

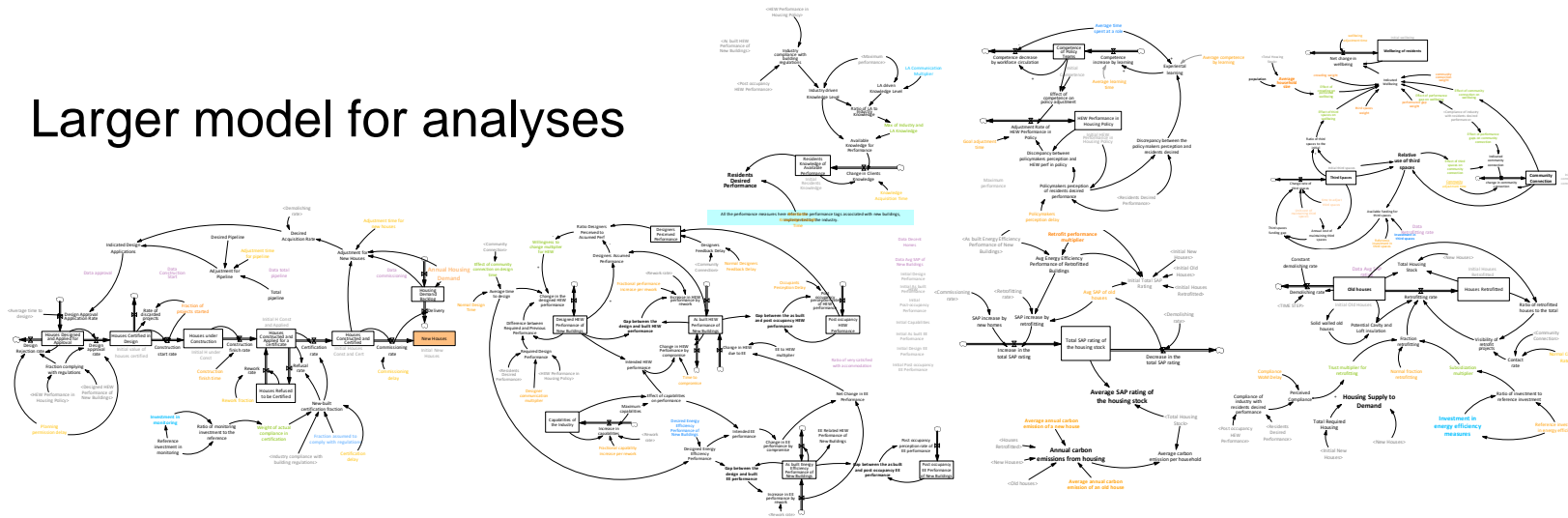
Sibel Eker and Nici Zimmermann

HEW-WISE: THE WEB-ENABLED INTERACTIVE SIMULATION ENVIRONMENT

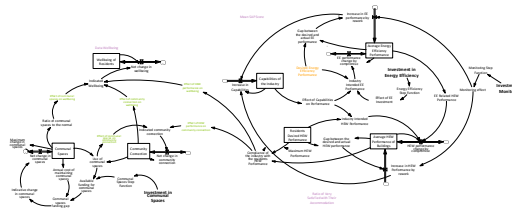


Modelling

- Larger model for analyses

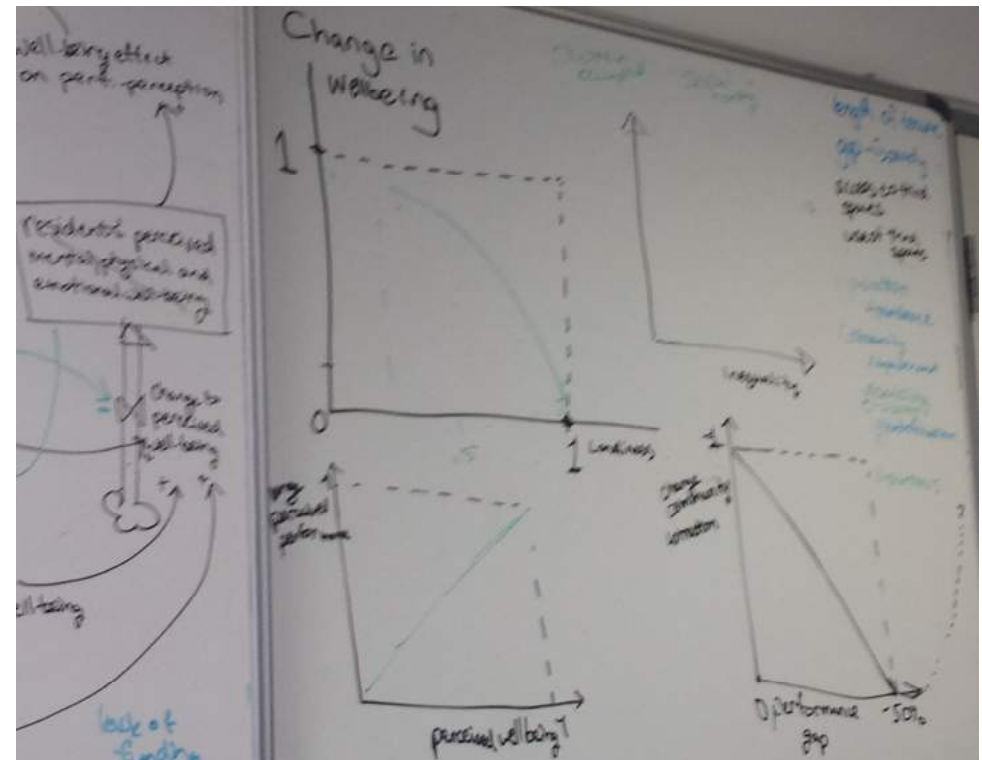


- Small model for interactive learning environment



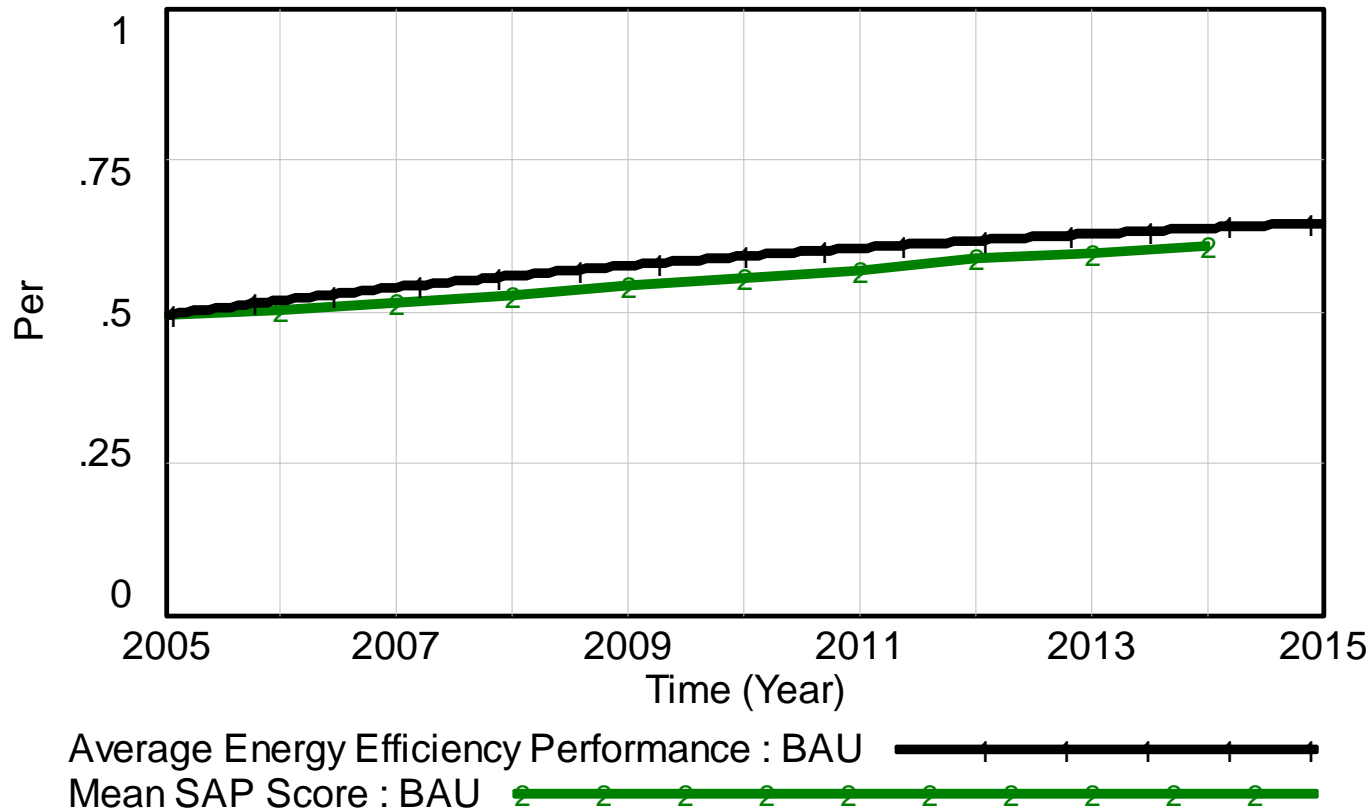
Data sources

- Literature
- Longitudinal data (especially for comparison and initial values)
- 3 group model building workshops



BAU simulation: Comparison to historical data Average Energy Efficiency Performance

