

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

# Environmental Innovation and Societal Transitions

journal homepage: [www.elsevier.com/locate/eist](http://www.elsevier.com/locate/eist)

## Advancing urban transitions and transformations research

Jonas Torrens<sup>a,b,\*</sup>, Linda Westman<sup>c</sup>, Marc Wolfram<sup>d,e</sup>, Vanessa Castán Broto<sup>c</sup>, Jake Barnes<sup>f</sup>, Markus Egermann<sup>d</sup>, Franziska Ehnert<sup>d</sup>, Niki Frantzeskaki<sup>g</sup>, Chiara Farné Fratini<sup>h</sup>, Irene Håkansson<sup>i</sup>, Katharina Hölscher<sup>j</sup>, Ping Huang<sup>c,k</sup>, Rob Raven<sup>a,l</sup>, Antonia Sattlegger<sup>m</sup>, Kaisa Schmidt-Thomé<sup>n</sup>, Emilia Smeds<sup>o</sup>, Nina Vogel<sup>p</sup>, Josefin Wangel<sup>q</sup>, Timo von Wirth<sup>j,r</sup>

<sup>a</sup> Copernicus Institute of Sustainable Development, Utrecht University, the Netherlands

<sup>b</sup> Department of Industrial Engineering and Innovation Sciences, Eindhoven University of Technology, P.O. Box 512, Eindhoven, the Netherlands

<sup>c</sup> Urban Institute, Interdisciplinary Centre of Social Sciences (ICOSS), University of Sheffield, UK

<sup>d</sup> Leibniz Institute of Ecological Urban and Regional Development (IOER), Dresden, Germany

<sup>e</sup> Technische Universität Dresden, Chair of Spatial Development and Transformation, Germany

<sup>f</sup> Environmental Change Institute, University of Oxford, UK

<sup>g</sup> Centre for Urban Transitions, Swinburne University of Technology, Melbourne, Australia

<sup>h</sup> Department of Environmental Engineering, Technical University of Denmark (DTU Environment)

<sup>i</sup> Notting Hill Genesis, UK

<sup>j</sup> Faculty of Social and Behavioral Sciences, Dutch Research Institute for Transitions (DRIFT), Erasmus University Rotterdam, the Netherlands

<sup>k</sup> The Advanced Institute of Global and Contemporary China Studies, Chinese University of Hong Kong, Shenzhen, China

<sup>l</sup> Monash Sustainable Development Institute, Monash University, Australia

<sup>m</sup> Department of Human Geography and Spatial Planning, Utrecht University, the Netherlands

<sup>n</sup> Demos Helsinki, Finland

<sup>o</sup> Department of Science, Technology, Engineering and Public Policy, University College London, UK

<sup>p</sup> Department of Landscape Architecture, Planning and Management, Swedish University of Agricultural Sciences (SLU), Sweden

<sup>q</sup> Department of Urban and Rural Studies, Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden

<sup>r</sup> Wuppertal Institute for Climate, Environment, and Energy, Wuppertal, Germany

### ARTICLE INFO

#### Keywords:

Urban transitions  
Urban transformations  
Sustainability  
Urban planning  
Urban governance

### ABSTRACT

Urban transitions and transformations research fosters a dialogue between sustainability transitions theory an inter- and transdisciplinary research on urban change. As a field, urban transitions and transformations research encompasses plural analytical and conceptual perspectives. In doing so, this field opens up sustainability transitions research to new communities of practice in urban environments, including mayors, transnational municipal networks, and international organizations.

; UTT, Urban Transitions and Transformations; EIST, Environmental Innovations and Societal Transitions; STRN, Sustainability Transitions Research Network.

\* Corresponding author at: Department of Industrial Engineering and Innovation Sciences, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven, the Netherlands.

E-mail address: [j.colen.ladeia.torrens@tue.nl](mailto:j.colen.ladeia.torrens@tue.nl) (J. Torrens).

<https://doi.org/10.1016/j.eist.2021.10.026>

Received 31 July 2021; Received in revised form 20 October 2021; Accepted 26 October 2021

Available online 5 November 2021

2210-4224/© 2021 The Authors.

