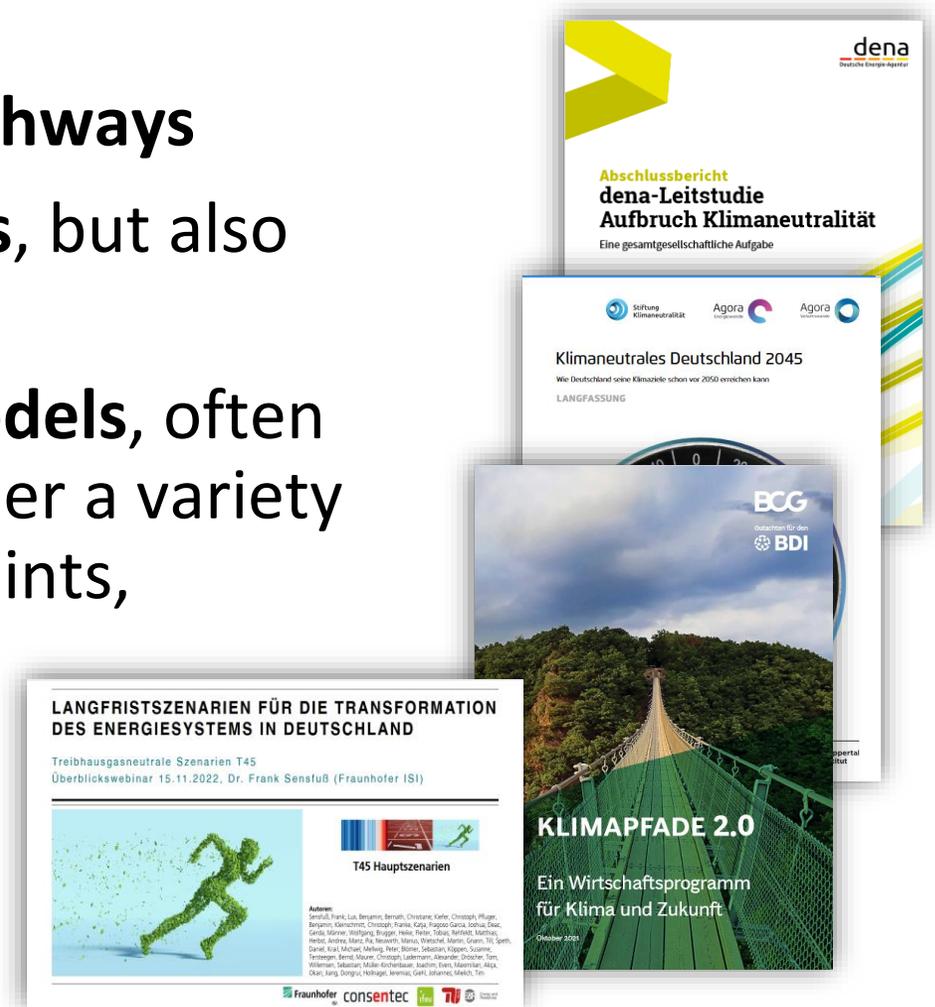


Representation of societal and political factors in long-term energy system scenarios