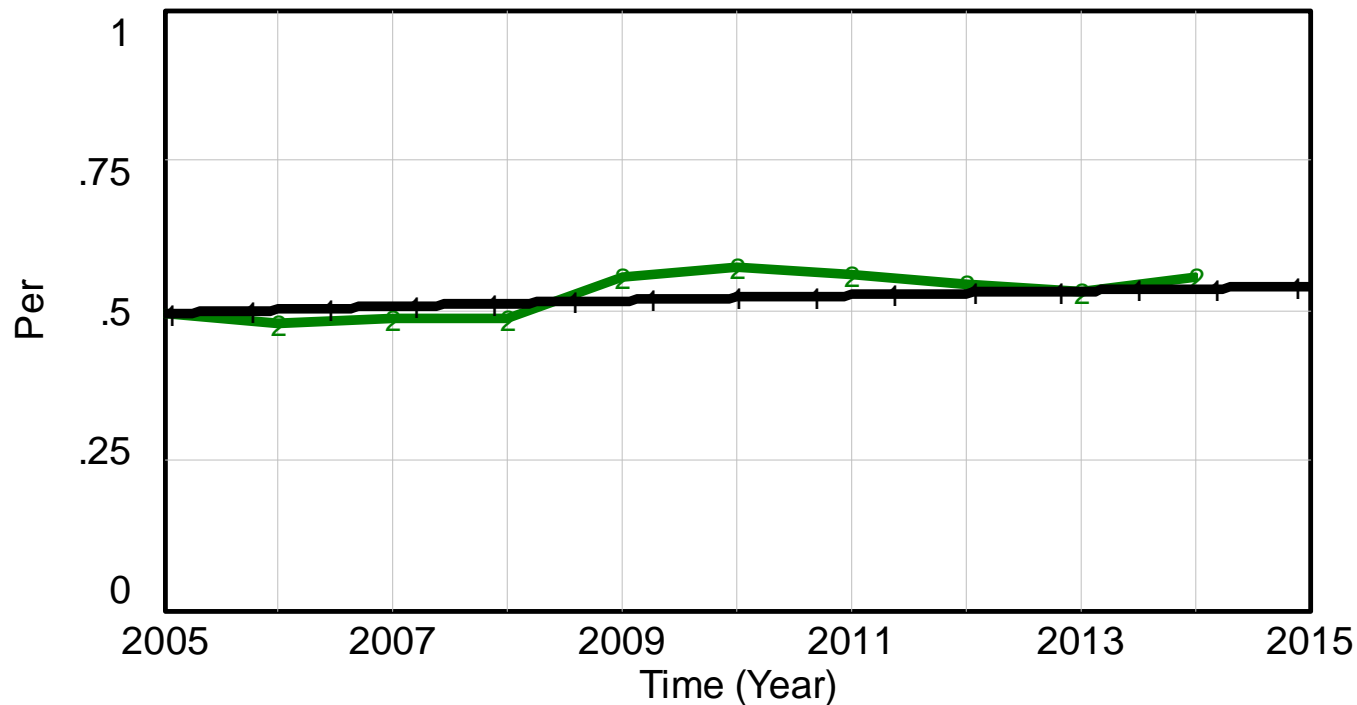
Data comparison energy efficiency



BAU simulation: Comparison to historical data

Average HEW Performance of Buildings

Data comparison HEW performance



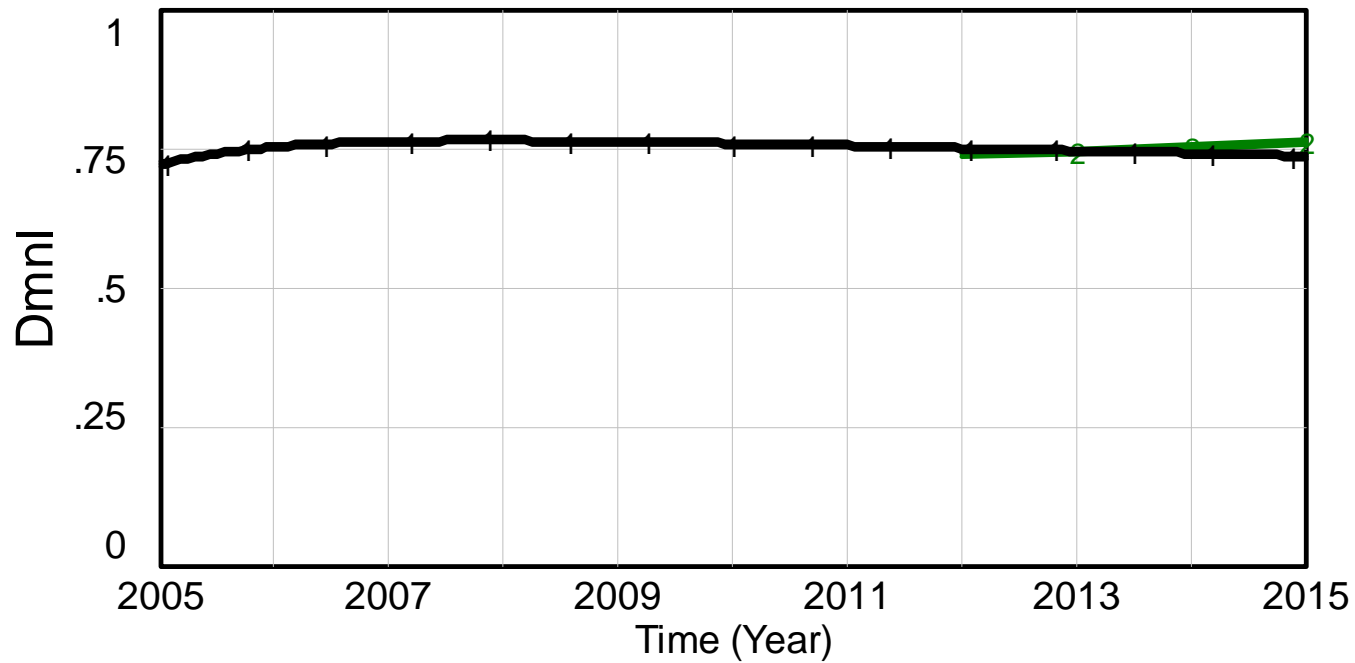
Average HEW Performance of Buildings : BAU ———— 1 1 1 1 1

Ratio of Very Satisfied with Their Accommodation : BAU ———— 2 2 2



BAU simulation: Comparison to historical data Wellbeing of Residents

Data comparison wellbeing of residents



Wellbeing of Residents : BAU

Data Wellbeing : BAU



Sibel Eker

INTERACTING WITH THE LEARNING ENVIRONMENT



Where to find it?

<http://www.bartlett.ucl.ac.uk/iede/research/project-directory/projects/housing-energy-wellbeing>

-directory/projects/housing-energy-wellbeing

UCL Institute for Environmental Design and Engineering

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- Centre for Advanced Spatial Analysis
 - School of Architecture
 - School of Construction & Project Mgt
 - Development Planning Unit
 - School of Planning
 - Space Syntax Laboratory
 - UCL Energy Institute
 - UCL Inst. for Env. Design and Eng.**
 - UCL Inst. for Sustainable Heritage
 - UCL Inst. for Sustainable Resources
 - UCL Institute for Global Prosperity

HEW: Integrated decision-making about Housing, Energy and Wellbeing

- [Research projects](#)
- [PhD projects](#)
- [EngD projects](#)



Web-enabled Interactive Simulation Environment (HEW-WISE)

The 4th stakeholder workshop of the project will be held on 30 June 2016. This workshop will introduce a new interactive simulation environment which is completely web-based.

> [Access the interactive simulation environment](#)

- [Overview](#)
- [People](#)
- [Workshops](#)
- [Workshop 1](#)
- [Workshop 2](#)
- [Workshop 3](#)
- [Group Model Building Workshops](#)
- [Workshop 4](#)

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Integrated decision-making about 4th stakeholder workshop

Housing, Energy and Wellbeing - Web-enabled Interactive Simulation Environment (HEW-WISE)

[Introduction](#)

Read more about the interactive simulation environment

[Instructions](#)

How to use the interactive simulation environment

[Simulate](#)

Explore London's housing future. How will you manage the simultaneous goals of housing in the U.K.?

[Learn about the Model](#)

Learn about the relationships included in the model

[Modify the Model Assumptions](#)

Change the parameter assumptions of the model to simulate different scenarios.

[F.A.Q](#)

Your questions answered, before you ask.

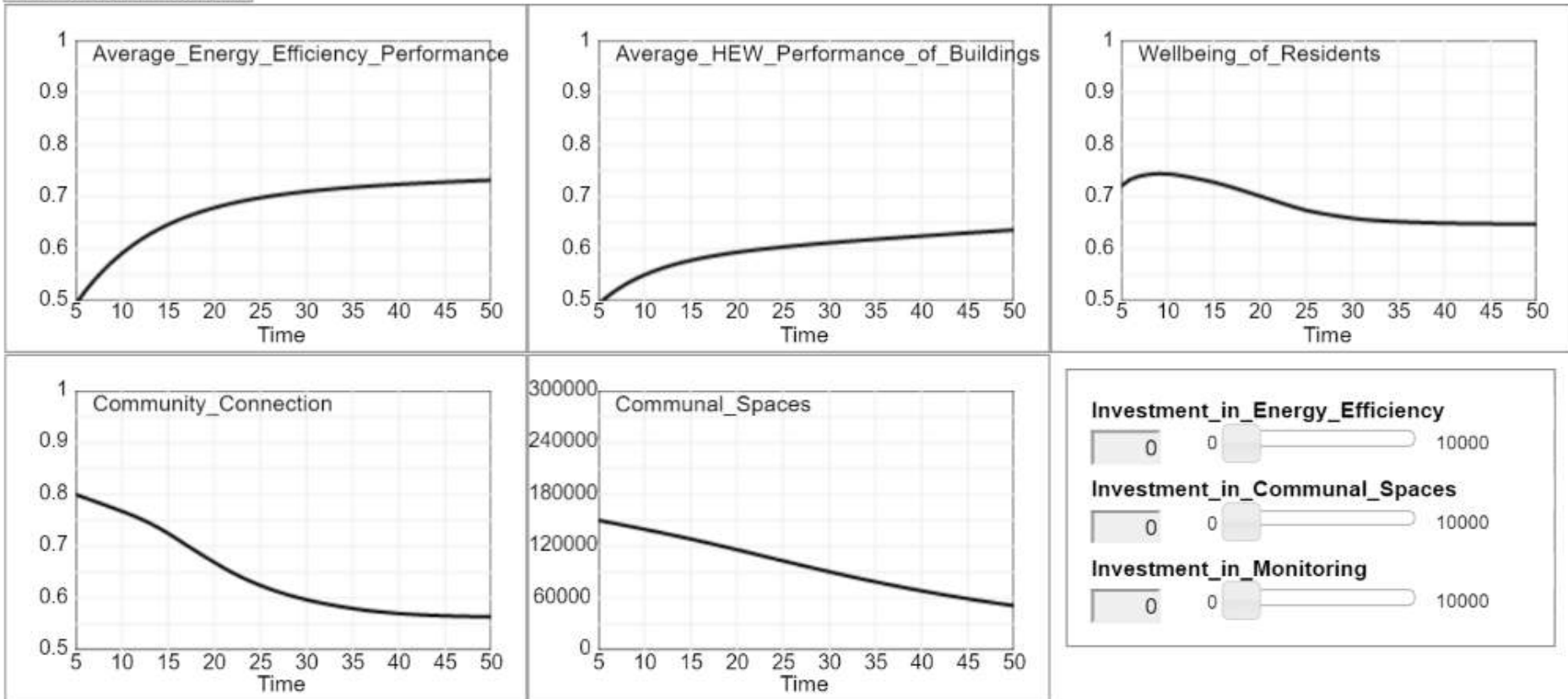
[Go Under the Hood](#)

View the model equations.