Published by Elsevier B.V. This is an open access article under the CC BY license

(<http://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

Achieving sustainability depends on delivering action at the urban scale. The urban transitions and transformations (UTT) research field analyses the role of cities in contemporary transformations (Hölscher and Frantzeskaki, 2021). The relationship between sustainability transitions and urban change became a focus of transition studies in the 2000s, when scholars pointed out that prevalent analytical approaches overlooked the dynamics of local action in cities and urban areas (e.g., Bulkeley et al., 2011; Frantzeskaki et al., 2017). Local action has always mattered to deliver global sustainability debates. Transition scholars focusing on the urban arena have demonstrated local actors' unique agency to facilitate experimentation and niche innovations (Bulkeley et al., 2015; Torrens et al., 2019). Since 2018, the Urban Transitions and Transformations thematic group within the Sustainability Transitions Research Network (STRN) has engaged actively in these debates.

This viewpoint reviews current debates in UTT research and proposes directions for advancing the field. Framing the field around transitions *and* transformations invites a dialogue with perspectives concerning sustainability transformations (Olsson et al., 2014), socio-ecological resilience (Elmqvist et al., 2019), and urban studies (Rutherford and Coutard, 2014). Transitions and transformations approaches have different entry points for analyzing radical systemic change towards sustainability, and thus, they generate multiple and innovative research avenues (Hölscher et al., 2018; Hölscher and Frantzeskaki, 2021).

## 2. New perspectives on space and transitions

The urban is not a neutral 'stage' for applying transitions research (Wolfram et al., 2019b). Perspectives such as relational geography and assemblage thinking question the urban as a passive scenario in which transitions happen (e.g., Bouzarovski and Haarstad, 2019; Blok, 2013). Such perspectives highlight dynamic interactions that elude conventional transitions research, especially the relationship between urban political processes, socio-spatial arrangements and scales, and the delivery of diverse types of experiments (Huang and Castán Broto, 2018; Torrens et al., 2019).

UTT research is revisiting transition debates' central assumptions such as socio-technical systems' obduracy (Moss, 2020; Roh-racher and Späth, 2013) and the influence of the cities' material fabric on the possibility of change (Hodson et al., 2017; Castán Broto, 2019). Ongoing work surveying systematically and empirically different UTT types aims to analyze and consolidate these assumptions (Hölscher and Frantzeskaki, 2021).

## 3. Rediscovering nature in transitions

The central role of ecology in urban transitions is a critical theme in UTT research. Multiple and intersecting ecological crises, induced by (urban) human activity, increasingly threaten livelihoods and wellbeing in urban areas. The socio-technical networks that provision urban systems extend from socio-ecological systems further afield, which influence the resilience of urban life (Meerow and Newell, 2019).

In its engagement with urban ecology, UTT research emphasizes a regenerative turn in urban human-nature relations (e.g., Breuste et al., 2020; Elmqvist et al., 2021). This 'regenerative turn' refers to both attempts to reimagine socio-ecological relations beyond current economic systems (e.g., Hatala et al., 2019; McMillen et al., 2020) and deliver practical insights for policy and planning in, for example, the design of the circular economy (Fratini et al., 2019). Nature-based solutions and green-blue infrastructures require shifting mindsets and challenge power relations (Dignum et al., 2020; Frantzeskaki et al., 2019). Urban political ecology approaches, in turn, show that experimentation involves fraught processes of reconfiguring material flows (e.g., Gopakumar, 2014). Increasing efforts at securitizing the urban environment often negatively impact disadvantaged populations and challenge resilience (UN-Habitat, 2020).

## 4. Politics of urban change

Urban history has demonstrated the risks of grandiose visions (Cugurullo, 2018; Hodson et al., 2017). Modern cities were built through brutal processes, such as slum clearance, red-lining, and mass displacement, riddled with class struggles, racial violence, discrimination, and marginalization. Urban history offers essential lessons for transition scholars. Claims of sustainability and inclusion deserve much scrutiny and engagement with critical urban and planning scholarship (e.g., Anguelovski et al., 2018; Wachsmuth et al., 2015).

UTT research highlights multiple 'loci' for politics around intersecting questions of place, identity, representation, recognition, and legitimacy (Grandin et al., 2018; Raymond et al., 2021). UTT must analyze the impactful changes happening under rapid urbanization, in postcolonial contexts, and outside the global circuits of urban knowledge (e.g., Ghosh and Schot, 2019). Studying transitions in or from 'elsewhere' (c.f. Bridge, 2018) demands engagement with feminist and decolonial practices (Robin et al., 2020; Swilling, 2020). Just transitions call for radical politics of recognition that challenge structural systems of oppression and discrimination sustained in plural epistemologies (Fratini et al., 2019).

