

Press release**Fraunhofer-Institut für Angewandte Informationstechnik FIT****Alex Deeg**

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Research results

Electrical engineering, Energy, Environment / ecology, Information technology
transregional, national**Leveraging Twin Transformation: Digital Infrastructures to Advance Decarbonisation at the Nexus of Energy and Mobility**

The study "Leveraging Twin Transformation – Digital Infrastructures to Advance Decarbonisation at the Nexus of Energy and Mobility" analyses the importance of digital infrastructure for the successful integration of renewable energy sources and the electrification of the EU economic sectors. A so-called "Digital Spine" can bridge investment gaps in physical infrastructure by integrating existing generators and consumers across sectors. Four key building blocks form the basis for the Digital Spine: "Digital Identity Management", "Cross-Country Bidirectional Electric Vehicle Charging Infrastructure", "Smart Energy Applications", "Cross-Sector Connection and Collaboration".

>>Advanced Digital Technologies Enhance Supply and Demand-Side Flexibility

Our latest study, "Leveraging Twin Transformation – Digital Infrastructures to Advance Decarbonisation at the Nexus of Energy and Mobility", contributes to leveraging digital technologies for decentralised intelligence, which is crucial for enhancing supply and demand-side flexibility. Digital technologies enable the efficient integration of distributed renewable energy sources and effectively exploitation of energy assets' flexibility. Thus, digital technologies and a corresponding digital infrastructure layer contribute significantly to accommodating the increased share of renewable capacity following the REPowerEU Plan and the successful electrification of the EU's main economic sectors. Achieving a 'green' electrification of the mobility, industry, building, and agriculture sectors is pivotal in rapidly reducing carbon emissions and achieving the sustainability goals stipulated in the European Green Deal. By utilising advanced digital infrastructures, energy system operators can identify and monitor the crucial flexibility capacity of distributed energy assets and, consequently, reinforce the security and reliability of the energy system and support its decarbonisation.

>>The Digital Spine Bridges Infrastructure Investment Gaps in the Short to Mid-Term

The annual infrastructure investment gaps in the European Union for mitigating adverse climate change effects accumulate to over €406 billion, impeding the necessary progress of decarbonisation efforts. This study introduces the concept of the 'Digital Spine', which aims to bridge these gaps by leveraging advanced digital technologies. The concept of a Digital Spine enables cross-sectoral integration of existing infrastructures, enhancing efficiency, sustainability, and competitiveness at a European level. A resulting digital infrastructure layer optimises the use of renewable energy sources across sectors and can bridge the need for extensive investments in physical infrastructure in the short- to mid-term.

>>Key Building Blocks of the Digital Spine

The study presents four key Building Blocks that leverage the potential of digital technologies to contribute to the successful implementation of cross-sectoral use cases for decarbonisation. These Building Blocks include digital identity management, cross-country bidirectional electric vehicle charging infrastructure, smart energy applications, and

cross-sector connection and collaboration. These actionable and promising starting points to close pressing infrastructure investment gaps are essential for connecting relevant stakeholder groups and facilitating cross-sectoral collaboration. Immediate action on a European level is necessary to advance the adoption of these Building Blocks, which rely on digital technologies such as digital identity management, data ecosystems, artificial intelligence, and edge computing.

>>A Holistic Vision for Digital Infrastructures on a European Level

The ambitious plans of the European Union to achieve climate neutrality by 2050 require fast and extensive decarbonisation efforts across all sectors. In line with advancing the digital transformation of the EU and its Member States through the Digital Decade programme, the green electrification of the economic sectors requires the introduction of an appropriate digital infrastructure. The Digital Spine offers a solution to bridge infrastructure investment gaps and facilitate the cross-sectoral integration of existing physical infrastructure. Focusing on key Building Blocks for leveraging advanced digital technologies, this study outlines a path towards a successful green and digital transformation of industries. Policymakers and stakeholders must prioritise investments in digital infrastructures to ensure long-term economic prosperity and environmental sustainability.

Download study: <https://s.fhg.de/leveraging-twin-transformation>