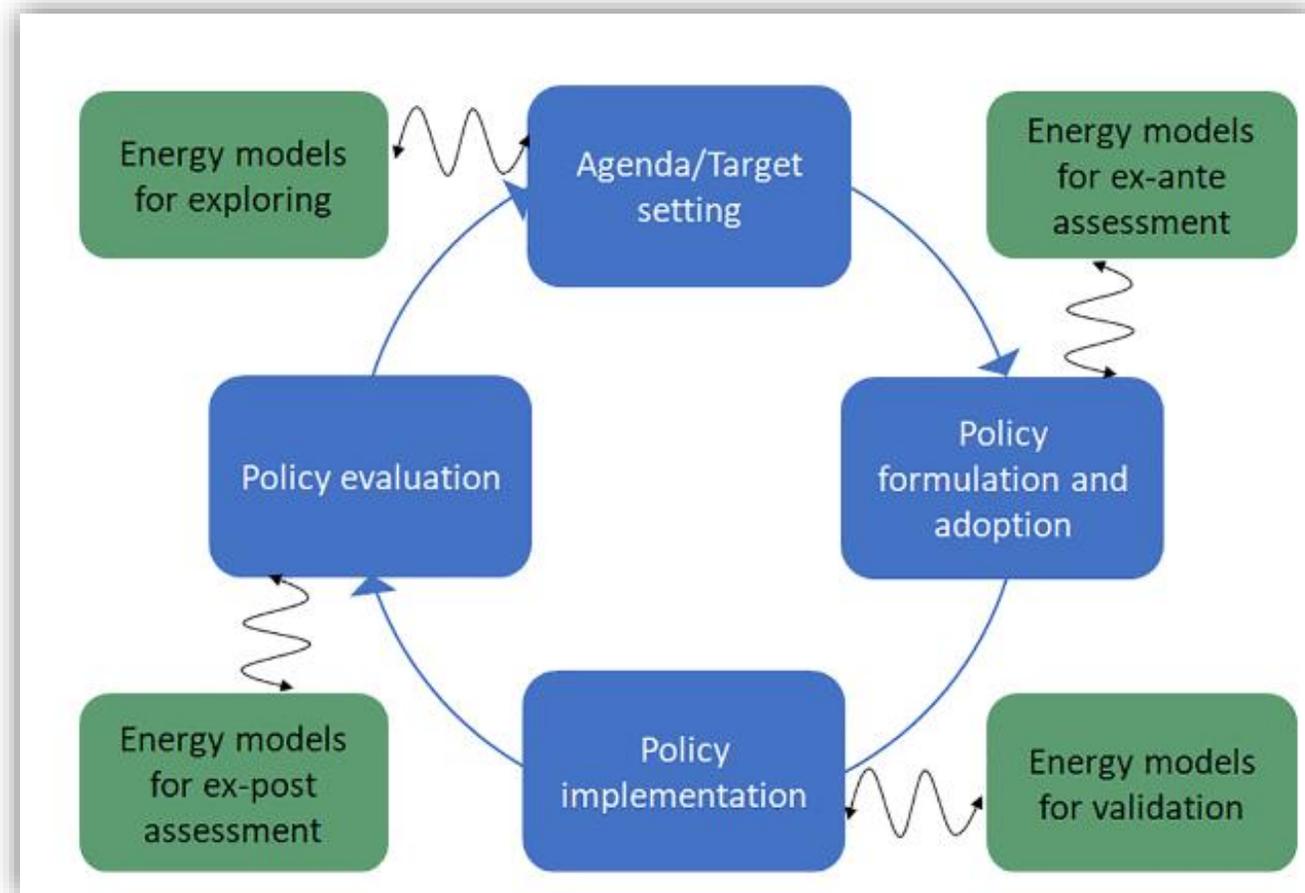
R.L. Grether, M. Schäfer, R. Qussous, F.M. Hoffart, N. Kerker,
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Long-term energy system scenarios

- Insights into potential **transformation pathways**
- Input for **political and societal discussions**, but also for **scientific research**
- Scenarios derived from energy system **models**, often seeking a cost-efficient system design under a variety of **boundary conditions** (technical constraints, emission budget, land availability,...)



Energy system model results matter!

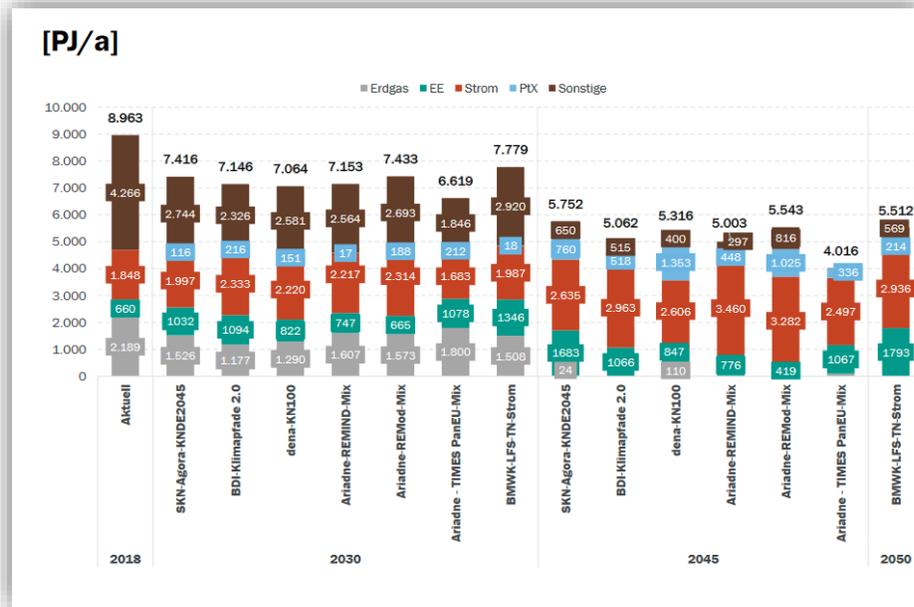


[Süsser et al. 2021, Model-based policymaking or policy-based modelling? How energy models and energy policy interact]

Learning from scenarios

- Synthesis and comparison of different scenarios allows to identify **consensus** and no-regret options, **trade-offs** between different options, influence of different **contextual** assumptions
 - NFDI4Energy Use Case: *Long term energy system scenarios, society and energy politics*
- Scenarios provide **stylized representation of possible futures**
 - NFDI4Energy Task Area *Integrating Society and Policy in Energy Research*