Simulate

[Top](#)

How to use the interface



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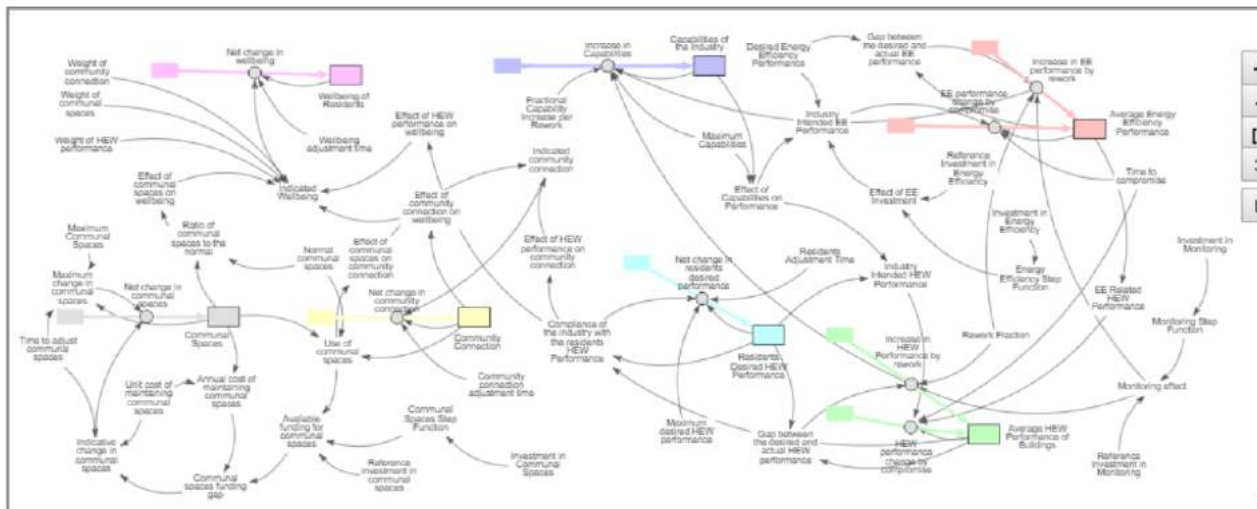


The Model

The model you see below is the 'engine' that computes all the simulations you have tested so far. Its relationships as well as their strength are based on many interviews and three workshops with stakeholders. The model should be regarded as a simplified representation of reality to be used as a platform for discussion. It is composed of three main elements:

- **Stocks**, represented as boxes, show accumulations, like a tub of water.
- **Flows**, represented by a valve sign, are the faucet and the drain of stocks.
- **Constants** affect feedback loops from outside, such as our three investment decisions, adjustment times, etc.
- **Auxiliaries** are all other variables in the system. They can be computed through the stocks, flows and constants in the model.

To explore the model diagram, you can click and drag in the window to reposition. Buttons on the right side of the diagram allow you to zoom in and out, reset the diagram to the original view or toggle the amount of detail shown. Double clicking on an element opens a window where you can view, and even change the equations numerically.



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Modify the model assumptions

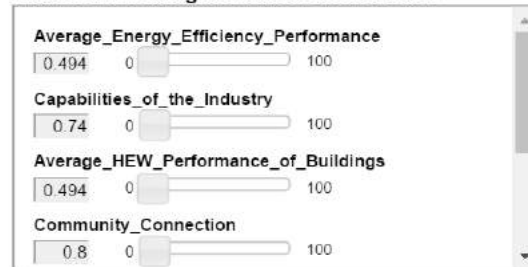
[Top](#)

These scroll-down panels allow you to dig deeper into the model assumptions and perform more detailed scenario testing. As you get comfortable with the model and its elements, test your thinking by adjusting the initial levels of stocks or changing the value of parameters. It is a good idea to consider what you expect to happen before you make a change. Question the result, does it make sense?

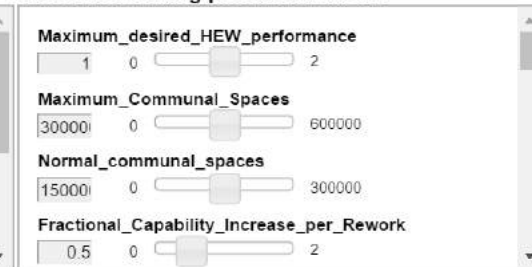
Start with **Wellbeing of Residents** – See that the net change to this stock is influenced by communal spaces, HEW performance and community connection. The strength of each effect is determined by a weight that our stakeholders collectively attributed to it at a workshop.

Modify the weights, **ensuring that they sum to 1**, and view the behaviour in the graphs above!

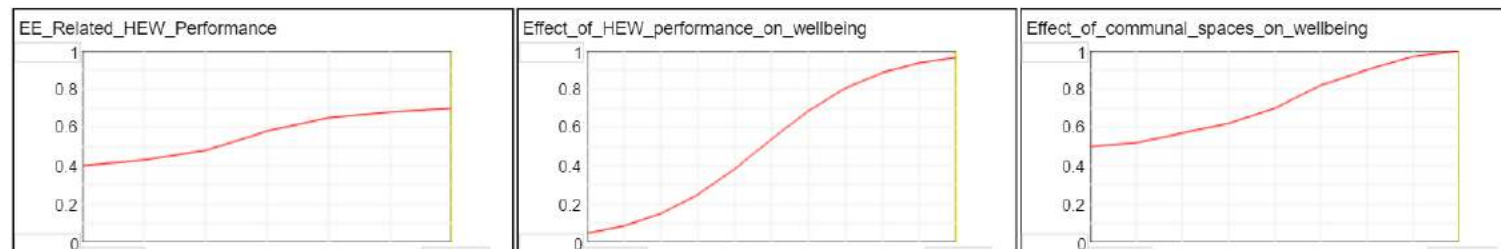
Sliders for setting the initial stock values



Sliders for setting parameter values



Sketch-graph lookups



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View the model equations.

Objective

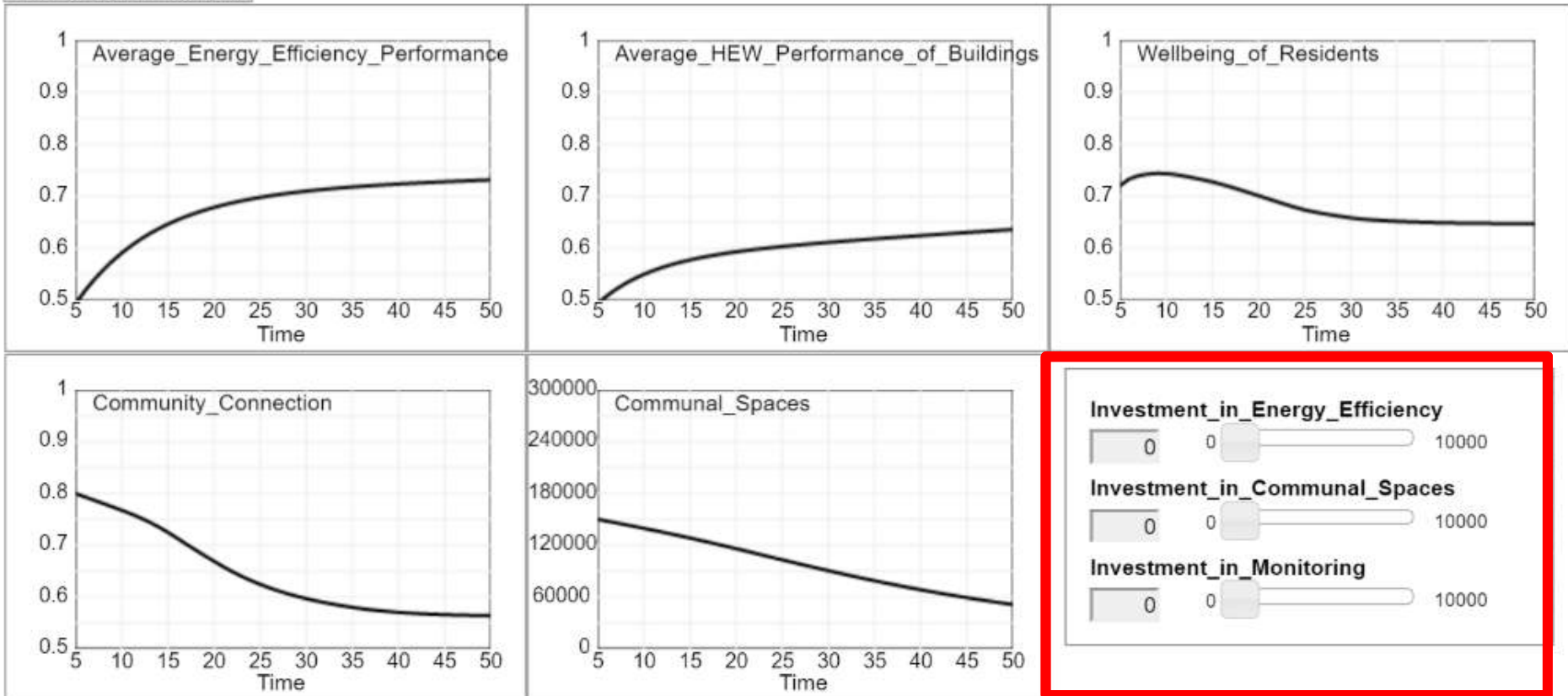
- A strategy for the allocation of the long-term built environment budget
- To improve the performance of London's mixed housing area
- Five indicators representing the policy criteria
 - **Average Energy Efficiency Performance**
 - **Average HEW (Housing, Energy and Wellbeing) Performance of Buildings**
 - **Wellbeing of Residents**
 - **Community Connection**
 - **Communal Spaces**



Simulate

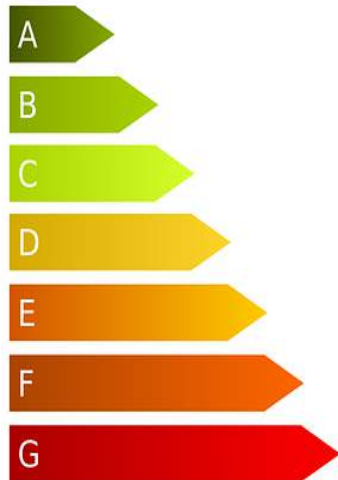
[Top](#)

How to use the interface



Three policy areas (decision options)

