EFS: ENERGY FLOW SIMULATION

Simulating the energy flow in transportation networks with KRUCH EFS

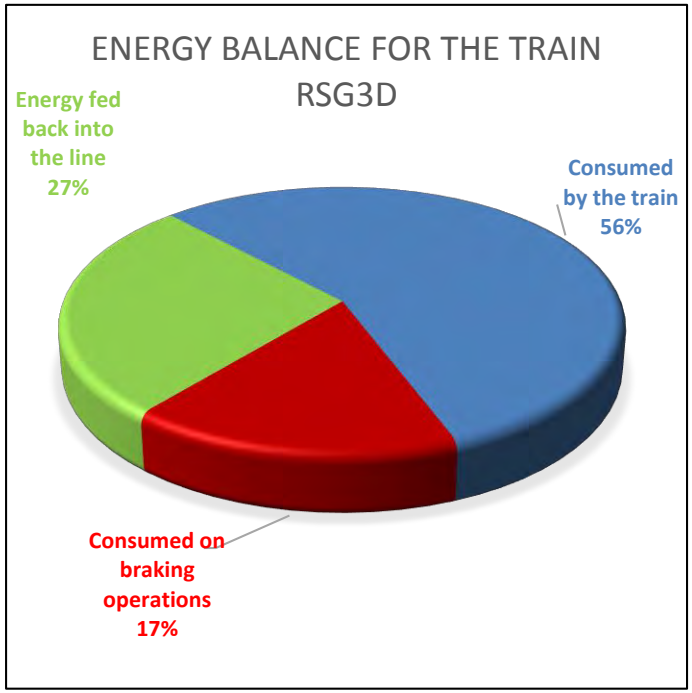
AUSTRIAN QUALITY since 1869

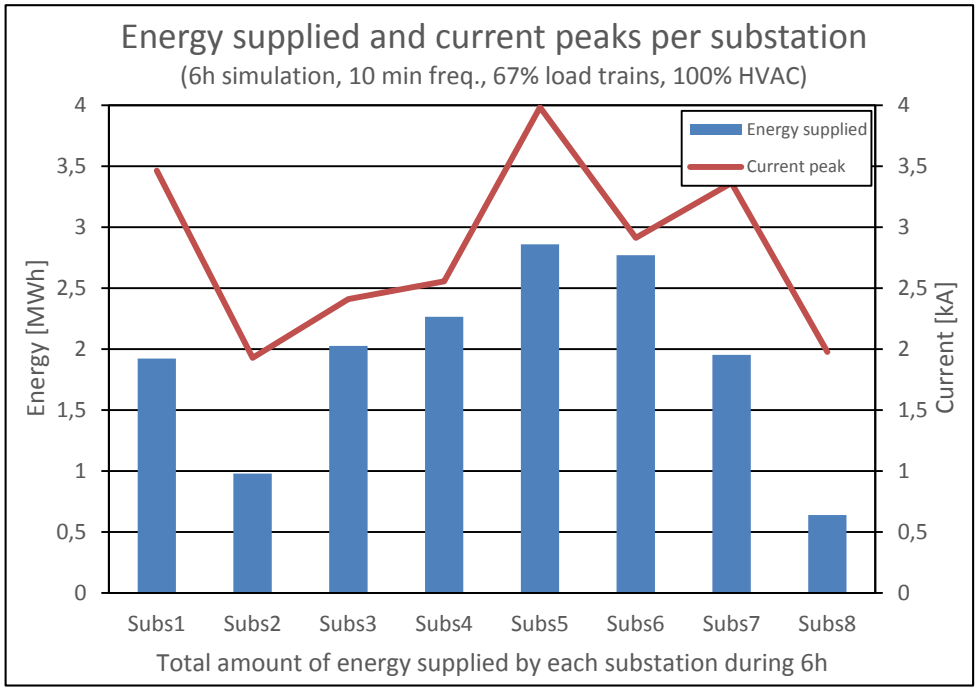
Index:

- What is EFS?
- What is it used for?
- Typical questions
- Features
- User interface
- Results of EFS
- Summary

What is EFS?

