NISMOD

National infrastructure systems model

Tom Russell

DAFNI webinar, 21st January 2021

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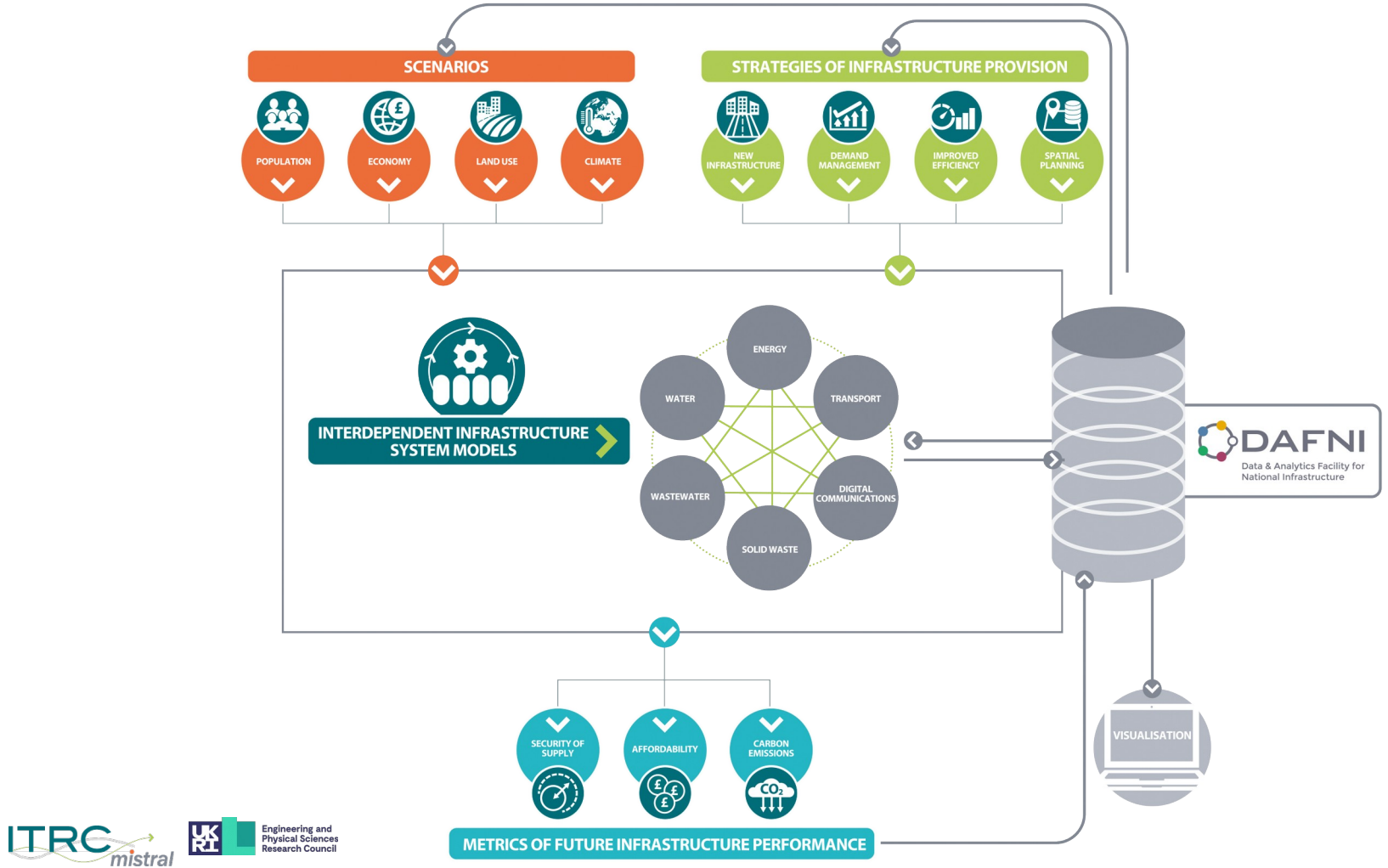