## 5. Planning and governing change

Planning and governance systems reproduce models of urban development that intensify ecological pressures and social injustices (Rapoport, 2014). Cities often lack the 'urban transformative capacity' to initiate and navigate transformation processes (Wolfram et al., 2019a). Incumbent and insurgent actors that mobilize urban experimentation can rekindle urban development (Grin, 2020;

Scholl and De Kraker, 2021). Future research should explore whether efforts to transform urban governance and planning regimes are succeeding or mobilizing the (often unwieldy) multiplicity of actions already taking place (Bulkeley, 2021; Westman and Castán Broto, 2021).

The visions and imaginaries informing governance deserve further scrutiny. Dominant imaginaries of smart, healthy, circular cities are not bridging the sustainability gap (de Jong et al., 2015; Fratini et al., 2019; Hajer and Versteeg, 2019). UTT research demonstrates that alternative imaginaries follow transdisciplinary and co-creative engagement (Frantzeskaki et al., 2018). Critical reflections on existing paradigms are a means to build radical pathways towards sustainable urban futures (Hajer and Versteeg, 2019).

## 6. New research openings

UTT research intends to accelerate and nuance the responses to the climate crisis and global environmental change. Its findings enrich transition studies at large, benefiting the wider sustainability transitions community in the context of rapid urbanization. The EIST journal has led UTT research and is uniquely positioned to reflect new research openings. UTT research will benefit from perspectives beyond established transition approaches. Strategic interdisciplinary reviews have an important role here in enabling focused explorations through conceptual or empirical studies. UTT research also proposes to address the overrepresentation of Anglophone and Eurocentric scholarship in transitions research. Alternative perspectives on transitions have been silenced by global patterns of discrimination and inequality in knowledge production. In doing so, UTT research recognizes the plurality of knowledge relevant to transitions research and opens the field to new audiences that are yet to engage with sustainability transitions.

## Declaration of Competing Interest

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.

