

Practical Exercise 2 – Model Answers

# THERMOS

Please read the instructions, descriptions and questions below carefully and follow these steps:

1. Access the tool (<https://tool.thermos-project.eu>)
2. Watch [Exercise 2](#) clip we prepared for using the software
3. Complete the tasks step-by-step as outlined below

***-----Model Answers-----***

## Practical Exercise 2 – Model Answers

## Optimisation decisions - Introduction

This exercise does not necessarily involve using the model per se – it is intended to increase your understanding of the interaction between constraints and objectives as described in the accompanying [video](#).

There are three parts to consider:

1. Choosing between two supply locations
2. Ways for things to be infeasible
3. Drivers for things to happen

## Part 1: Choosing between two supply locations

**Question 1:**

How would you set up the model to pick between two different supply locations for a network whose constituent demands you had already chosen?

**Correct answer:**

**To choose between two supply locations there are two things you can do:**

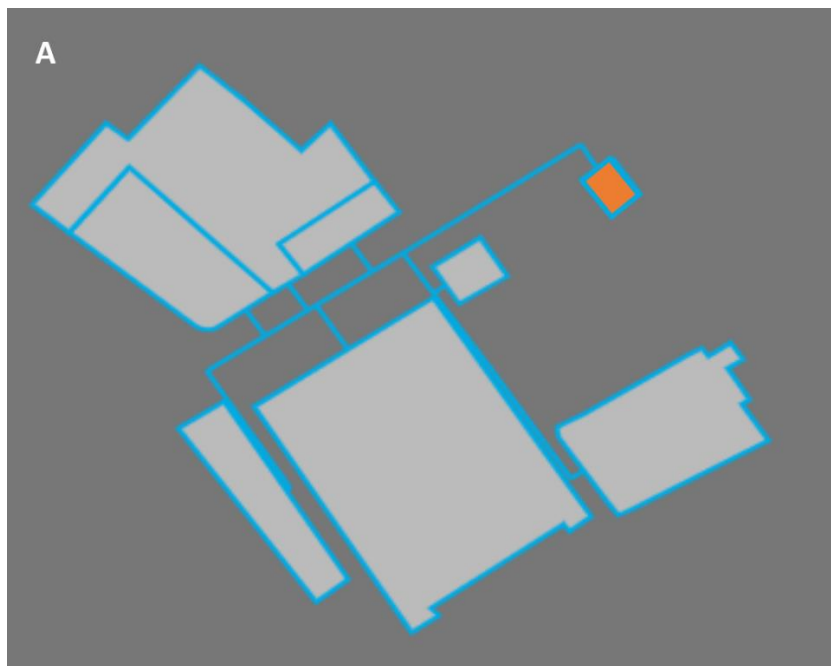
- 1. If the choice is exclusive, make two problems, one with supply A and one with supply B. Optimise both of them and compare the solutions. You can then decide which you prefer. Since the demands are already chosen, you can fix these and leave the routing decisions to the optimiser.**
- 2. If the choice is not exclusive, you can set both locations as supplies in the same problem. When optimising, the model may then use none, one or both locations to supply the demands in the network.**

## Part 2: Ways for things to be infeasible

**Question 2:**

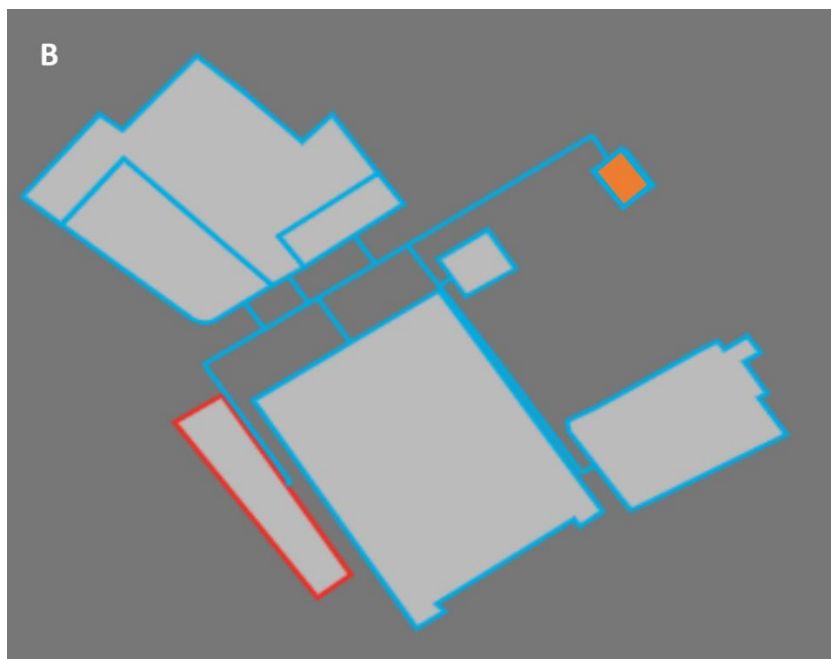
Look at the three scenarios A, B and C below. Considering each in turn, describe ways in which these problems could be 'infeasible' (i.e. have no permitted solution).

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**Correct answer:**

**This problem could be infeasible if there is an emissions constraint when the optimisation objective is 'Whole system' and no solution can meet the constraint.**



**Correct answer:**

**Same as for problem A, or:**

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- **The supply capacity is not enough to meet the demand in the red ('required') building**
- **The maximum pipe size does not carry enough heat to meet the demand in the red ('required') building.**



**Correct answer:**

**Same as for problem B.**

Part 3: Drivers for things to happen

**Question 3:**

When the objective is set to 'Maximise Network NPV' you can still tell the model to offer insulation measures and other heating systems.

These systems produce no revenue to the network. Can you describe circumstances in which the model might decide to insulate a building or purchase a new individual heating system when in this configuration?

**Correct answer:**

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**Unfortunately this question was set in error and no longer makes sense due to changes implemented in the model since the question was set.**

**The correct question is:**

When the model is set to maximise network NPV, it does not consider insulation & other heating systems. Why do you think this is?

**Correct answer:**

**When maximising network NPV, only the factors that directly impact the revenue to the network operator are considered. From the network's point of view, it is never profitable to install insulation or other heating systems as this can reduce demand and increase costs, and therefore offers no benefit in terms of network revenue generation.**