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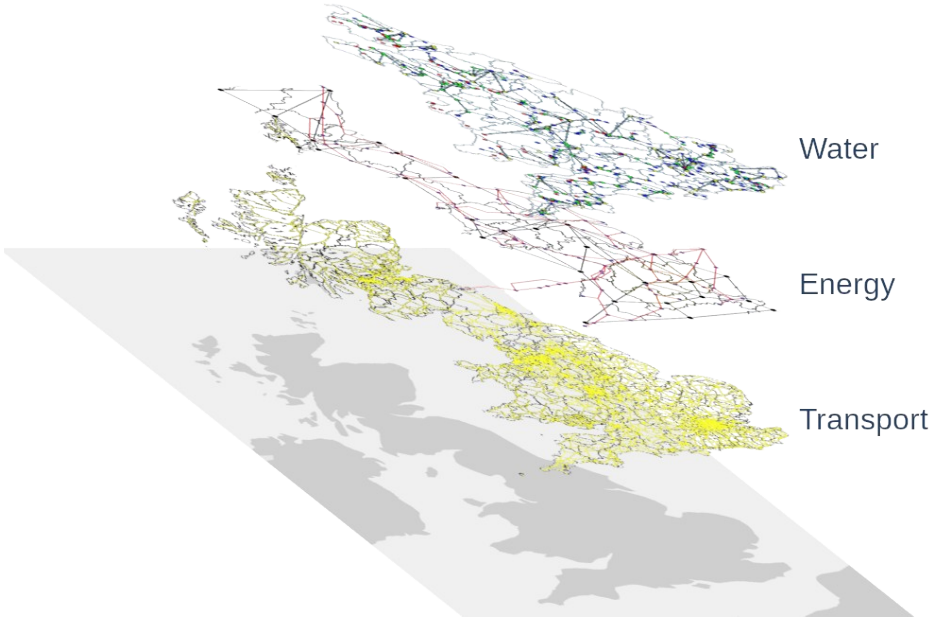
What is NISMOD?

- **Code:** https://github.com/nismod
- **Webinars:** https://tinyurl.com/itrc2021



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National Infrastructure Systems Model

NISMOD-LP

United Kingdom http://www.itrc.org.uk

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smif
Simulation Modelling Integration Framework
Python 16 5

nismod2
National Infrastructure Systems Model setup, configuration and tests
Python 5 2

energy_demand
HIRE - HIgh Resolution Energy Demand simulation model
Python 8 5

ukpopulation
Population and demographics projection module, developed for ITRC/MISTRAL
Python 6 5

household_microsynth
A python package for microsynthesising household populations from census data, including communal and unoccupied residences.
Python 6 3

transport
NISMOD v2 Transport Model is a national-scale (Great Britain) transport model developed to support policy making regarding the future infrastructure
Java 3 1

smif

Navigation

Installation
Getting Started
Concepts
Configuration
Adding a Model

smif

Simulation Modelling Integration Framework

github nismod/smif | build passing | build passing | coverage 71% | pypi v1.2.1 | conda-forge v1.2.1 | DOI 10.5281/zenodo.3386164 | JORS 10.5334/jors.265 | docs passing

smif is a framework for handling the creation, management and running of system-of-systems models.

