

RESULT 4 & 6 – Network & Techno-Economics

Network model

Part 1: What is the potential impact of DRA's on district heating (DH) systems and geothermal wells/reservoirs, and are we able to set up and validate simulation models to determine this effect?

Part 2: Can this effect be quantified by exporting the resulting network and component design to link up with the techno-economic phase of the project, comparing non-DRA system results with that of DRA systems?



Flow Loop model

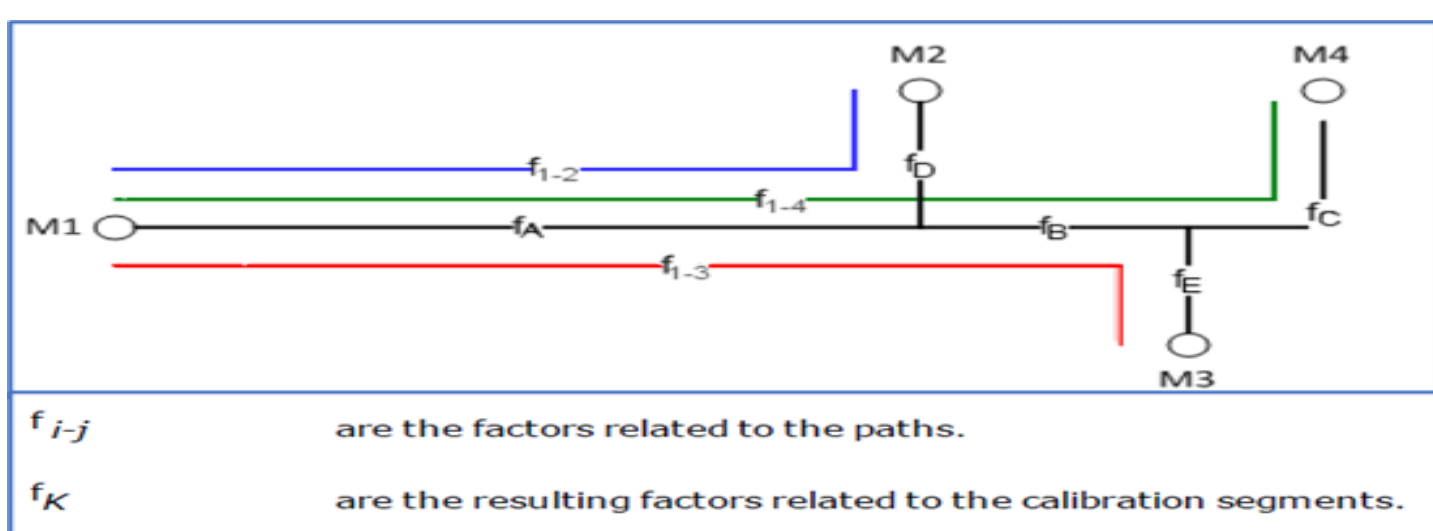
Model to represent the experimental flow loop setup
Process and system boundary conditions considered during DRA performance testing

Measurements at various test conditions and DRA concentrations as pressure correction factors or modified object properties (i.e. roughness in pipes)

