HOW READY ARE SUSTAINABLE URBAN SOLUTIONS?

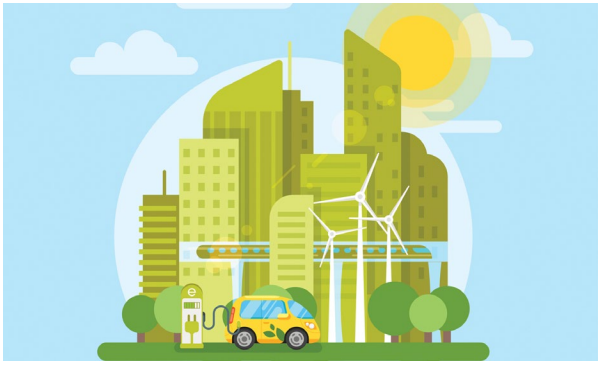
IN BRIEF

- The green and digital transformation of cities requires system innovations as key building blocks of sustainable urban development.
- Urban system innovations comprise products, services, processes or methods that lead to large-scale transformation.
- Reliable assessment of the readiness of such system innovations is essential to ensure effective management of the necessary development processes.
- A new method provides an alternative to the widely used TRL scale. It can be used to steer research programmes and manage R&D projects.

WHAT IS IT ABOUT?

To make cities more sustainable, comprehensive solutions that can be integrated into existing structures are needed. Consequently, research funding must focus not only on the development of new technologies but also on integrated systems that work in practice. However, transitioning from technology-oriented solutions to holistic approaches presents a number of challenges. One of these is the question of how the desired system innovations can be adequately described and how reliable insights into their stage of development can be obtained.

Readiness assessment is a well-established field of research and a widely used practice in consultancy. Initially, the focus was on evaluating the readiness of technologies that were considered critical to the success of innovations. For the assessment of the readiness of technologies under development, the nine-level Technology Readiness Level (TRL) scale has become the established standard. TRLs 1-3 correspond to the initial phases of a research and development project, during which an initial idea is formulated into a proof of concept and progressively refined. TRLs 4-6 form part of the validation and demonstration phase, which is initially carried out in a controlled laboratory environment and later under real or near-real conditions.



How ready are innovations for climate-neutral cities?

TRL 7 is the final stage of prototyping, whereas TRLs 8-9 represent the typical stages preceding the market readiness and the launch of a new technology.

Criticism of this highly technical approach has led to a number of proposals aimed at broadening the assessment to include more comprehensive perspectives. Whilst significant progress has been made in this area in recent years, a suitable approach for adequately assessing the readiness of urban innovations and identifying development options remains elusive.

BASIC DATA

Project title:	System Readiness - Ein Modell zur Bewertung des Reifegrads von urbanen Innovationen für die klimaneutrale Stadt
Project team:	Ornetzeder, M.; Bettin, S. (as part of a national consortium)
Duration:	02/2023 – 12/2023
Funded by:	Climate and Energy Fund
Website:	klimafonds.gv.at/projekte/system-readiness/

KEY RESULTS

Urban system innovations are defined as new products, services, processes or methods ("innovation as an outcome") that are used in urban environments and lead to progress within that environment. Examples of such urban system innovations that have either already been implemented or are still under development can be found in the fields of urban planning, transport, building design, and energy production.



Bild: DallE/ITA-ng

Seven dimensions for assessing readiness

In the transport sector, examples include public bicycle-sharing schemes, mobility centres, car-free neighbourhoods, and cycle highways. In recent years, the construction sector has developed and promoted green façades, and eco-friendly, sustainable timber construction has been adapted for multi-storey buildings.

Examples of energy-related innovations include so-called multi-energy systems, which enable cities to become independent of fossil fuels. To assess the readiness of urban system innovations, a model comprising seven dimensions has been proposed: (1) system architecture, (2) technology, (3) production, (4) infrastructure, (5) operation, (6) use, and (7) regulations. Each dimension is described and assessed independently.

The assessment is carried out using a nine-point scale that is largely based on the TRL methodology. The following procedure is proposed: First, the innovation to be assessed is selected and defined. The innovation is then described across the seven dimensions. On the basis of this, the readiness level is assessed using a set of questions. Finally, the results are reviewed for plausibility and recommendations are made.

WHAT TO DO?

Transforming cities to become more sustainable requires a holistic approach and holistic solutions. Research funding bodies, as well as innovation stakeholders, must increasingly focus on comprehensive systems that work in practice. To steer such developments effectively, reliable assessments of the readiness and deployability of such system innovations are essential.

- *Pilot application of the new methodology:* The methodology developed to assess the readiness of urban system innovations is now ready to be tested in practice during a pilot phase. A research programme aimed at developing solutions for a climate-friendly city is particularly well suited to this purpose.
- *Management of innovation processes:* The methodology is also suitable to continuously monitor innovation processes. Development teams gain detailed insights into the relevant dimensions of an innovation and can simultaneously identify areas with potential and deficits.
- *Application of the methodology to other areas:* A methodology that has been tested in practice and subsequently refined could also be useful for assessing the readiness of comprehensive innovations in other areas. This could be pursued within the framework of further research projects.

FURTHER READING

Wieser,H.; Kofler, J.; Bettin, S.; Ornetzeder, M.; Wedler, M. (2024) Guide „System Readiness Modell" for the assessment of the level of maturity of system innovations. *klimafonds.gv.at/wp-content/uploads/2025/03/System-Readiness-Modell_Handbuch.pdf*

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