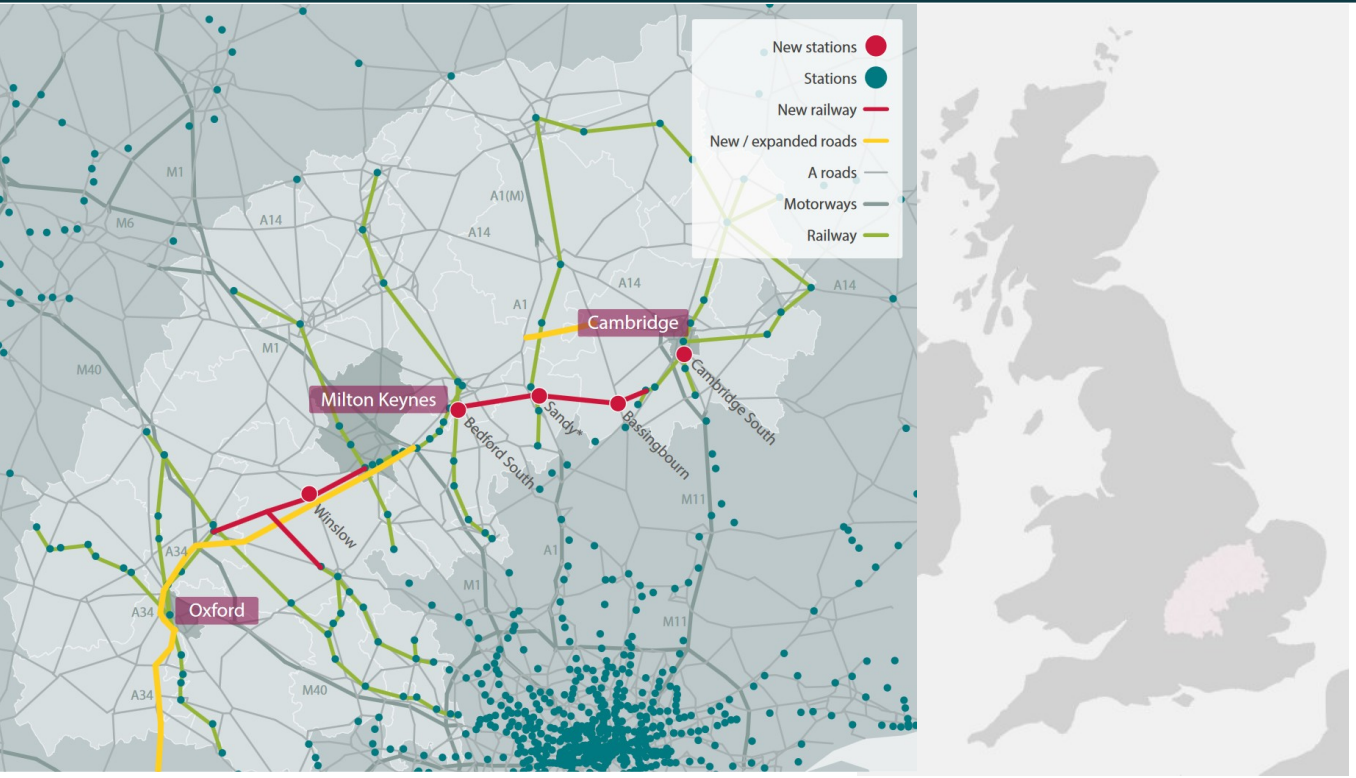
Software Sustainability Institute — Journal of open research software

Software Metapapers

A Software Framework for the Integration of Infrastructure Simulation Models

Authors: Will Usher, Tom Russell

The Oxford-Cambridge Arc in context



External links include:

- Housing pressure
- Internal migration
- Freight routes E-W
- Major roads N-S
- Water catchments
- Electricity grid

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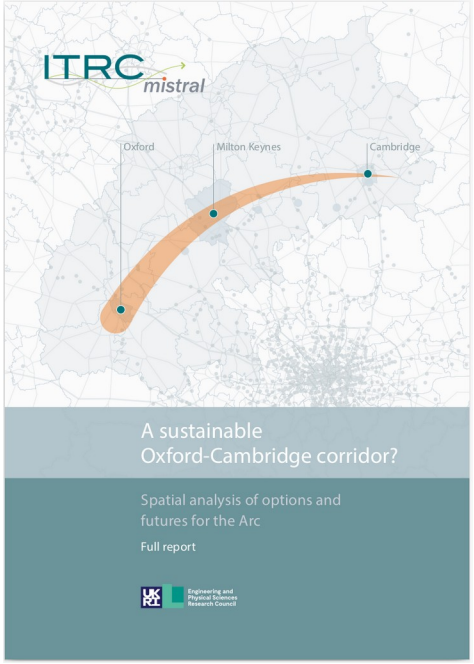
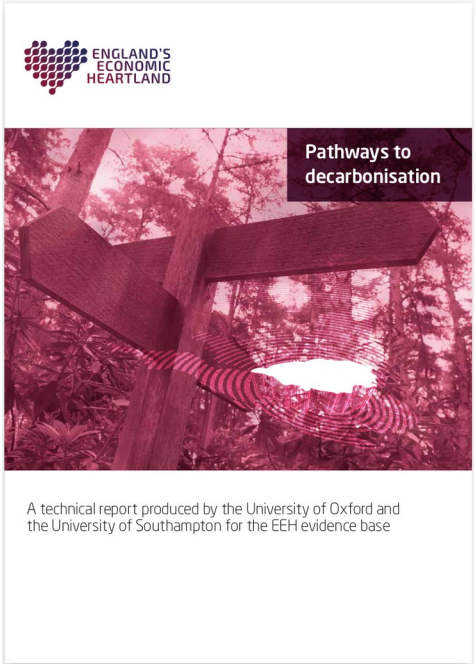
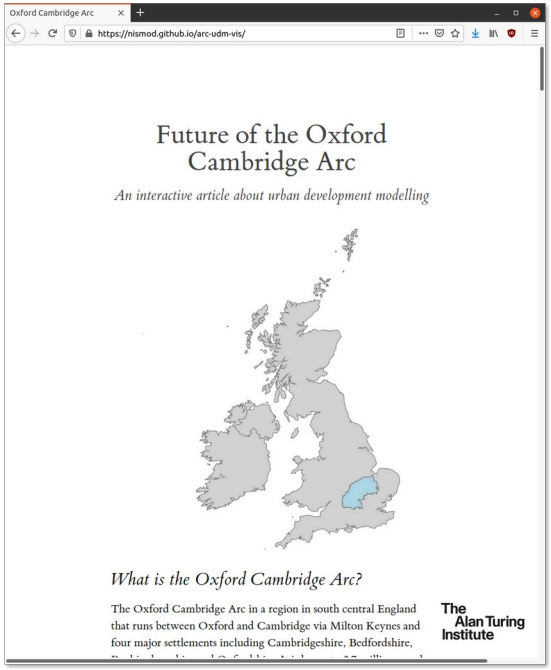
NISMOD analysis around the Arc