The **Energy Flow Simulation** is a software tool that simulates the energy flow within you electrical network.





What is it used for?

- **Solve problems, increase reliability**

  EFS detects failures due to overloaded substations, it highlights low voltages in the OLE or high voltage values on the return rail.

- **Simulate the energy flow for different scenarios**

  Test new timetables, try new voltages or simulate substations failures.

- **Analyse the returns of investments**

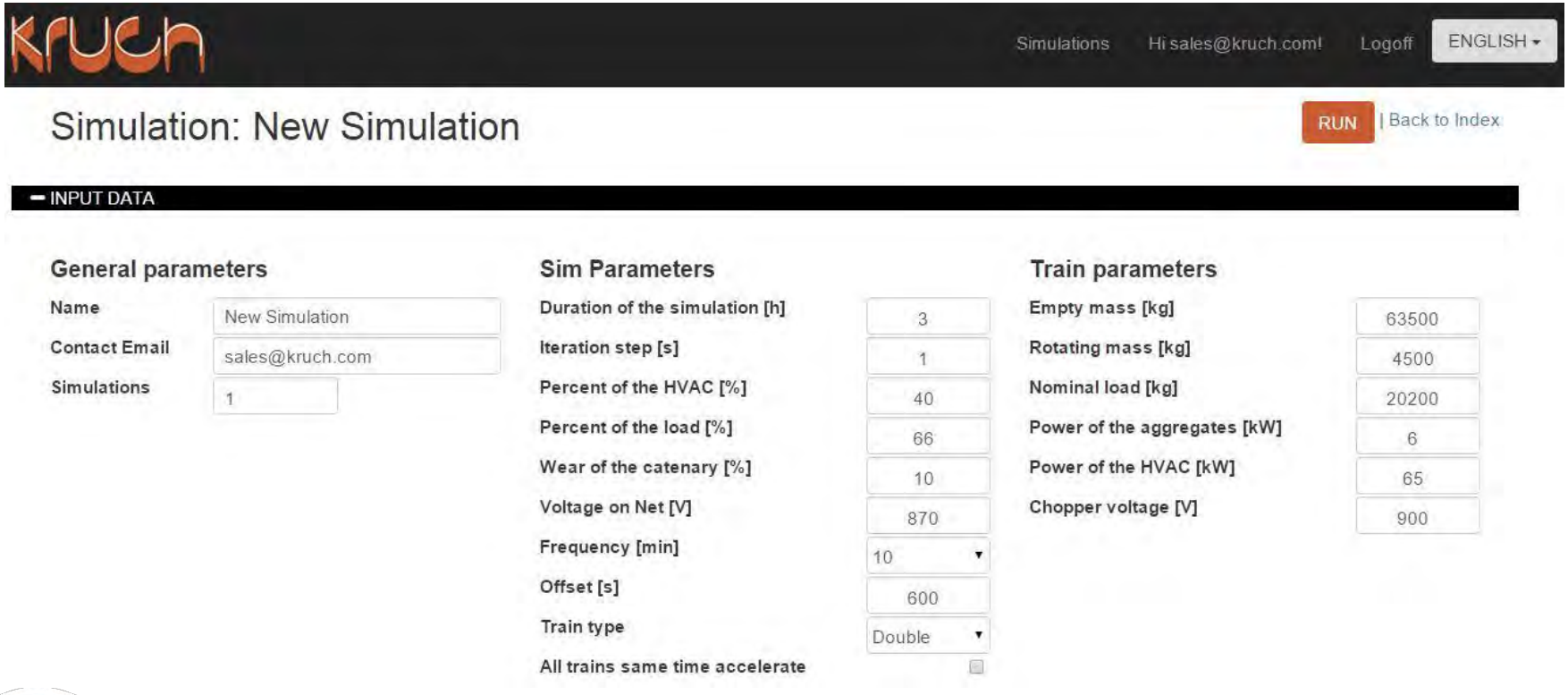
  Check if infrastructure investments will pay for themselves, such as new contact wires, new substations, energy storages, etc.