Scenario comparisons



[Ariadne 2022, Vergleich der „Big 5“ Klimaneutralitätsszenarien]



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Full-length article

Strategies for climate neutrality. Lessons from a meta-analysis of energy scenarios

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ARTICLE INFO

ABSTRACT

The ambition to reach climate-neutral energy systems studies exist which present different options to reach the climate neutrality in Germany are identified through a meta-analysis of energy scenarios. Demand-side solutions and energy demand, an expansion of domestic wind and solar energy, and the use of synthetic energy carriers are key strategies and carbon capture and storage playing a very limited role. However, a very high potential to diminish the significance of certain limitations regarding their potential. The level of

SCHRIFTENREIHE
ENERGIESYSTEME DER ZUKUNFT

Analyse

Februar 2023

Szenarien für ein klimaneutrales Deutschland

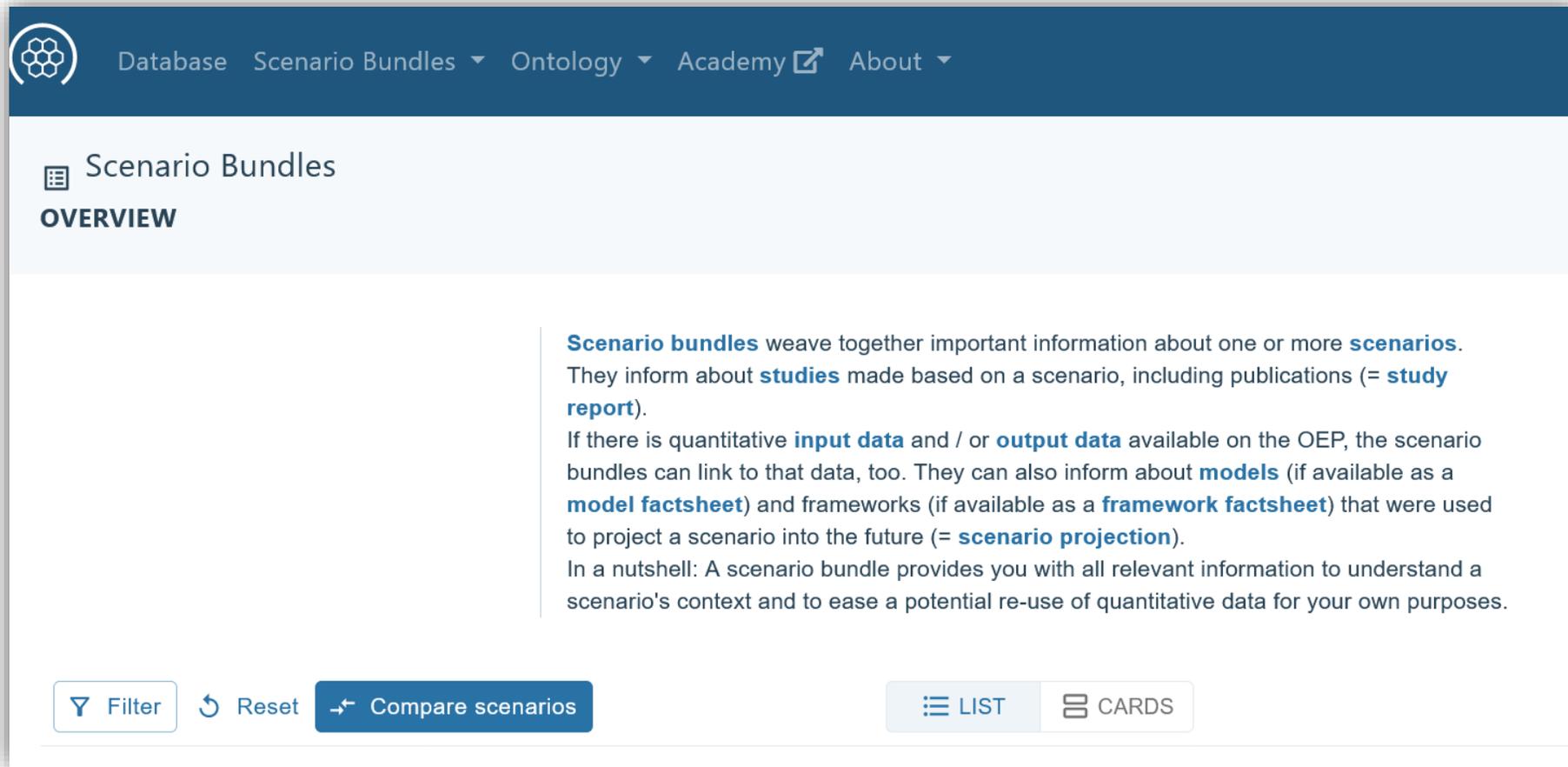
Technologieumbau, Verbrauchsreduktion und Kohlenstoffmanagement