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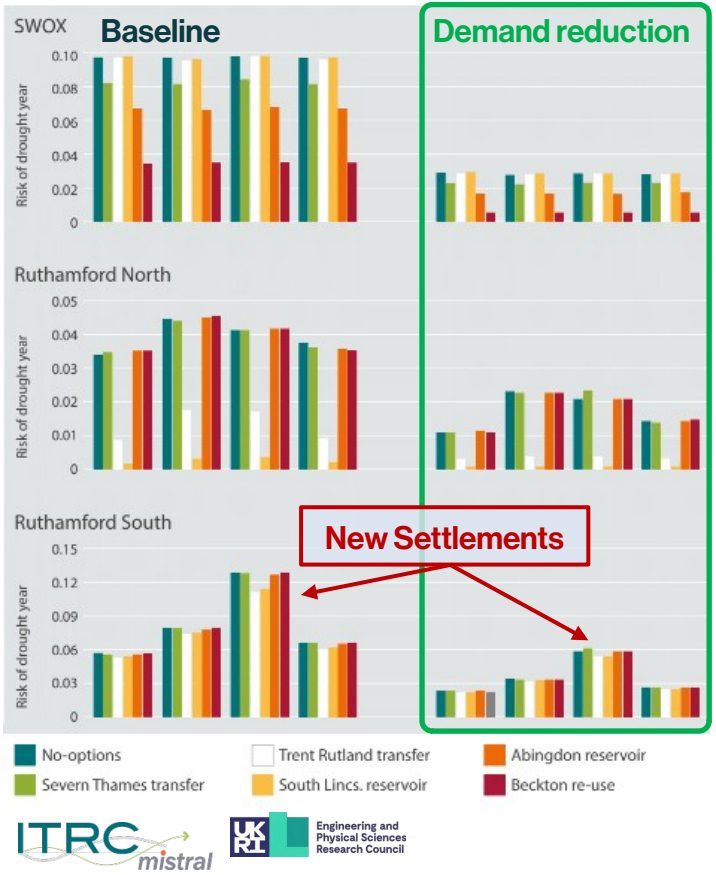
Water supply under population and climate scenarios