Investment in Energy Efficiency



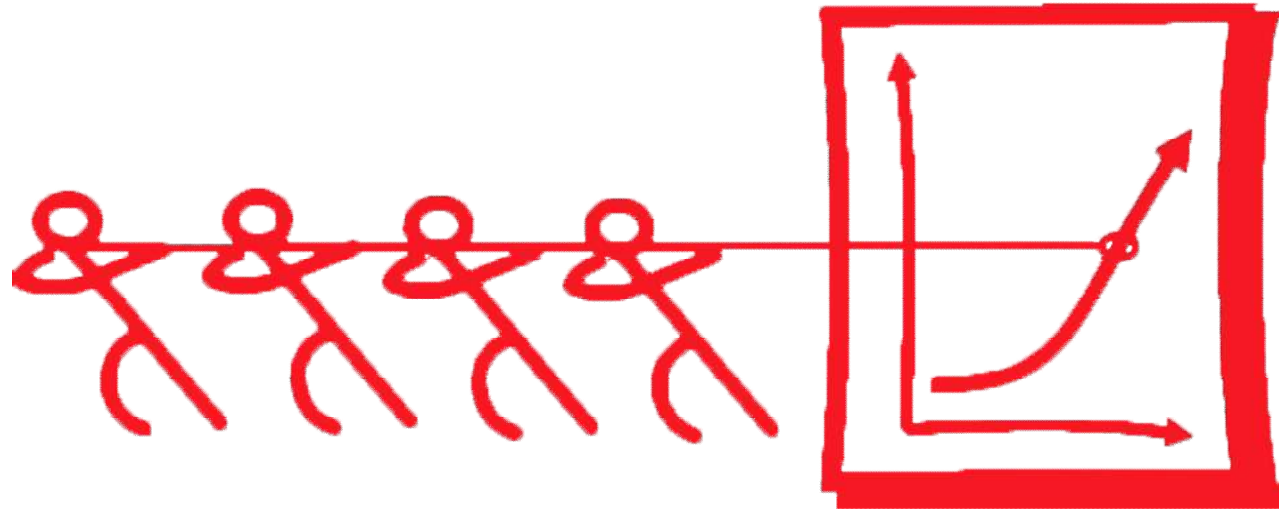
Investment in Communal Spaces



Investment in Monitoring



Team work



MORNING

- One hour and three simulation runs
- Agreement on how to allocate
- Record the decision
- Discuss your results

AFTERNOON

- One hour and more simulation runs
- Change the model assumptions

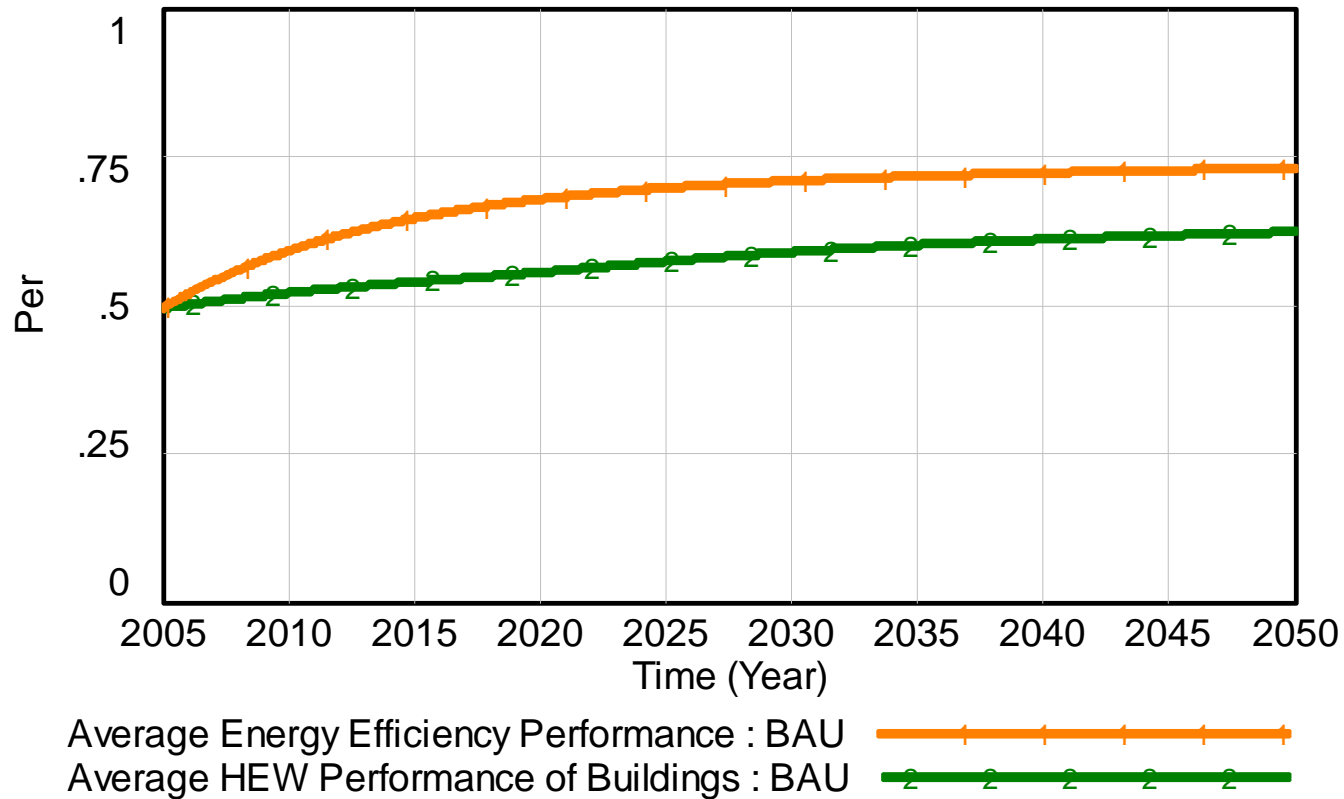
Nici Zimmermann

MODEL UNFOLDING



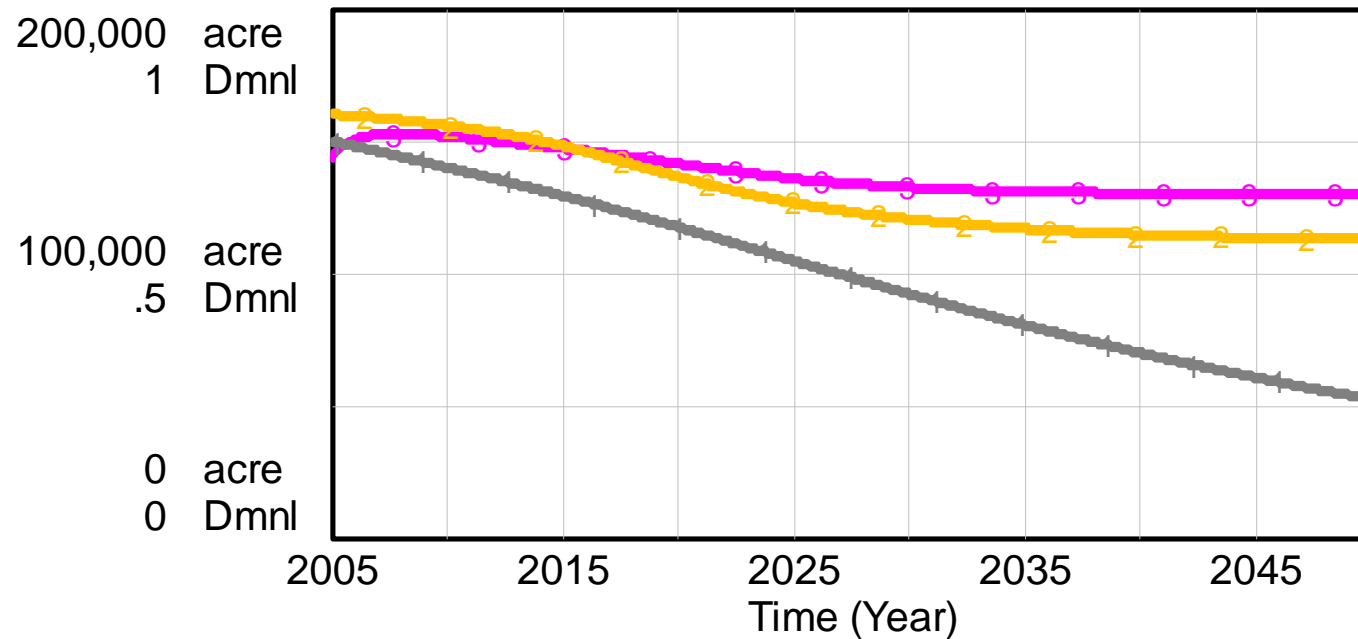
BAU simulation of the model: Long-term behaviour

Energy efficiency and HEW performance



BAU simulation of the model: Long-term behaviour

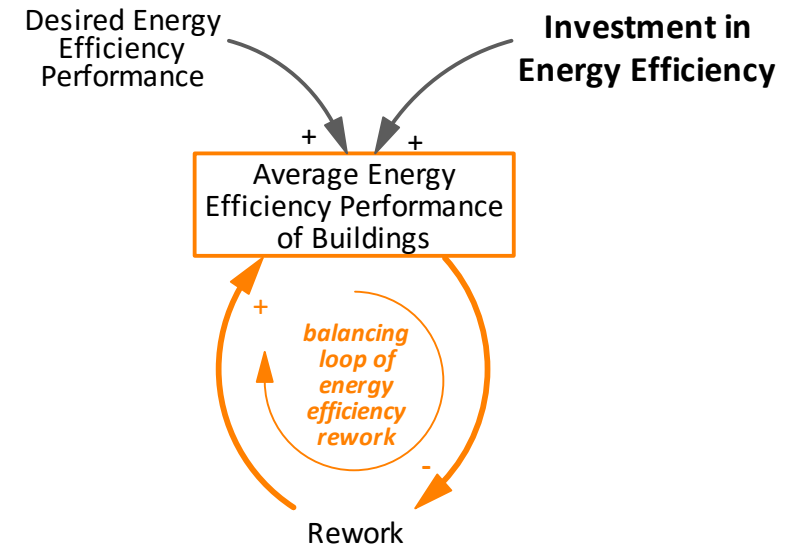
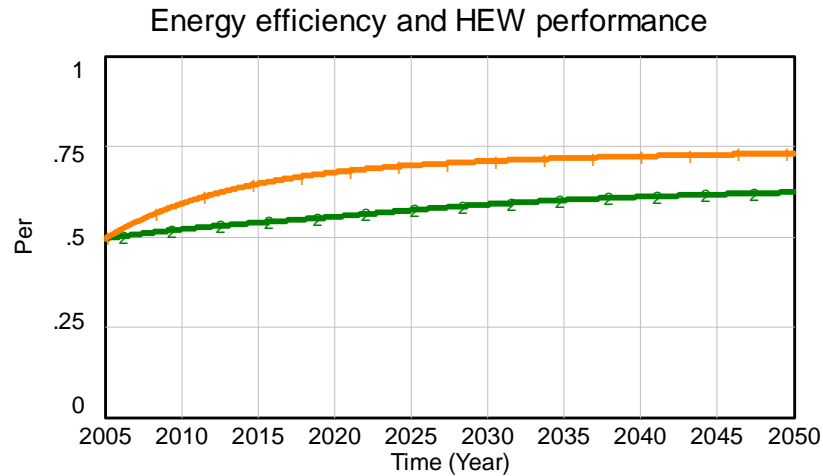
Communal spaces, community connection and wellbeing