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Vergleich der „Big 5“ Klimaneutralitätsszenarien

16.03.2022

Scenario bundles (SIROP project)



The screenshot shows the 'Scenario Bundles' overview page. At the top, there is a navigation bar with a logo and links for 'Database', 'Scenario Bundles', 'Ontology', 'Academy', and 'About'. Below the navigation bar, the page title 'Scenario Bundles' is followed by the section 'OVERVIEW'. The main content area contains a definition of scenario bundles, explaining that they weave together information about scenarios, studies, input/output data, models, and frameworks. At the bottom of the page, there are interactive buttons for 'Filter', 'Reset', 'Compare scenarios', and view toggles for 'LIST' and 'CARDS'.

Database Scenario Bundles Ontology Academy About

Scenario Bundles

OVERVIEW

Scenario bundles weave together important information about one or more **scenarios**. They inform about **studies** made based on a scenario, including publications (= **study report**).

If there is quantitative **input data** and / or **output data** available on the OEP, the scenario bundles can link to that data, too. They can also inform about **models** (if available as a **model factsheet**) and frameworks (if available as a **framework factsheet**) that were used to project a scenario into the future (= **scenario projection**).

In a nutshell: A scenario bundle provides you with all relevant information to understand a scenario's context and to ease a potential re-use of quantitative data for your own purposes.

Filter Reset Compare scenarios LIST CARDS



Scenario bundles (SIROP project)



Scenarios (2) | Publications | Sectors and technology | Models and frameworks

Scenario name ⓘ	With existing measures scenario
Acronym ⓘ	WEM
Abstract ⓘ	The with existing measures scenario (WEM; MMS in its German acronym) is a policy scenario that includes policy instruments and transformative measures that have been adopted and implemented.
Scenario type ⓘ	with existing measures scenario · policy scenario ·
Years ⓘ	2025 · 2030 · 2035 · 2040 · 2045 · 2050 ·
Regions ⓘ	
Interacting regions ⓘ	
Input datasets ⓘ	
Output datasets ⓘ	Rahmendaten für den Projektionsbericht 2023 (Datentabelle)