## References

- Angelovski, I., Connolly, J.J.T., Masip, L., Pearsall, H., 2018. Assessing green gentrification in historically disenfranchised neighborhoods: a longitudinal and spatial analysis of Barcelona. *Urban Geogr.* 39, 458–491. <https://doi.org/10.1080/02723638.2017.1349987>.
- Blok, A., 2013. Urban green assemblages: an ANT view on sustainable city building projects. *Sci. Technol. Stud.* 26, 5–24. <https://doi.org/10.1631/jzus.A12ISGT0>.
- Bouzarovski, S., Haarstad, H., 2019. Rescaling low-carbon transformations: towards a relational ontology. *Trans. Inst. Br. Geogr.* 44, 256–269. <https://doi.org/10.1111/tran.12275>.
- Breuste, J., Artmann, M., Loja, C., Qureshi, S., 2020. *Making Green Cities, Cities and Nature*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-37716-8>. Cham.
- Bridge, G., 2018. The map is not the territory: a sympathetic critique of energy research's spatial turn. *Energy Res. Soc. Sci.* 36, 11–20. <https://doi.org/10.1016/j.erss.2017.09.033>.
- Bulkeley, H., 2021. Climate changed urban futures: environmental politics in the anthropocene city. *Environ. Politics* 30, 266–284. <https://doi.org/10.1080/09644016.2021.1880713>.
- Bulkeley, H., Castán Broto, V., Edwards, G.A.S., 2015. *An Urban Politics of Climate Change: experimentation and the Governing of Socio-Technical Transitions*. Routledge, London. <https://doi.org/10.1017/CBO9781107415324.004>.
- Bulkeley, H., Castán Broto, V., Hodson, M., Marvin, S., 2011. *Cities and Low Carbon Transitions, Cities and Low Carbon Transitions*. Routledge, Oxon. <https://doi.org/10.4324/9780203839249>.
- Castán Broto, V., 2019. *Urban Energy Landscapes*. Cambridge University Press, Cambridge. <https://doi.org/10.1017/9781108297868>.
- Çugurullo, F., 2018. Exposing smart cities and eco-cities : Frankenstein urbanism and the sustainability challenges of the experimental city. *Environ. Plan. A* 50, 73–92. <https://doi.org/10.1177/0308518X17738535>.
- de Jong, M., Joss, S., Schraven, D., Zhan, C., Weijnen, M., 2015. Sustainable-smart-resilient-low carbon-eco-knowledge cities; making sense of a multitude of concepts promoting sustainable urbanization. *J. Clean. Prod.* 109, 25–38. <https://doi.org/10.1016/j.jclepro.2015.02.004>.
- Dignum, M., Dorst, H., van Schie, M., Dassen, T., Raven, R., 2020. Nurturing nature: exploring socio-spatial conditions for urban experimentation. *Environ. Innov. Soc. Transit.* 34, 7–25. <https://doi.org/10.1016/j.eist.2019.11.010>.
- Elmqvist, T., Andersson, E., Frantzeskaki, N., McPhearson, T., Olsson, P., Gaffney, O., Takeuchi, K., Folke, C., 2019. Sustainability and resilience for transformation in the urban century. *Nat. Sustain.* 2, 267–273. <https://doi.org/10.1038/s41893-019-0250-1>.
- Elmqvist, T., Andersson, E., McPhearson, T., Bai, X., Bettencourt, L., Brondizio, E., Colding, J., Daily, G., Folke, C., Grimm, N., Haase, D., Ospina, D., Parnell, S., Polasky, S., Seto, K.C., Van Der Leeuw, S., 2021. Urbanisation in and for the anthropocene. *NPJ Urban Sustain.* 1, 1–6. <https://doi.org/10.1038/s42949-021-00018-w>.
- Frantzeskaki, N., Castán Broto, V., Coenen, L., Loorbach, D., 2017. *Urban Sustainability Transitions*. Routledge, London and New York.
- Frantzeskaki, N., Hölscher, K., Bach, M., Avelino, F., 2018. *Co-creating Sustainable Urban Futures: A Primer on Applying Transition Management in Cities*. Springer.
- Frantzeskaki, N., McPhearson, T., Collier, M.J., Kendal, D., Bulkeley, H., Dumitru, A., Walsh, C., Noble, K., Wyk, E.V.A.N., Ordóñez, C., Oke, C., 2019. Nature-based solutions for urban climate change adaptation : linking science, policy, and practice communities for evidence-based decision-making XX, 1–12. 10.1093/biosci/biz042.
- Fratini, C.F., Georg, S., Jørgensen, M.S., 2019. Exploring circular economy imaginaries in European cities: a research agenda for the governance of urban sustainability transitions. *J. Clean. Prod.* 228, 974–989. <https://doi.org/10.1016/j.jclepro.2019.04.193>.
- Ghosh, B., Schot, J., 2019. Towards a novel regime change framework: studying mobility transitions in public transport regimes in an Indian megacity. *Energy Res. Soc. Sci.* 51, 82–95. <https://doi.org/10.1016/j.erss.2018.12.001>.
- Gopakumar, G., 2014. Experiments and counter-experiments in the Urban laboratory of water-supply partnerships in India. *Int. J. Urban Reg. Res.* 38, 393–412. <https://doi.org/10.1111/1468-2427.12076>.
- Grandin, J., Haarstad, H., Kjærås, K., Bouzarovski, S., 2018. The politics of rapid urban transformation. *Curr. Opin. Environ. Sustain.* 31, 16–22. <https://doi.org/10.1016/j.cosust.2017.12.002>.
- Grin, J., 2020. 'Doing' system innovations from within the heart of the regime. *J. Environ. Policy Plan.* 22, 682–694. <https://doi.org/10.1080/1523908X.2020.1776099>.
- Hajer, M., Versteeg, W., 2019. Imagining the post-fossil city: why is it so difficult to think of new possible worlds? *Territ. Politics Gov.* 7, 122–134. <https://doi.org/10.1080/21622671.2018.1510339>.