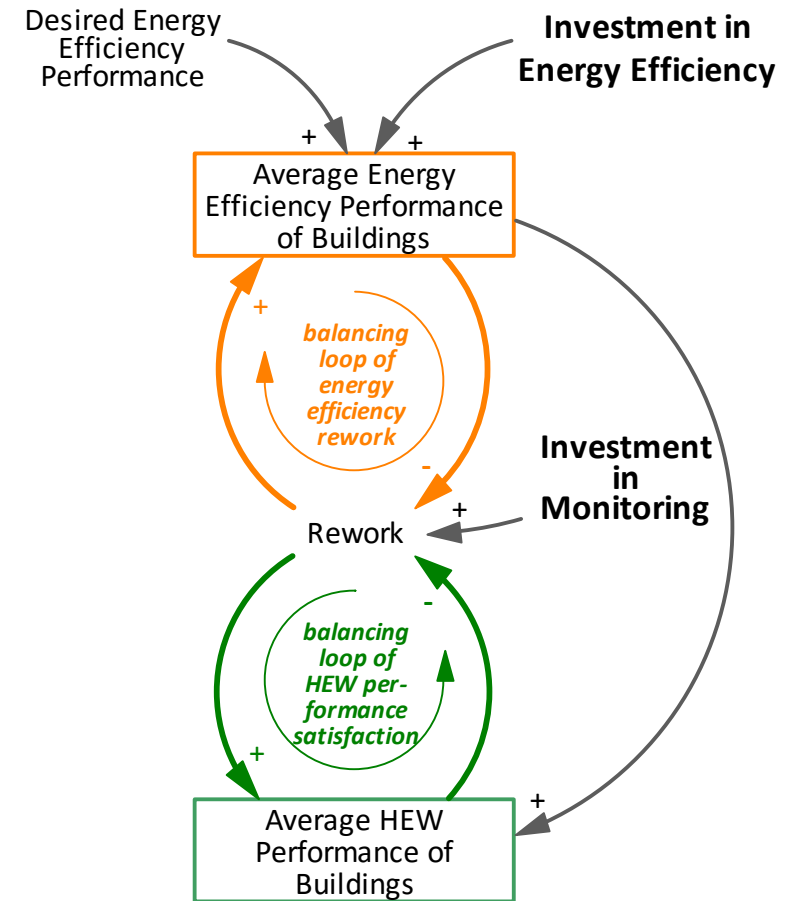
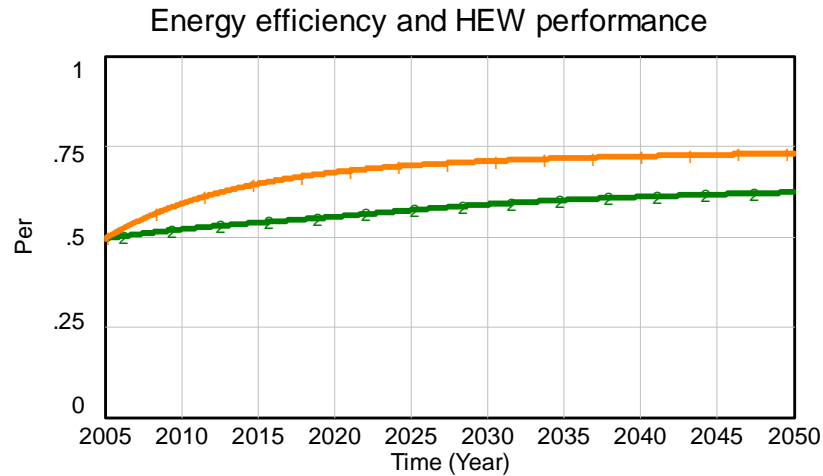
Communal Spaces : BAU acre
 Community Connection : BAU Dmnl
 Wellbeing of Residents : BAU Dmnl



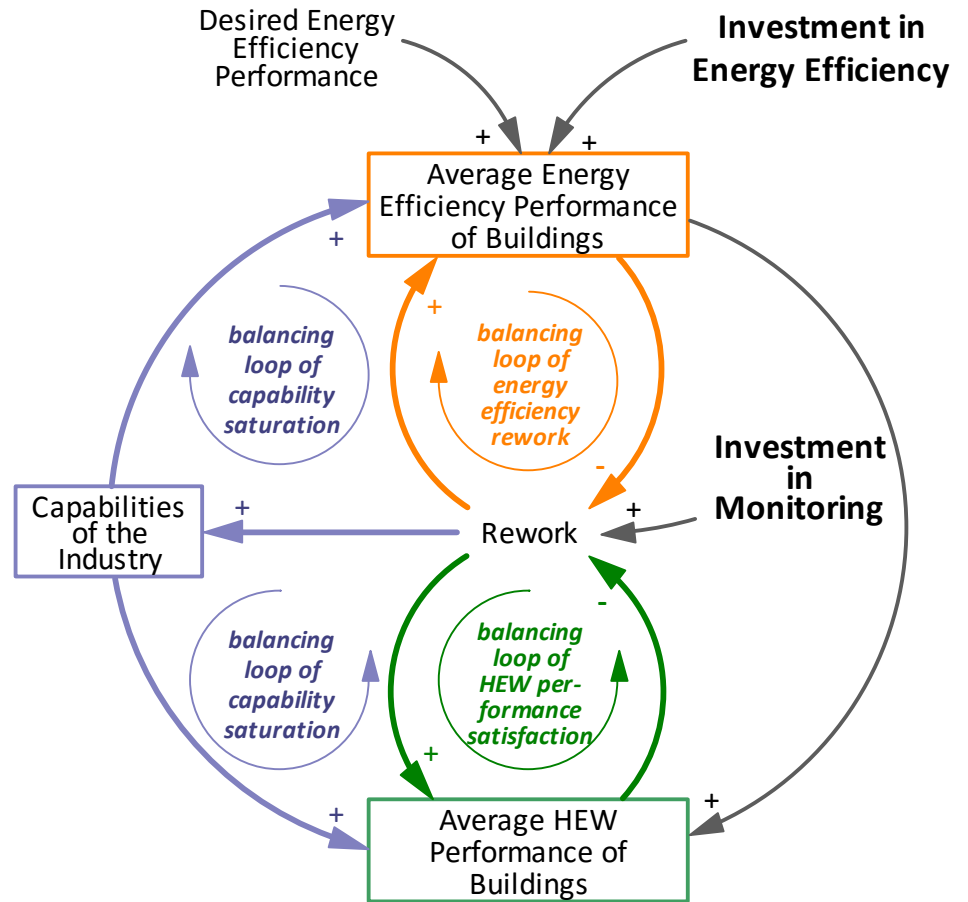
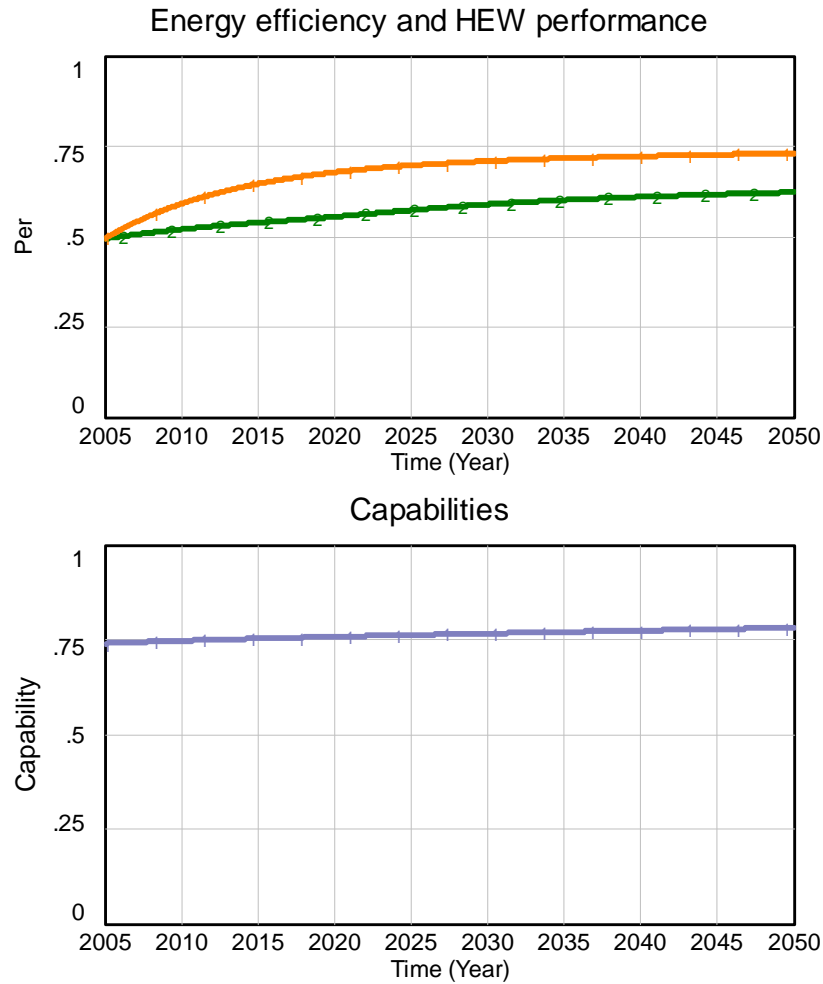
Causal loop diagram