Database
Topics / scenario / deutscher_projektionsbericht2023_rahmendaten

Data | Meta information | Review results | Related Scenarios

View Table | Graphs | Maps

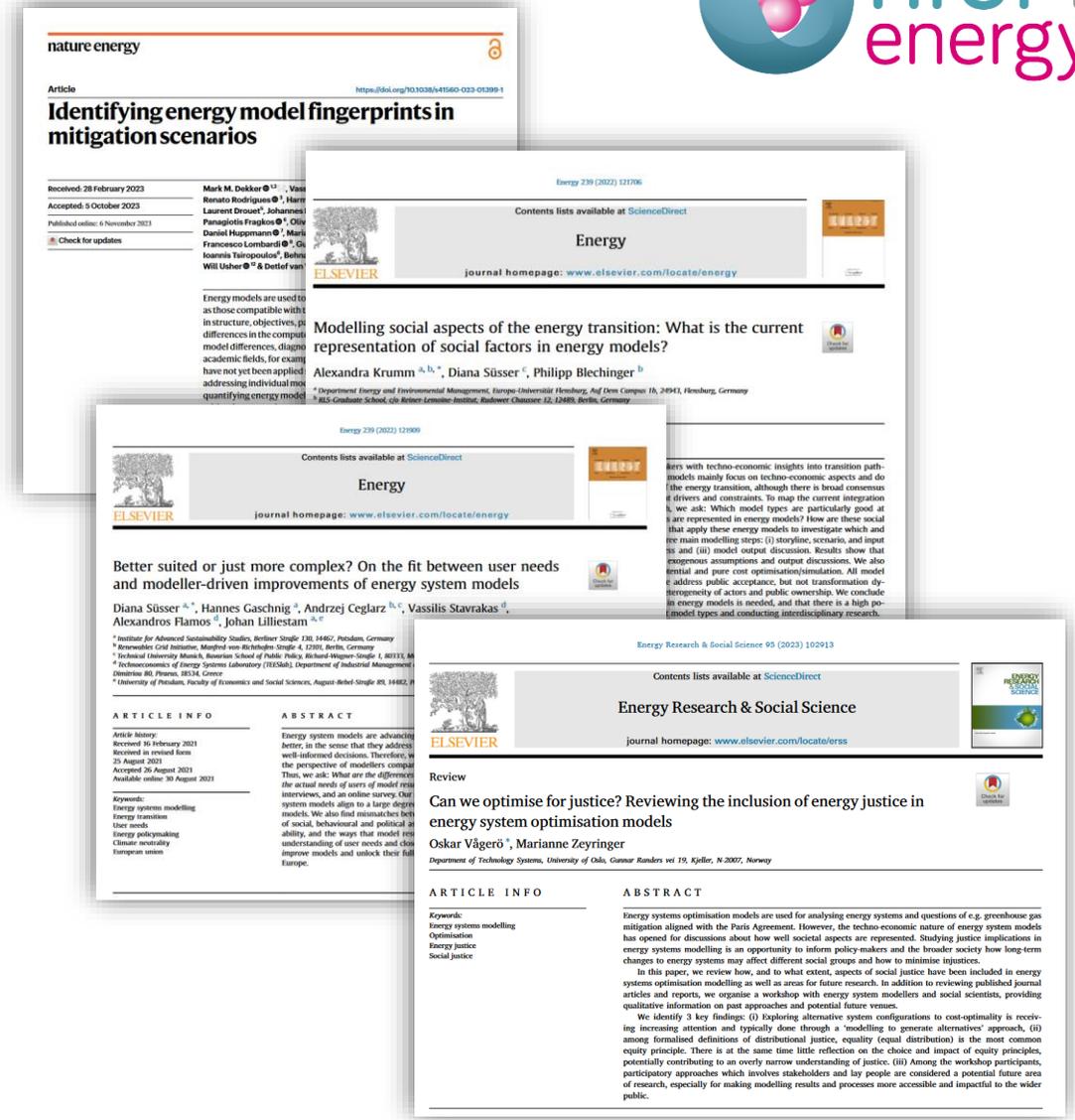
Show 10 entries

id	tabelle	parameter	einheit	jahr	wert
355	6	Preis im nationalen Emissionshandel (nEHS)	EUR(2019)/t CO2	2025	37.89744244
358	6	Preis im nationalen Emissionshandel (nEHS)	EUR(2019)/t CO2	2028	75.18081499
353	6	Preis im nationalen Emissionshandel (nEHS)	EUR(2019)/t CO2	2023	26.5174569

Energy system modelling

- Increasing research interest in:
 - Comparison of models
 - Discussion of underlying assumptions, limitations, modelling decisions
 - Wider scope of modelling (societal and political factors, for instance)
 - Critical view on how models are used

- Challenge for NFDI4Energy:
 - How to operationalize these findings? (databases, guides, best practices,...)



Example: „Low energy demand scenarios“

- Scenarios with reduced energy demand (technological and social innovations, behavioural changes, energy sufficiency)
- Strong consideration of demand-side options
- Modelling challenges:
 - Parameter settings – how much is „low“?
 - Measure/policy quantification
 - Scenario analysis



[ESYS 2023]

Potential of Demand-side Actions and Service Provisioning Systems

Demand-side mitigation and new ways of providing services can help *avoid, shift, and improve* final service demand. Rapid and deep changes in demand make it easier for every sector to reduce greenhouse gas (GHG) emissions in the short and medium term (*high confidence*). {5.2, 5.3}

[Creutzig et al. in IPCC 2022]

Current work: Sufficiency quantification (poster)

- Parameters:
 - Key parameters in sufficiency scenarios (in preparation)
- Sufficiency potentials:
 - Database with quantified saving potentials of sufficiency measures and policies (ongoing research, focus Germany)
 - Let us know about relevant studies!

