cherp et al., 2018). More recent scholarship has moved away from geographically naïve, “spatially-blind centrifugal [innovation] diffusion” models (Golubchikov and O’Sullivan, 2020, p. 1) towards a finer level understanding of transitions as processes influenced by the social and spatial coordinates where they take place.

In this context, resource and energy peripheries (see Table 1) are increasingly gaining attention as geographical concepts that highlight the need to research socio-technical change beyond cores - and thus outside centres where elites dwell and thrive. They underline the spatial justice dimensions of transitions taking place in the form of core-periphery imbalanced power relations, social inequalities and uneven development.

**Table 1**

Key concepts in this viewpoint.

Resource periphery	“An area with a significant quantity of [energy] resources, which is dependent on ‘core’ areas because it is less developed, and is exploited by cores through, for example, migration or resource exploitation” (Munro (2019), p. 3)
Energy periphery	“Places that are systematically disadvantaged through the whole energy system due to their inferior position within the asymmetrical spatial distribution of material, economic, political and symbolic resources and capabilities” (Golubchikov and O’Sullivan, 2020, p. 2)

‘Energy peripheries’ concentrate a large proportion of the world’s energy poor even if they are not a major source of global carbon emissions. Thus socio-technical change in these regions is of paramount importance from an energy equity perspective. Examples of relevant low-carbon innovation in these contexts is found in transformative energy access models for African informal settlements (Koranteng, 2020) or in locally developed off-grid solar lighting solutions in Asia (Prabhu, 2017). Importantly, however, these trends are not restricted to the Global South. One example is in the metropolitan region of Madrid (Spain), where dwellers of Sector 5 and Sector 6 in the Cañada Real informal settlement - one of the largest in Europe - are installing off-grid solar PV *en masse* in response to the interruption of the electricity supply that has left nearly 4,500 people without power since October 2020 (Jones, 2021). The quick proliferation of solar PV in Cañada Real suggests that penetration rates for this low-carbon technology in this marginalised community are likely higher than in any other parts of the otherwise rich urban core of Madrid (see Fig. 1).



**Fig. 1.** Solar PV panels installed in the Cañada Real informal settlement (Madrid, Spain) after the interruption of the electricity supply started in October 2020. Source: Cañada Solar project (Light Humanity).

## Implications of low carbon innovation from the peripheries

These examples make clear that we need to move beyond a version of transitions that privileges elite knowledge to one that more fully embraces the experiences and perspectives outside the centres. In these ‘energy peripheries’, where the priority is in ensuring livelihoods and material living conditions, the uptake of transition technologies does not follow a low-carbon or climate change mitigation rationale. Flexibility and adaptability therefore emerge as key attributes driving the adoption of innovations - as long as such technologies strategically serve the purpose of securing living conditions more effectively than less climate-friendly alternatives. Such instances of ‘spontaneous’ peripheral transitions taking place in the absence of low-carbon politics may lead to longer-lasting and more equitable regimes of energy usage. More broadly, the prospect of a de-centered research agenda on transitions ‘from the periphery’ also appeals to the transformative, emancipatory potential of transitions beyond the realm of environmental and energy issues.

However, we also acknowledge the risk of transitions re-affirming the status quo and the power of elites. More often than not, the implementation of low-carbon agendas will result in peripheries depending on capital and technology imports from cores and thus reproducing exploitative ‘resource periphery’ dynamics and structural forms of spatial injustice (Samarakoon et al., 2021). In this scenario, socio-technical change taking place in or emerging from the peripheries would remain marginal and would have limited effect on the actual living conditions of those at the margins of global societies.

Almost by default, transitions destabilize pre-existing socio-technological regimes and, through such change, innovations emerging from ‘energy peripheries’ may provide an important mechanism to create more socially and environmentally just energy futures. This is not to suggest that peripheries, which often include vulnerable populations, should be expected to take on responsibility where innovations from elites have failed. Instead, they offer a way of challenging the politics of knowledge production and facilitating a more diverse array of innovation practices. Through deeper structural transformation, peripheries can therefore play a meaningful role in shaping more equitable low-carbon transition pathways.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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