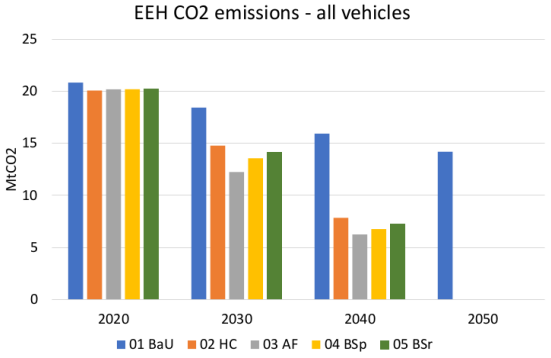


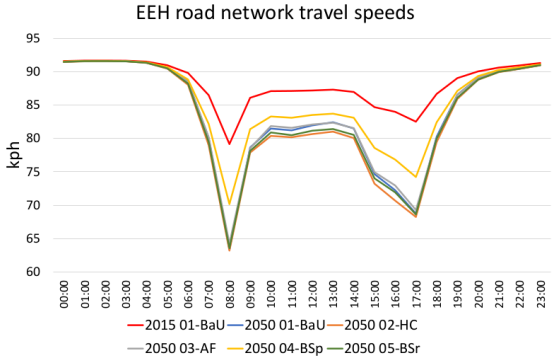
Population growth increases water demand despite per-capita reductions.

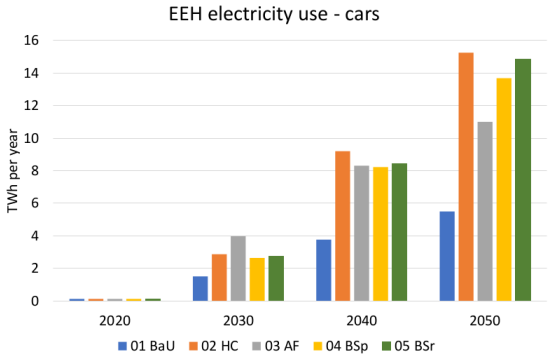
Near-future **climate** scenarios contribute to increased risk of water use restrictions.

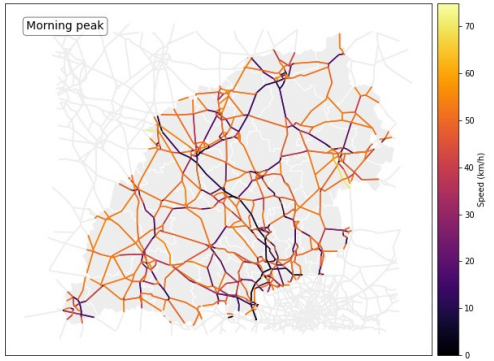
Big **interventions** could mitigate risks.

Towards net-zero transport









Switching to electric vehicles would reduce transport **emissions** and increase **electricity** demand.

Without other drivers to reduce demand for private vehicle use, **congestion** and **total kilometres** travelled increase.

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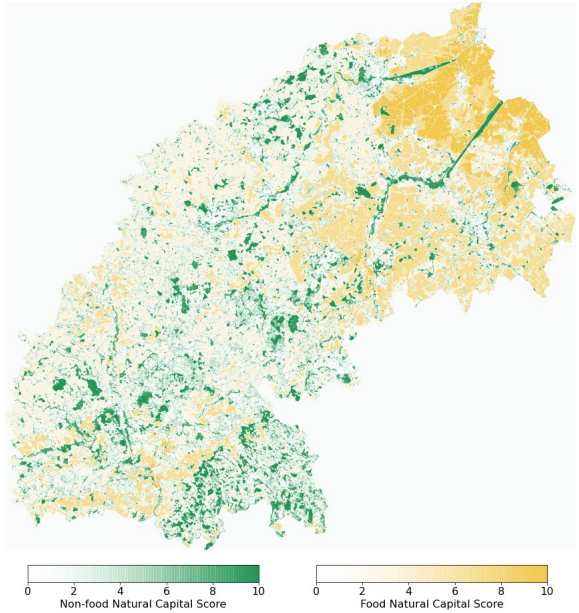
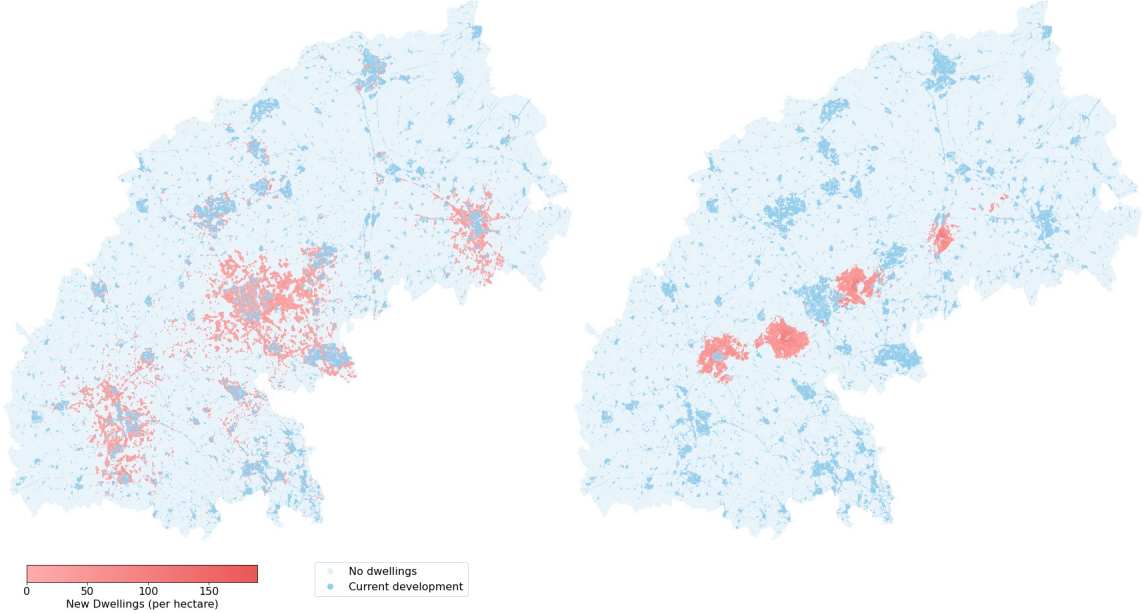
Exploring urban development scenarios