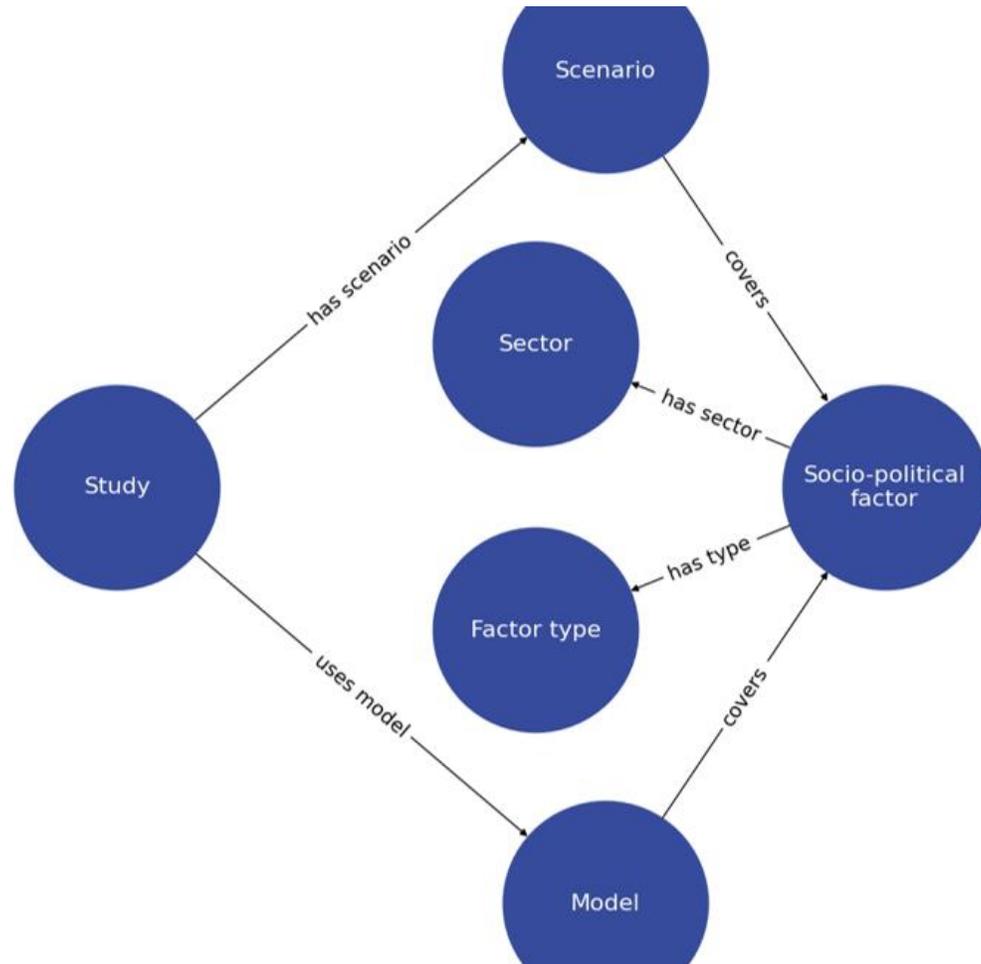


Societal and political factors in scenario studies

- “User-perspective”: What can we learn about the representation of societal and political factors in current scenarios from the provided reports and material?
 - Context or specific model representation?
 - Exogenous/Endogenous model representation?
 - Parameter setting?
 - Discussion of model output?
- First findings:
 - Similar factors are represented in various different ways
 - Tabular data representation restrictive