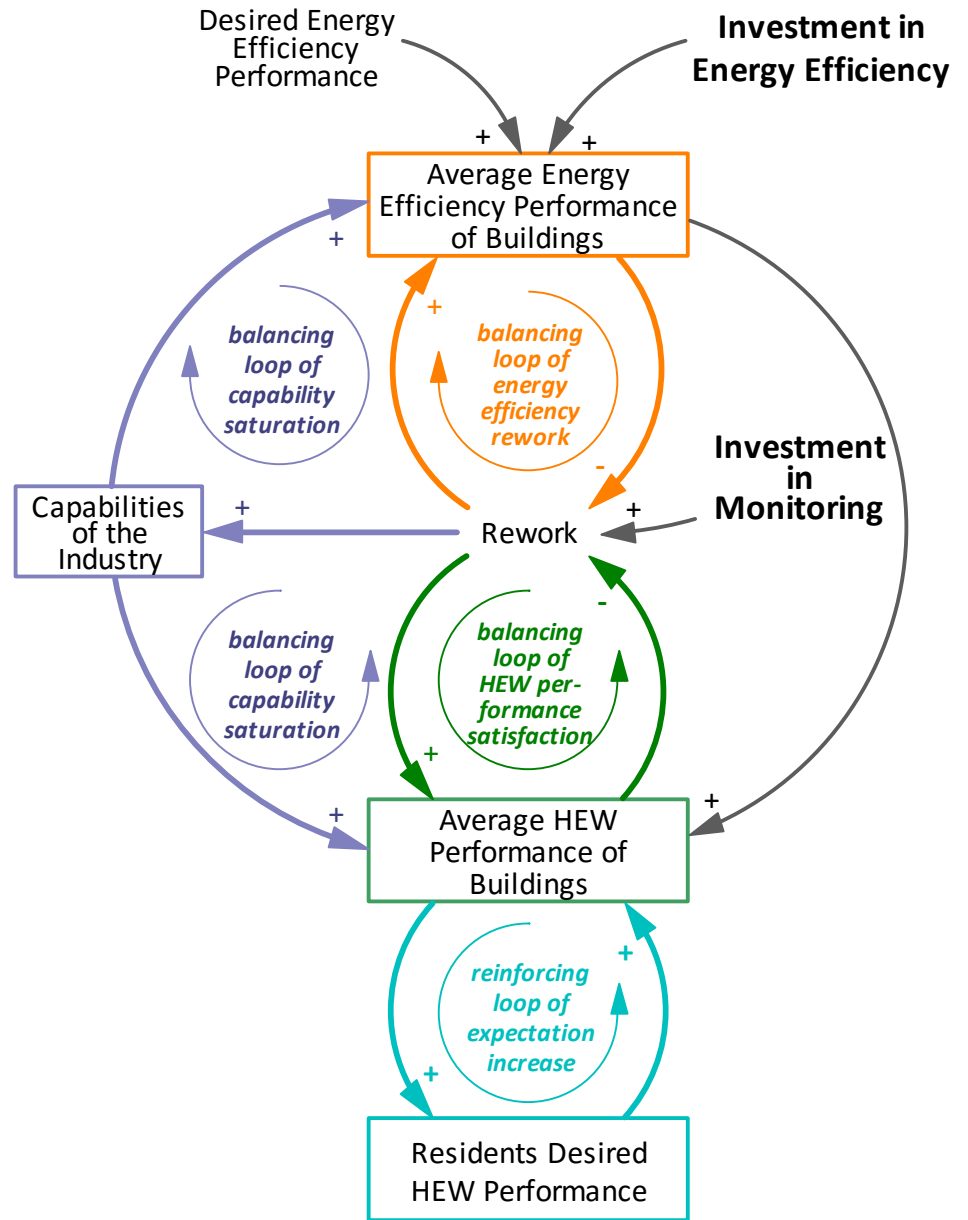
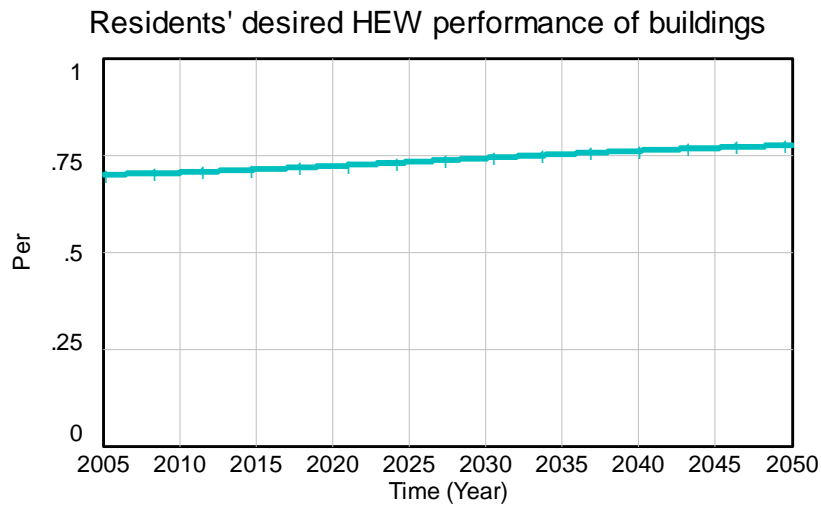
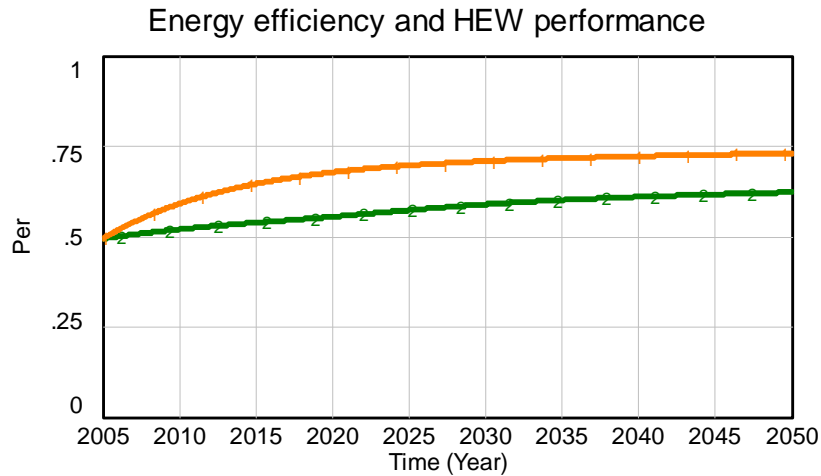
Causal loop diagram



Causal loop diagram

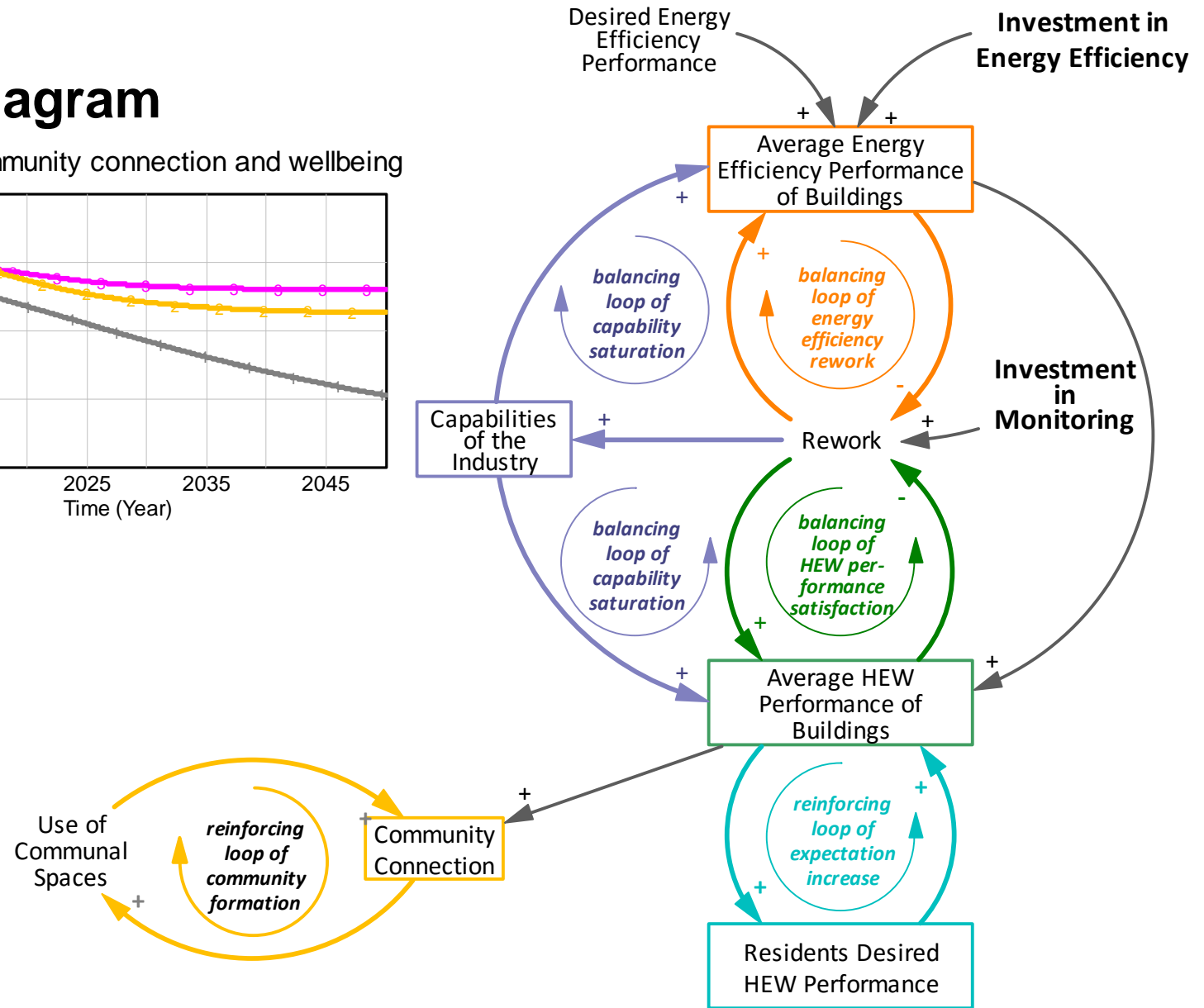
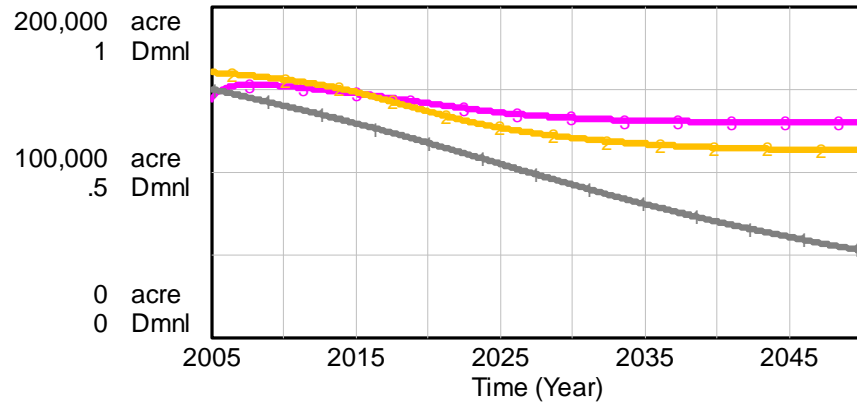