- Hatala, A.R., Morton, D., Njeze, C., Bird-Naytowhow, K., Pearl, T., 2019. Reimagining miyo-wicehtowin: human-nature relations, land-making, and wellness among Indigenous youth in a Canadian urban context. *Soc. Sci. Med.* 230, 122–130. <https://doi.org/10.1016/j.socscimed.2019.04.012>.
- Hodson, M., Geels, F.W., McMeekin, A., 2017. Reconfiguring urban sustainability transitions, analysing multiplicity. *Sustainability* 9, 299. <https://doi.org/10.3390/su9020299>.
- Hölscher, K., Frantzeskaki, N., 2021. Perspectives on urban transformation research: transformations in, of, and by cities. *Urban Transf.* 3 <https://doi.org/10.1186/s42854-021-00019-z>.
- Hölscher, K., Wittmayer, J.M., Loorbach, D., 2018. Transition versus transformation: what's the difference? *Environ. Innov. Soc. Transit.* 27, 1–3. <https://doi.org/10.1016/j.eist.2017.10.007>.
- Huang, P., Castán Broto, V., 2018. Interdependence between urban processes and energy transitions: the urban energy transitions (DUET) Framework. *Environ. Innov. Soc. Transit.* 28, 35–45. <https://doi.org/10.1016/j.eist.2018.03.004>.
- McMillen, H.L., Campbell, L.K., Svendsen, E.S., Kealiikanakaoleohailani, K., Francisco, K.S., Giardina, C.P., 2020. Biocultural stewardship, indigenous and local ecological knowledge, and the urban crucible. *Ecol. Soc.* 25, 1–14. <https://doi.org/10.5751/ES-11386-250209>.
- Meerow, S., Newell, J.P., 2019. Urban resilience for whom, what, when, where, and why? *Urban Geogr.* 40, 309–329. <https://doi.org/10.1080/02723638.2016.1206395>.
- Moss, T., 2020. *Remaking Berlin: A History of the City through Infrastructure*. MIT Press, pp. 1920–2020.
- Olsson, P., Galaz, V., Boonstra, W.J., 2014. Sustainability transformations: a resilience perspective. *Ecol. Soc.* 19 (4). <http://www.jstor.org/stable/26269651>.
- Rapoport, E., 2014. Utopian visions and real estate dreams: the eco-city past, present and future. *Geogr. Compass.* <https://doi.org/10.1111/gec3.12113>.
- Raymond, P.C., Williams, D., Di Masso, A., Manzo, L., Von Wirth, T., 2021. Introduction: senses of place in the face of global challenges. In: Raymond, C., Manzo, L., Williams, D., Di Masso, A., Von Wirth, T. (Eds.), *Changing Senses of Place: Navigating Global Challenges*. Cambridge University Press.
- Robin, E., Westman, L., Castán Broto, V., 2020. For a Minor perspective on climate urbanism: towards a decolonial research praxis, in: Castán Broto, V., Robin, E., While, A. (eds.), *Climate Urbanism: Towards a Critical Research Agenda*. Springer International Publishing, Cham, pp. 15–30. [10.1007/978-3-030-53386-1\\_2](https://doi.org/10.1007/978-3-030-53386-1_2).
- Rohracher, H., Späth, P., 2013. The interplay of urban energy policy and socio-technical transitions: the eco-cities of Graz and Freiburg in retrospect. *Urban Stud.* 51, 1415–1431. <https://doi.org/10.1177/0042098013500360>.
- Rutherford, J., Coutard, O., 2014. Urban energy transitions: places, processes and politics of socio-technical change. *Urban Stud.* 51 (7), 1353–1377.
- Scholl, C., De Kraker, J., 2021. Urban planning by experiment: practices, outcomes, and impacts. *Urban Plan.* 6, 156–160. <https://doi.org/10.17645/up.v6i1.4248>.
- Swilling, M., 2020. *The Age of Sustainability: Just Transitions in a Complex World*. Routledge, London.
- Torrens, J., Schot, J., Raven, R., Johnstone, P., 2019. Seedbeds, harbours and battlegrounds: on the origins of favourable environments for urban experimentation with sustainability. *Environ. Innov. Soc. Transit.* 31, 211–232. <https://doi.org/10.1016/j.asoc.2014.04.024>.
- UN-Habitat, 2020. *2020 World Cities Report: the Value of Sustainable Urbanization*. UN-Habitat, Nairobi.
- Wachsmuth, D., Aldana Cohen, D., Angelo, H., 2015. Expand the frontiers of urban sustainability. *Nature* 536, 391–393. <https://doi.org/10.4324/9780203109496-14>.
- Westman, L., Castán Broto, V., 2021. Transcending existing paradigms: the quest for justice in urban climate change planning. *Local Environ.* 26, 536–541. <https://doi.org/10.1080/13549839.2021.1916903>.
- Wolfram, M., Borgström, S., Farrelly, M., 2019a. Urban transformative capacity: from concept to practice. *Ambio* 48, 437–448. <https://doi.org/10.1007/s13280-019-01169-y>.
- Wolfram, M., Torrens, J., Castán Broto, V., Barnes, J., Fratini, C., Håkansson, I., Hölscher, K., Schmidt-Thome, K., Vogel, N., von Wirth, T., Wangel, J., Smeds, E., Frantzeskaki, N., 2019b. Urban pathways towards sustainability: concepts, knowledge boundaries and a transformative future agenda. In: *Proceedings of the International Sustainability Transitions Conference*. Ottawa, CA, p. 33.