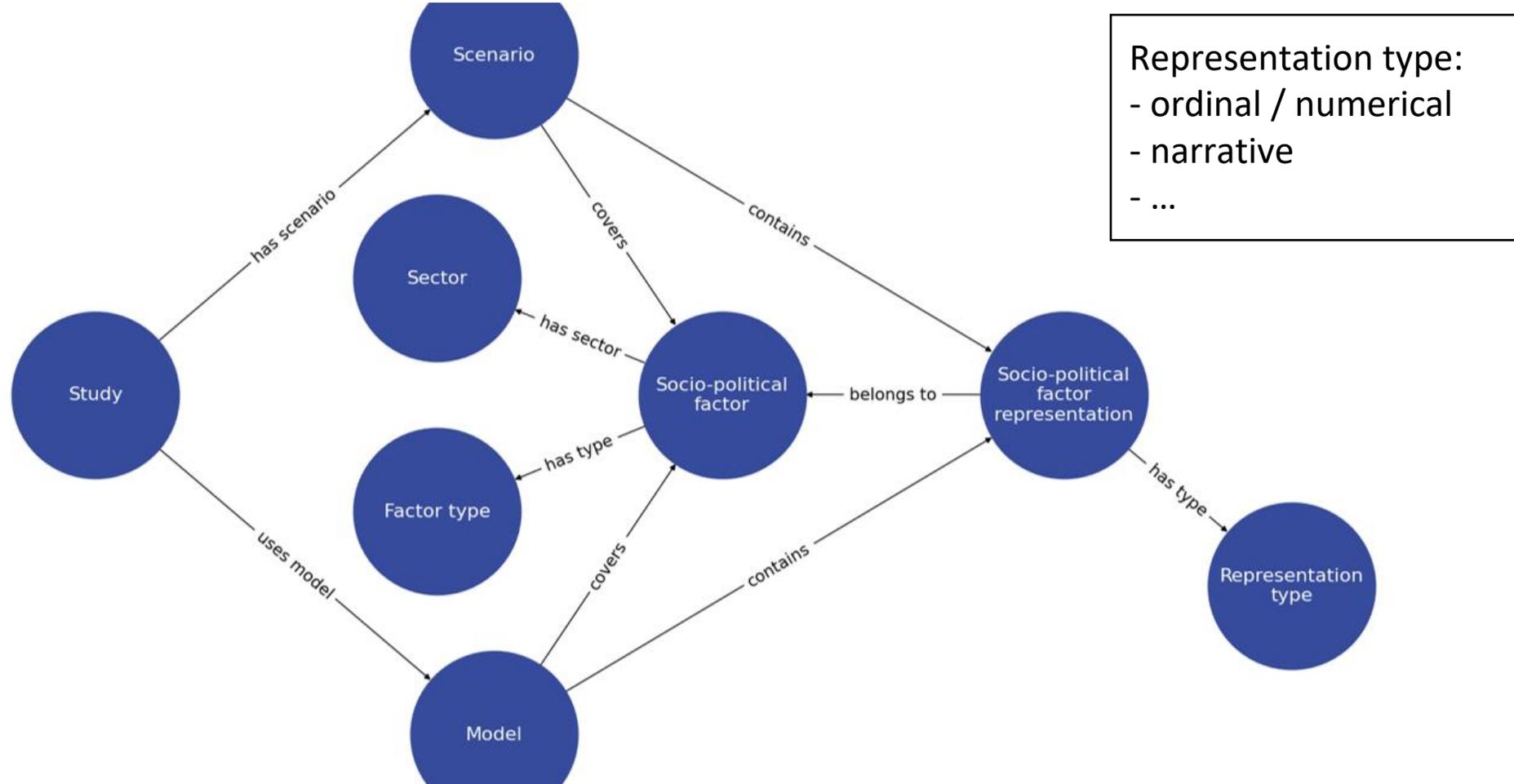


Preliminary knowledge graph

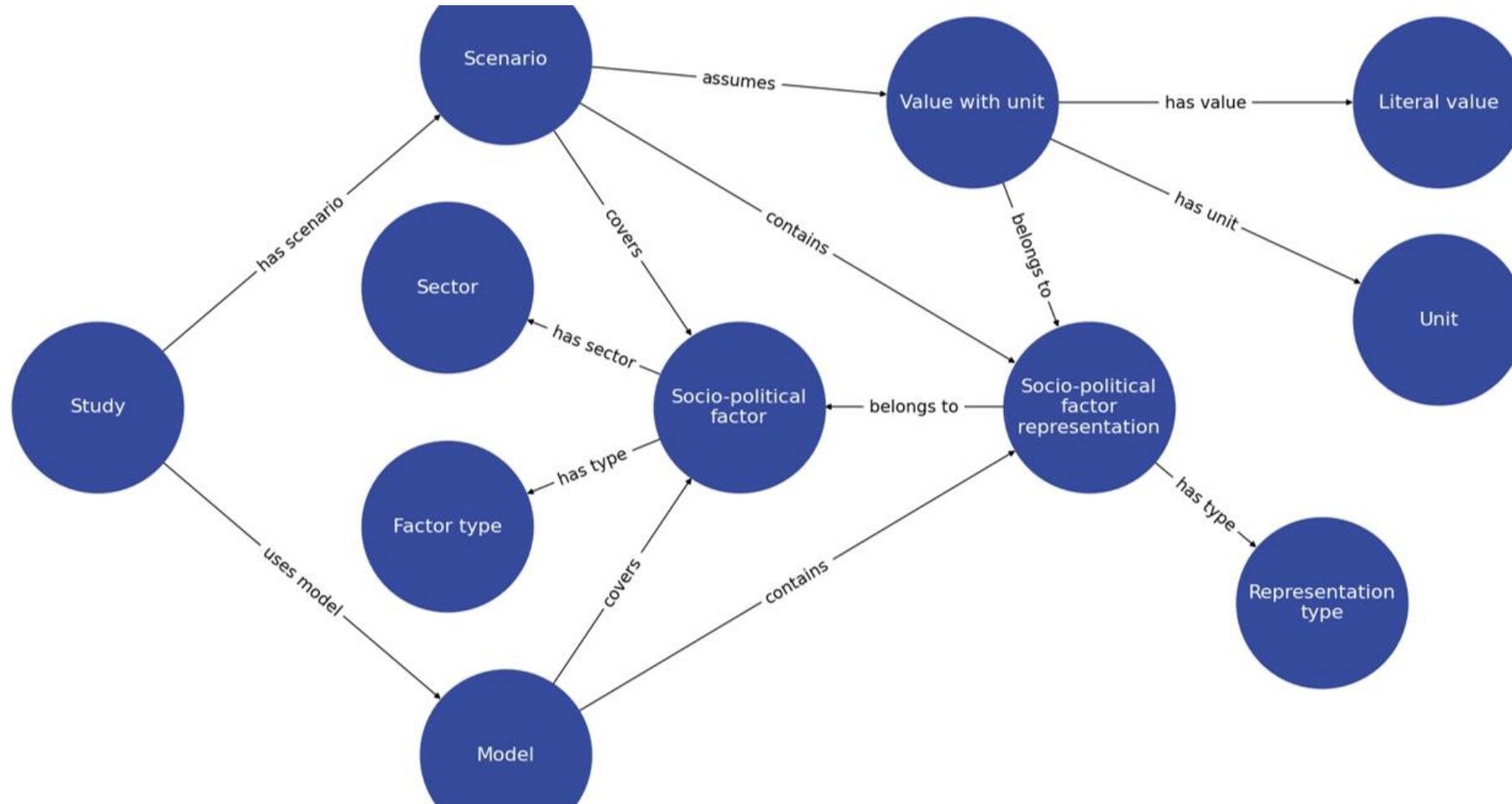


- Factor type:
- Policy
 - Acceptance & Participation
 - Behavioral Change & Sufficiency
 - Social Justice
 - Labour