New dwellings, population and employment combine with other **attractors** and **constraints** (flood zones, areas of high natural capital) to drive urban development at different **densities**.

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The Alan Turing Institute

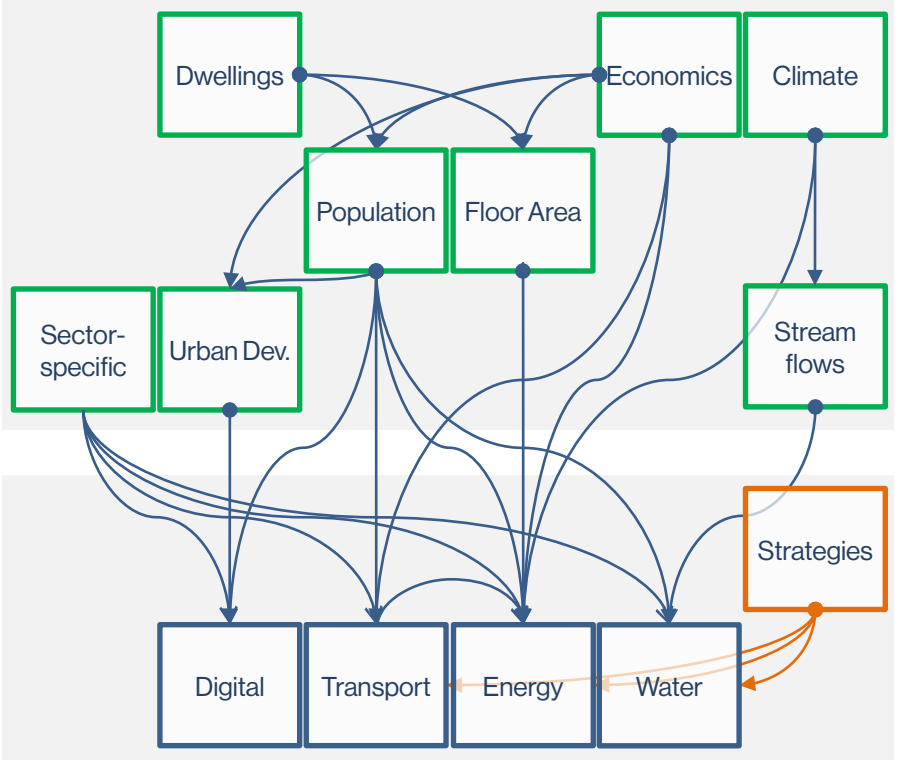
Integrated infrastructure systems modelling

National models, regional analysis
- Set results in context
- Detail in area of interest

Scenarios
- Population, economy, land use, climate

Strategies
- Build, changing use, efficiency, spatial planning

Interdependencies
- Electrification of heat and transport
- Climate variability for energy and water



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