Causal loop diagram



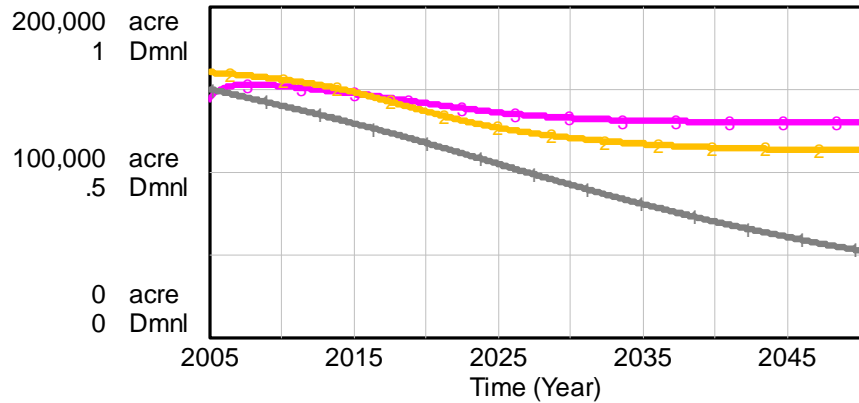
Causal loop diagram

Communal spaces, community connection and wellbeing

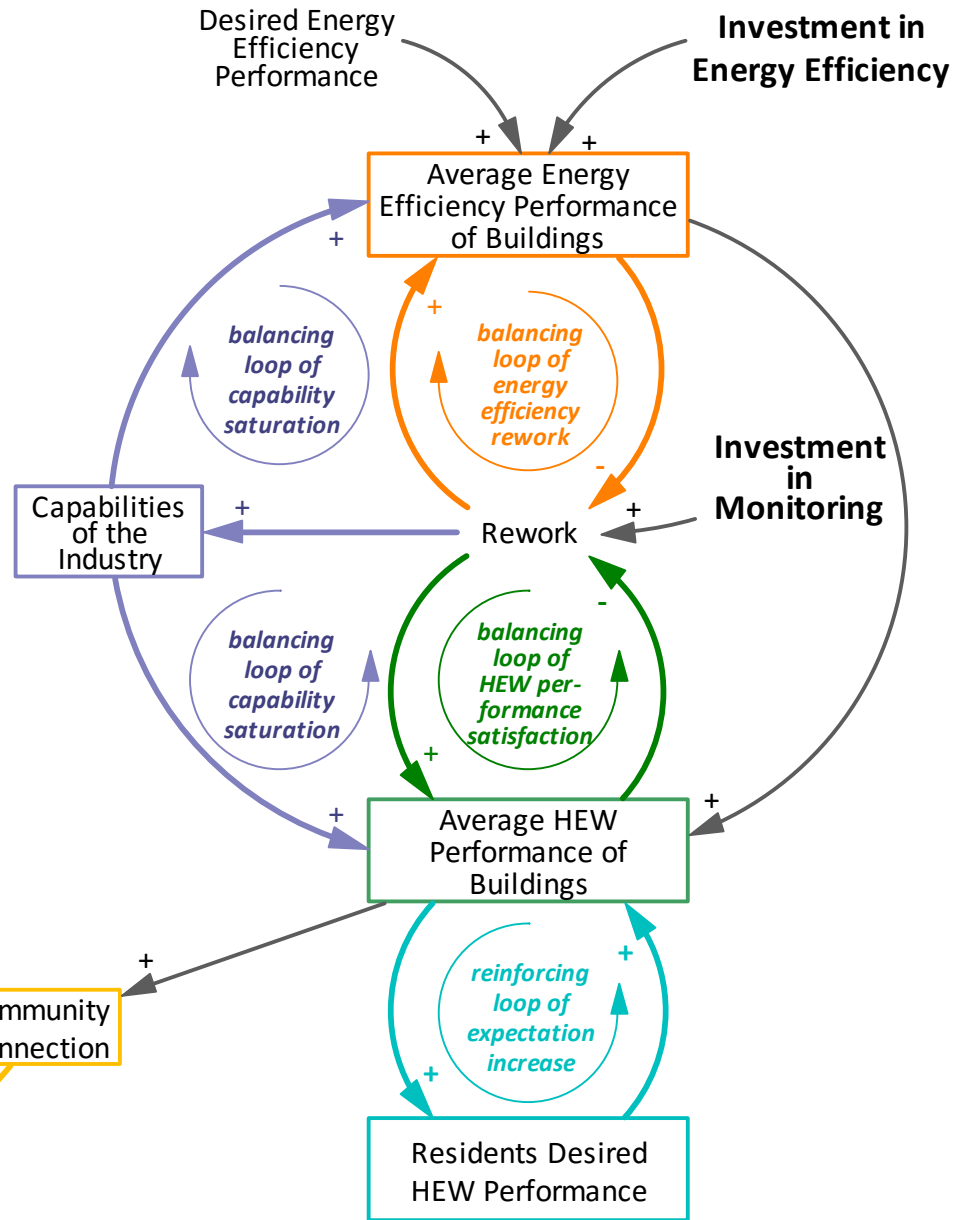
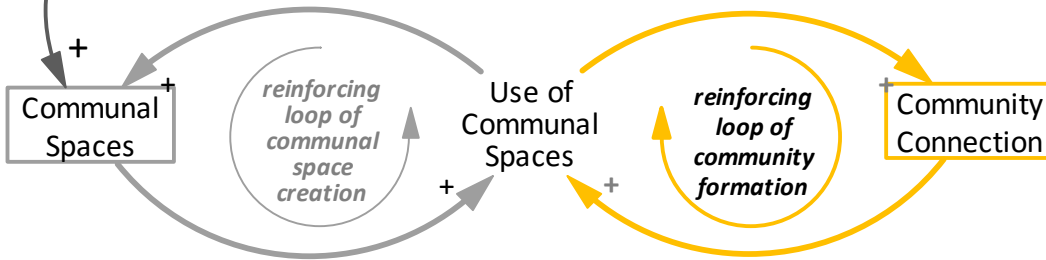


Causal loop diagram

Communal spaces, community connection and wellbeing

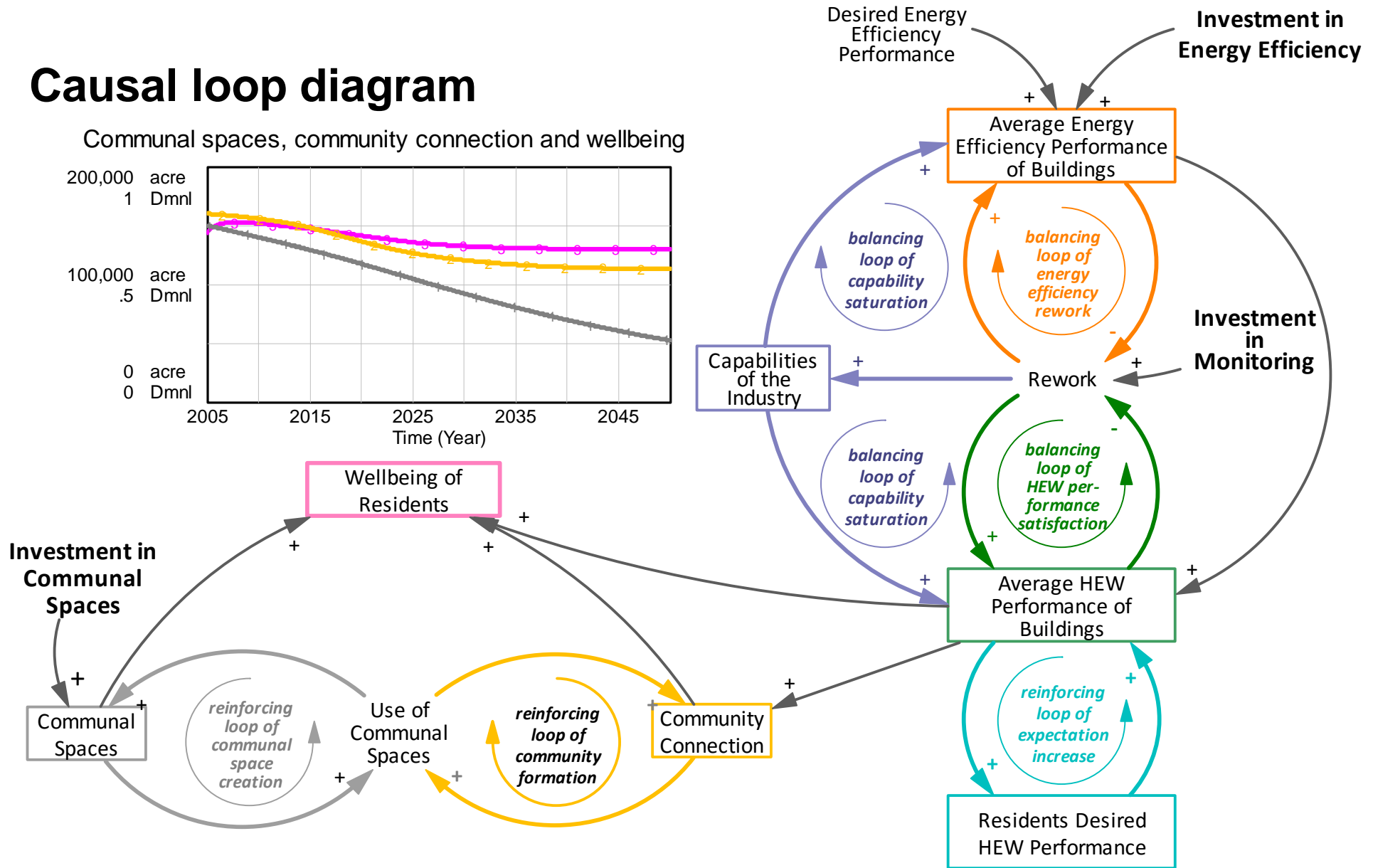
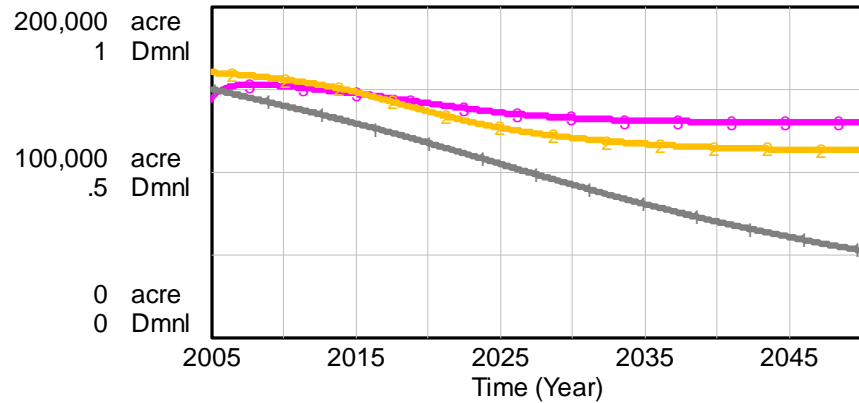


