

## Article

# An Open Digital Platform to Support Interdisciplinary Energy Research and Practice—Conceptualization

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**Abstract:** Energy research itself is changing due to digitalization and the trend to open science. While this change enables new research, it also increases the amount of, and need for, available data and models. Therefore, a platform for open digital energy research and development is required to support researchers and practitioners with their new needs and to enable FAIR (findable, accessible, interoperable and reusable) research data management in energy research. We present a functional and technological concept for such a platform based on six elements: *Competence* to enable researchers and practitioners to find suitable partners for their projects, *Methods* to give an overview on the diverse possible research methods within energy research, *Repository* to support finding data and models for simulation of energy systems, *Simulation* to couple these models and data to create user-defined simulation scenarios, *Transparency* to publish results and other content relevant for the different stakeholder in energy research, and *Core* to interconnect all elements and to offer a unified entry point. We discuss the envisioned use of the outlined platform with use cases addressing three relevant stakeholder groups.

**Keywords:** energy research; digital platform; research data management



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## 1. Introduction

Energy research is facing multiple challenges for practitioners and researchers. The energy systems' transition requires the integration of more decentralized renewable energy, increasing the complexity of energy systems [1]. The digitalization toward cyber–physical energy systems (CPES) addresses this issue by enabling a new level of automation. As a consequence, the complexity of simulations increases further, and their development requires additional technical skills and theoretical background [2]. Keeping results from simulations reproducible presents an additional challenge.

Due to the political, societal, and economic relevance of the energy systems' transition, energy research has received extensive funding from federal and state governments. These funds can be more efficiently used by opening models and data, as proposed by Open Science [3]. In this way, obstacles in interdisciplinary research can be overcome by providing a fundamental basis of freely accessible knowledge and tools. This change should be accompanied with making data more findable, accessible, interoperable, and reusable (FAIR) for humans and machines by applying the FAIR criteria [4]. This reduces barriers for participation in energy research and helps to produce new results and data more quickly.

Werth et al. introduced an open digital energy research and development (R&D) platform to enable FAIR energy research. The platform should help to improve energy research based on open science and the FAIR criteria with five key services for researchers and practitioners. These key services are *Competence* to enable researchers and developers to