

## Reshaping urban infrastructure for a carbon-neutral and sustainable future

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More than half of the world's population now lives in urban areas. Rapid urbanization in developing countries and urban re-development in developed countries are creating demand for new or renewed infrastructure in the coming decades. Cities worldwide are facing enormous challenges of providing infrastructure services in a carbon-neutral and sustainable manner. Here, urban infrastructure is referred to as the underlying structural foundation that supports socioeconomic activities in cities. It consists of key physical provisioning systems that provide resources and services, such as water, energy, shelter (buildings), mobility-connectivity, food, sanitation, waste management, and green and public spaces (Ramaswami, 2020; Ramaswami et al., 2016).

The way we design and construct infrastructure provisioning systems to cities shapes how we mitigate and adapt to climate change, and achieve sustainable development (Ramaswami, 2020; Dong et al., 2018). These urban infrastructure systems usually have a lifetime lasting from decades to centuries, and impose climatic impacts during their whole life cycles (from material extraction, building, maintenance and upgrading, to disposal of construction waste). However, global infrastructure systems, a large part of which serves the urban population, have locked in

a pathway of high carbon and resource intensities for decades, resulting in multiple challenges to sustainability, e.g., greenhouse gas (GHG) emissions, resources use, and public health (Chen et al., 2020; Ramaswami et al., 2016). GHG emissions from existing global infrastructure systems, e.g., energy, mobility, and construction material production, may already jeopardize the 1.5 °C climate target. The lock-in related to other important urban infrastructure systems, such as food and water provision, wastewater treatment, and solid waste management, can also have a strong contribution to GHG emissions (Dhakal and Ruth, 2017). In addition, urban infrastructure is embedded in larger infrastructure systems exceeding the city boundary. In many cases, the transboundary emissions and resource extraction of infrastructure triggered by urban consumption (e.g., demand for electricity and food produced outside of cities) are prominent (Ramaswami et al., 2016), and many of them were outsourced to regions with less strict environmental regulations and enforcement.

The lock-in and transboundary issues have increased the complexity of controlling the GHGs associated with urban infrastructure. There is a need to rethink alternative pathways to low-carbon or carbon-neutral urban infrastructure and how underlying industries and supply chains related to urban provisioning systems can better facilitate such transition. This underscores the fact that urban is a complex and open system. Towards this end, there is a need for new empirical and theoretical insights to inform public policy in this critical intersection of infrastructure and urbanization. Additionally, the integration of various models and tools will be beneficial to study the synergies between future climatic impact and other aspects of sustainable development, such as environmental quality, affordability, public health, and livability.

To catalyze studies of reshaping urban infrastructure for a carbon-neutral and sustainable future, this Virtual Special Issue (VSI) is aimed at new emerging insights to researchers, practitioners, and decision-makers on questions pertaining to sustainable design and carbon-neutral management of urban infrastructure systems (i.e., energy, mobility-connectivity, water supply wastewater treatment, solid waste management, buildings/shelters, food supply, and green/public spaces). We believe that this VSI can help gather state-of-the-art ideas and practices on the design, construction, use, and disposal of urban infrastructure, and foster new knowledge that supports building low-carbon/carbon-neutral and more sustainable infrastructure systems.

This VSI welcomes submissions on, but is not limited to, the following topics:

- Evaluation of the impacts of current urban infrastructures on environment and climate change and how they can be reduced in the future;
- Design and management of urban infrastructure future transitions under the constrain of future GHG emissions determined by national or global policies (e.g., national carbon neutrality goals, Paris Agreement);
- Advanced models and tools to track and assess the carbon footprint of urban infrastructure and urban infrastructure transitions/interventions, and how they contribute to climate change mitigation;
- Optimization of energy efficiency, other GHG mitigation strategies, and waste management related to urban infrastructures and their applications in urban planning;

- Trade-offs and synergies between energy use, carbon footprint, and social impacts of urban infrastructure;
- Nexus and connections of urban infrastructure with respect to public health, livability, well-being, social equity, and other sustainable development goals;
- Demonstrations and practical analyses of low-carbon or carbon-neutral projects and applications of urban infrastructure that have broad implications for urban infrastructure transitions towards carbon neutrality and sustainability; and
- Ex-post and ex-ante evaluation of urban infrastructure policies in relation to GHG emissions using quantitative and qualitative techniques.

### **Manuscript Preparation and Submission**

A Virtual Special Issue (VSI) is an online-only grouping of Special Issue articles traditionally assigned to a single Special Issue. The articles in a VSI will be assigned a unique identifier and published in a regular journal issue. The unique identifier allows to simultaneously add the article to a VSI in ScienceDirect.com. Articles grouped together in a VSI retain their original citation details. A VSI speeds up the publication of individual articles as, unlike the publication process for conventional Special Issue articles, a VSI does not need to wait for the final article to be ready before publication.

A detailed submission guideline is available as “Guide for Authors” at: <http://www.journals.elsevier.com/resources-conservation-and-recycling>. All manuscripts and any supplementary material should be submitted through the online editorial system (<https://www.editorialmanager.com/recycl>). The authors must select “SI: urban infrastructure” in the submission process.

### **Important Dates**

- Full paper submission deadline: 28 February 2022
- Final decision notification: 31 August 2022
- Publication: As soon as accepted (VSI)

### **References**

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