Investment in Communal Spaces

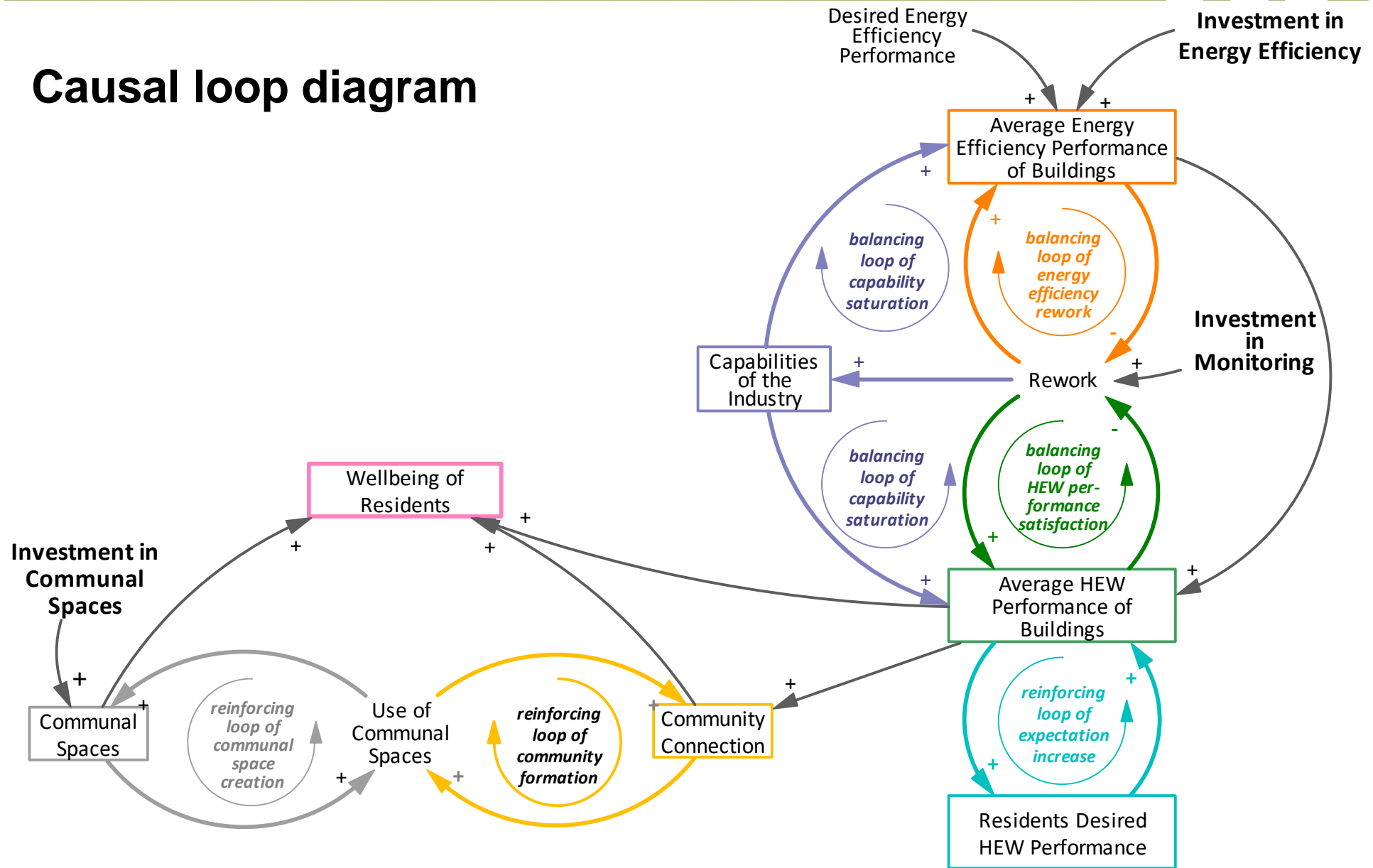


Causal loop diagram

Communal spaces, community connection and wellbeing

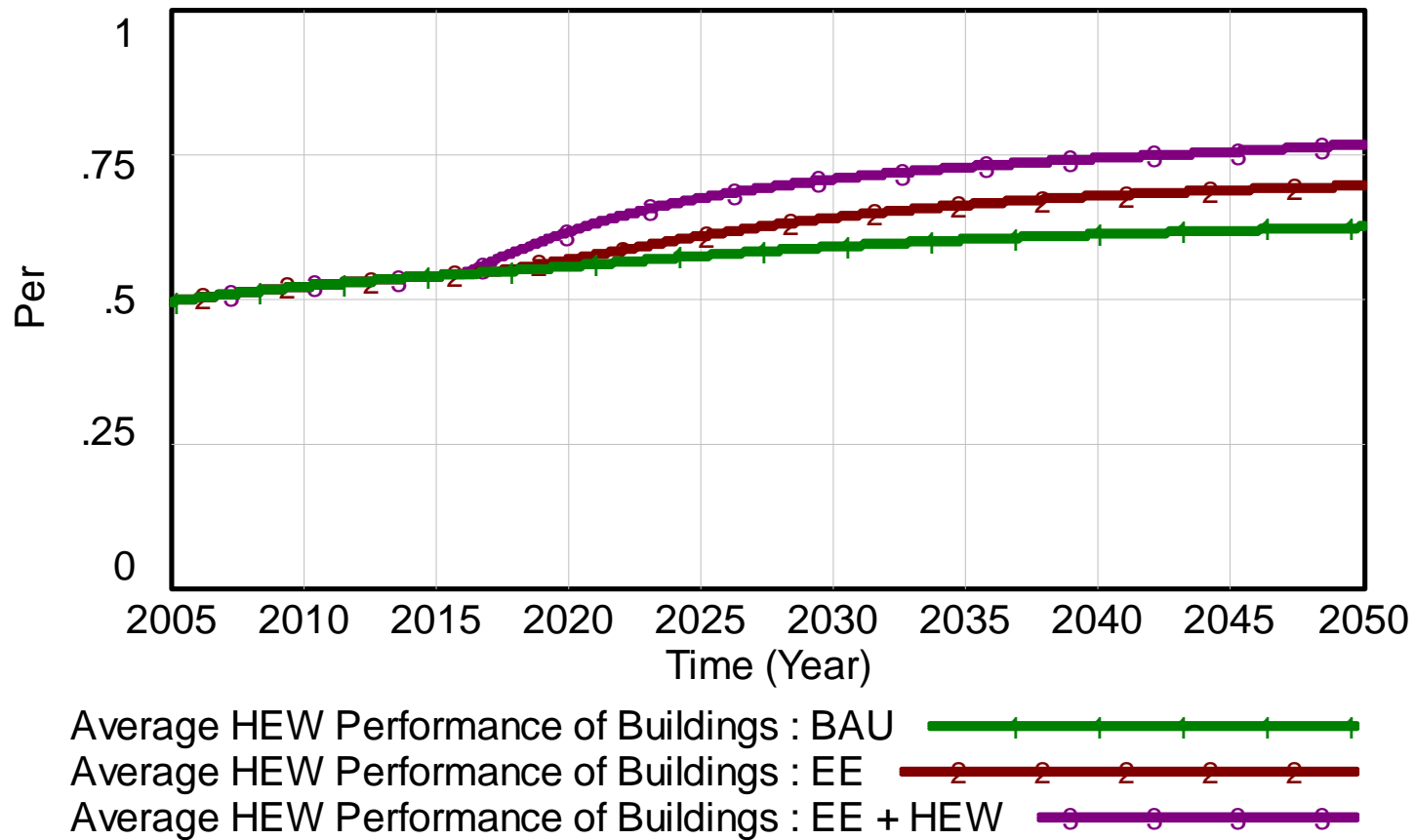


Causal loop diagram



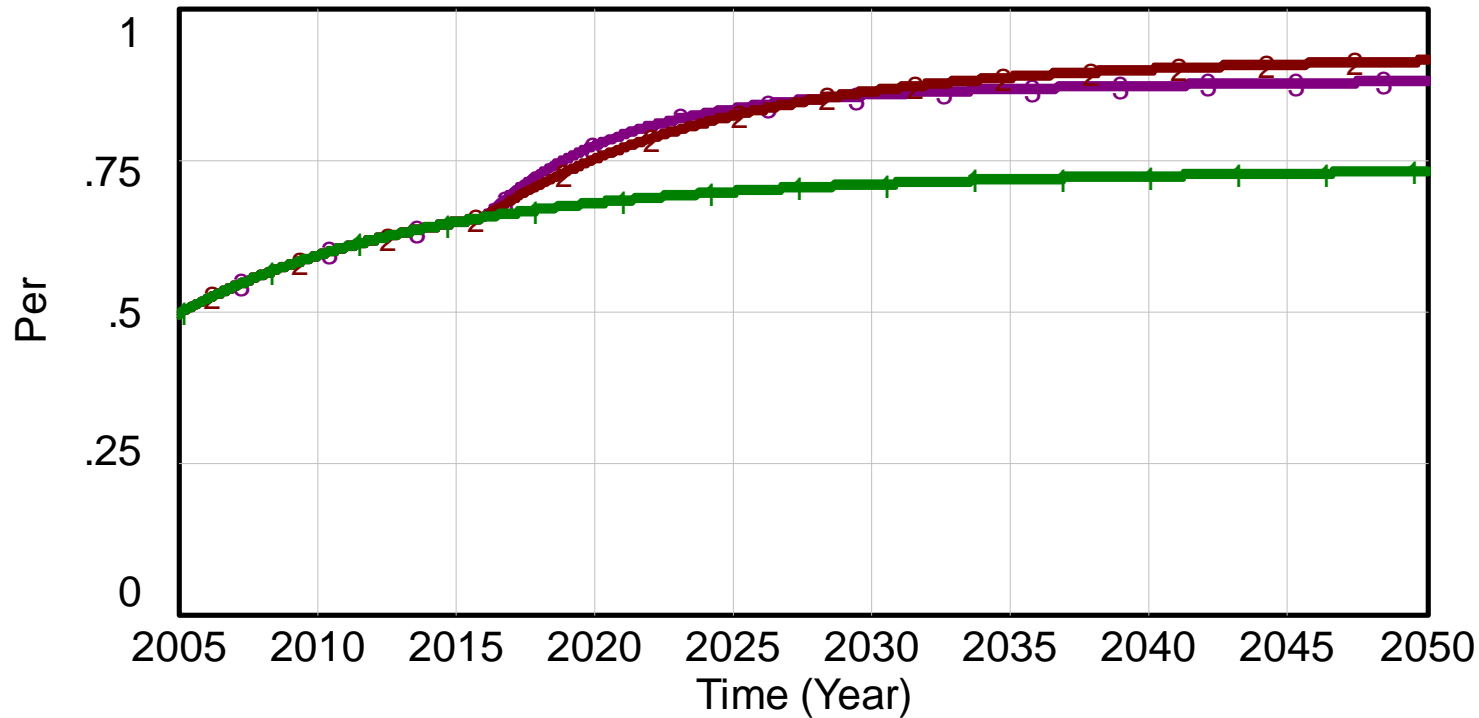
Behaviour comparison

HEW Performance of Buildings



Behaviour comparison

Energy efficiency of buildings



Average Energy Efficiency Performance : BAU

Average Energy Efficiency Performance : EE

Average Energy Efficiency Performance : EE + HEW



QUESTIONS FOR MODEL ANALYSIS



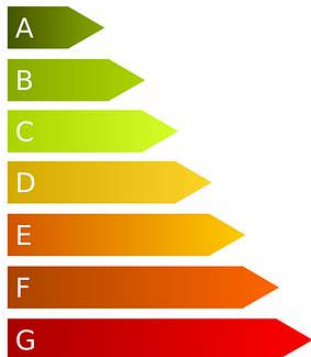
To explore

- Which single investment maximizes HEW performance?
 - Monitoring
- Which single investment is best and second best for community connection
 1. Communal spaces
 2. Monitoring
- The aggregated opinion of Community small workshop participants determined the relative weight by which energy efficiency, HEW performance and communal spaces affect wellbeing. What weighting would your group assign to these?



Nici Zimmermann

SIMULATION ENVIRONMENT DISCUSSION



Purpose



Purpose



Institute for Environmental Design and Engineering (IED) about Housing Energy and Wellbeing (HEW)

Simulation environment discussion

- Were your assumptions challenged?
- Do you challenge our assumptions?
- At what level do we create leverage?
- Suggestions \leftrightarrow value systems
- How did you come to consensus?
- Usefulness and learning