Calibration: Targeted at a path with comparison between two node objects

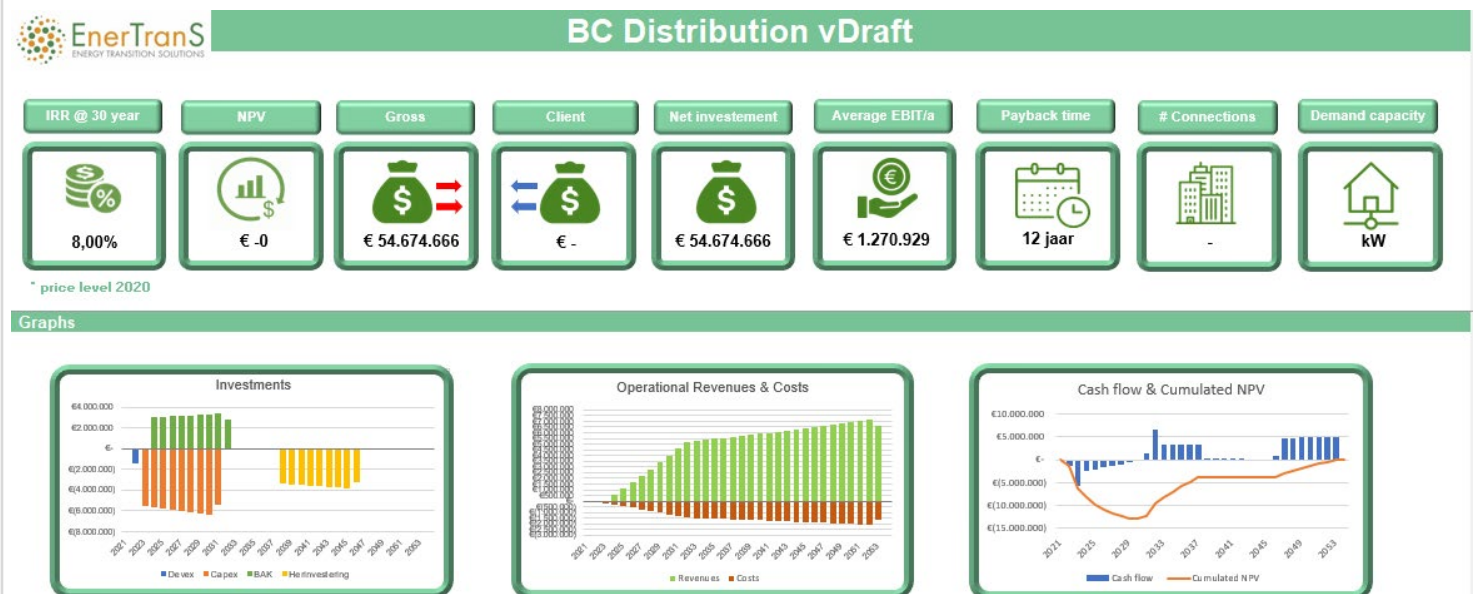
Comparison between simulation- and measured results

Output: correction factor that is stored as an attribute for all pipes.



Financial model

This techno-economic activity includes building individual business case models as a reference case based on conventional design parameters, optimised system development and rollout. The model output will be validated, and the base model will be updated and optimized.

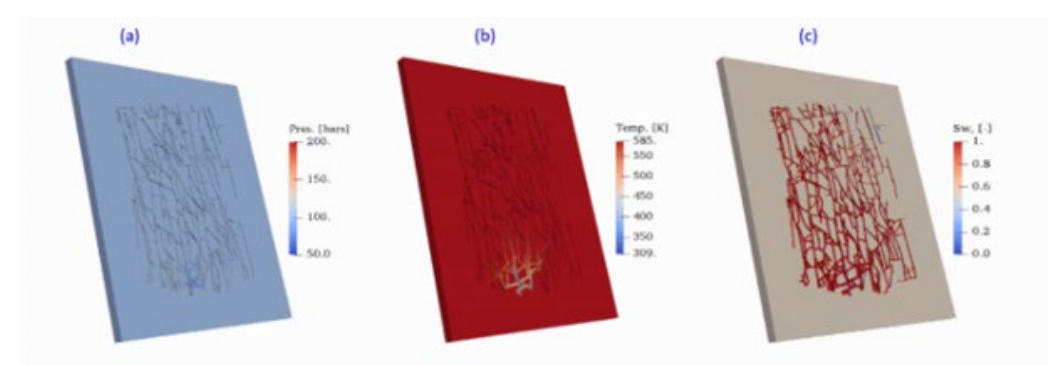


The contribution of DRA's in District Heating System is expected to lead into smaller pipe size diameters which should result in lower CAPEX and environmental impact within the subsurface.

Geothermal integration

Based on experience and project results the criteria is defined for an integrated/combined financial model to achieve optimization of the business case and reduction execution and validation timelines. According to defined criteria, an integrated and combined financial model is developed for production, distribution and operational elements of the project and system. Each part will contain elements related to design, build, operate and maintain. The integrated model can be filled from a central dashboard and outputs validated.

During the project results from activities will be used as input for the financial model. Combining or integrating business cases and approaches should lead into further optimization between production and supply and reducing the use of pump energy.



Energy depletion in a carbonate fractured reservoir: pressure (a), temperature (b) and liquid saturation (c)