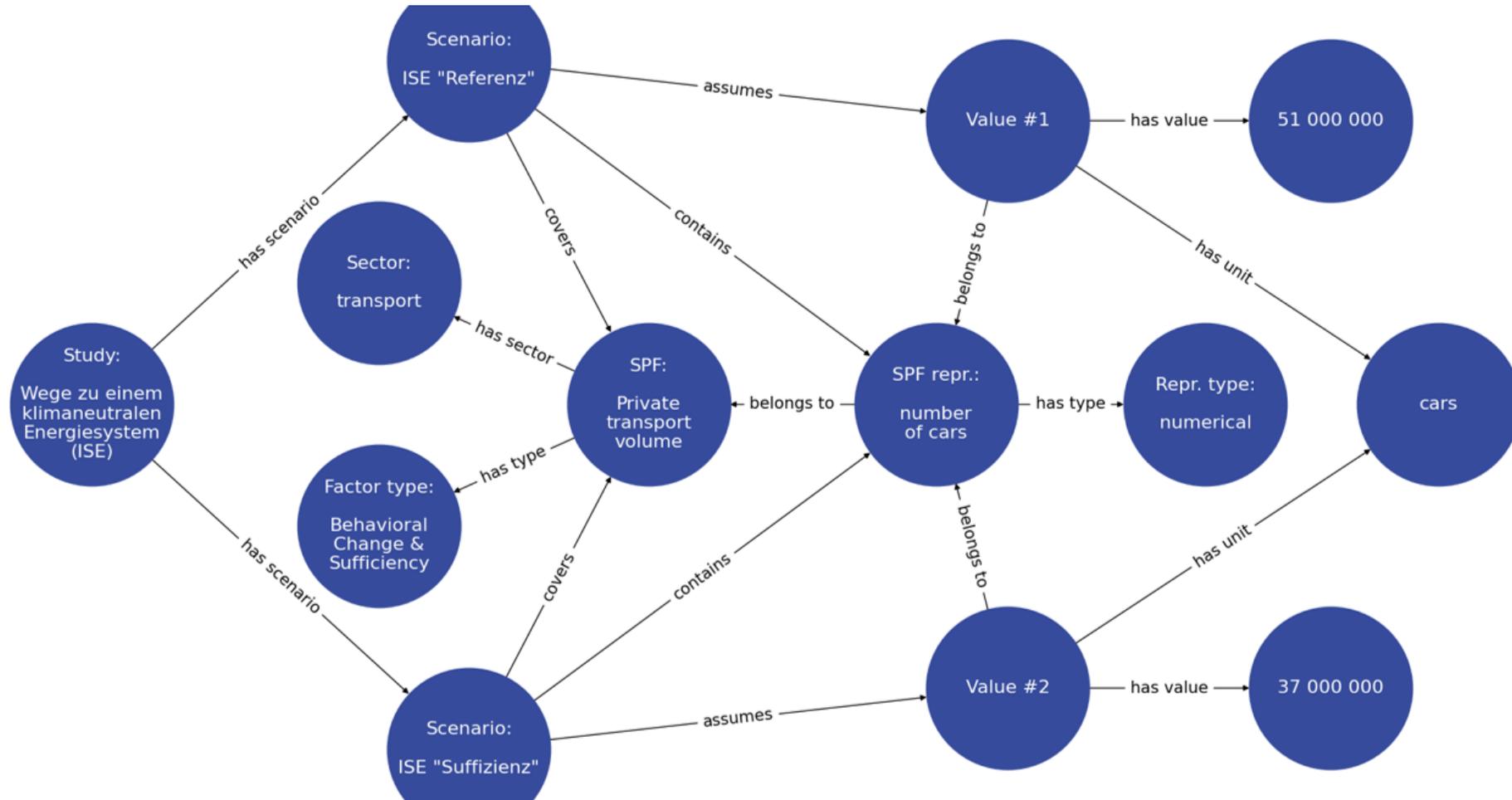
Preliminary knowledge graph



Preliminary knowledge graph



Example: Private transport volume (ISE study)



Next steps

- Coordinate with and learn from NFDI4Energy partners about suitable data representation (ontology development, knowledge graphs)
- Literature review using this data representation as a tool
- Scenario comparison

- Future plans:
 - Databases for exogenous representation of societal and political factors
 - Guidelines for endogeneous model representation

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- Energy system models and scenario studies matter – how to make better use of them?
- How to operationalize findings and insights from the community for modelling, analysis and communication?
- Representation of societal and political factors in scenario studies – how to structure the data?