Features of EFS

- **Very easy to use:** Training to work on this system takes no more than 1h!
- **Supplies reliable results:** Confirmed results with on-track measurements
- **Easy to maintain:** Adaptations to the physical network can easily be transferred to the simulation
- **A sustainable investment:** New infrastructure investments can be checked thoroughly to help make decisions

User interface

EFS is an online platform, you can use it on any device with web access. No local installations are required. The user interface is clearly arranged and simple to use.



Typical questions

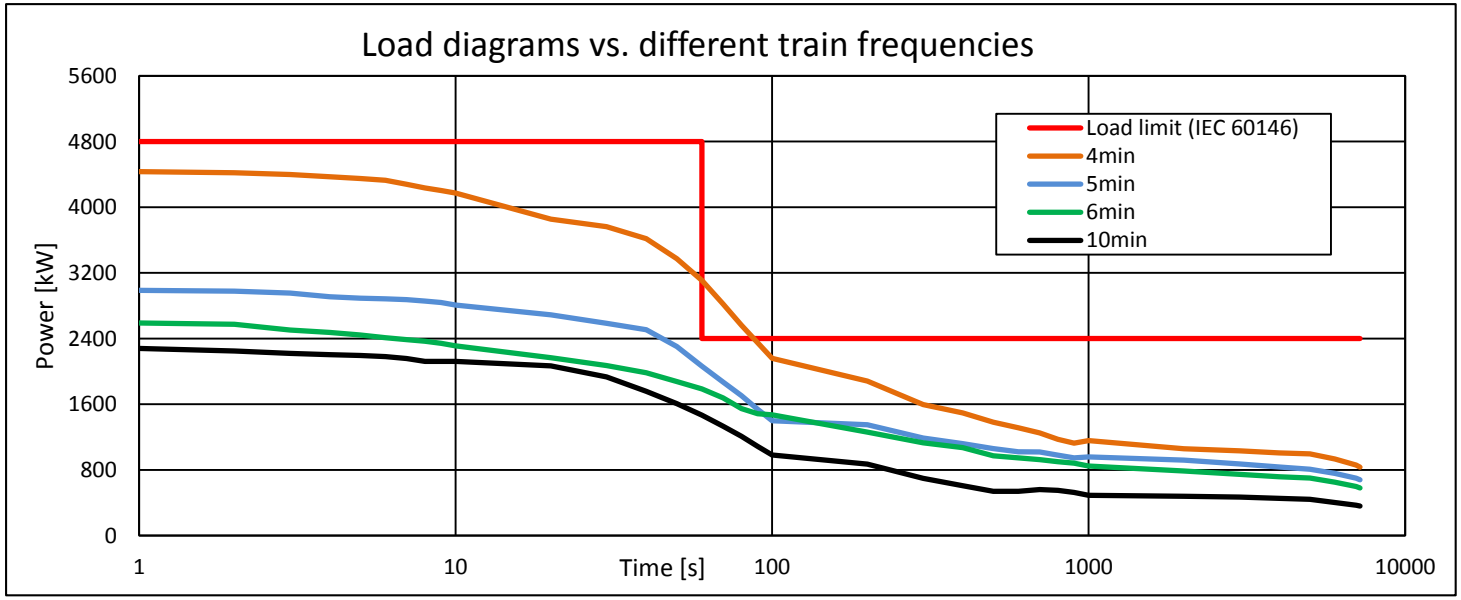
- **Where** are the critical points in the network?
- **Why** do certain substations shut down?
- **Why** is the power demand higher than expected?
- **What** happens if the train frequency is increased?
- **How** should I best extend the length of the network?
- **How** is it possible to save energy in the network?

Results of EFS

- EFS highlights **critical points** in the electrical network
- It displays load **diagrams, load histograms**, etc.
- It shows the **current and voltage** of the consumers (trams, trolleys...) in all parts of the network
- **Substations** are **analysed** in detail
- **Energy consumption** of the vehicles are analysed
- **Energy losses** in the overhead wires are displayed

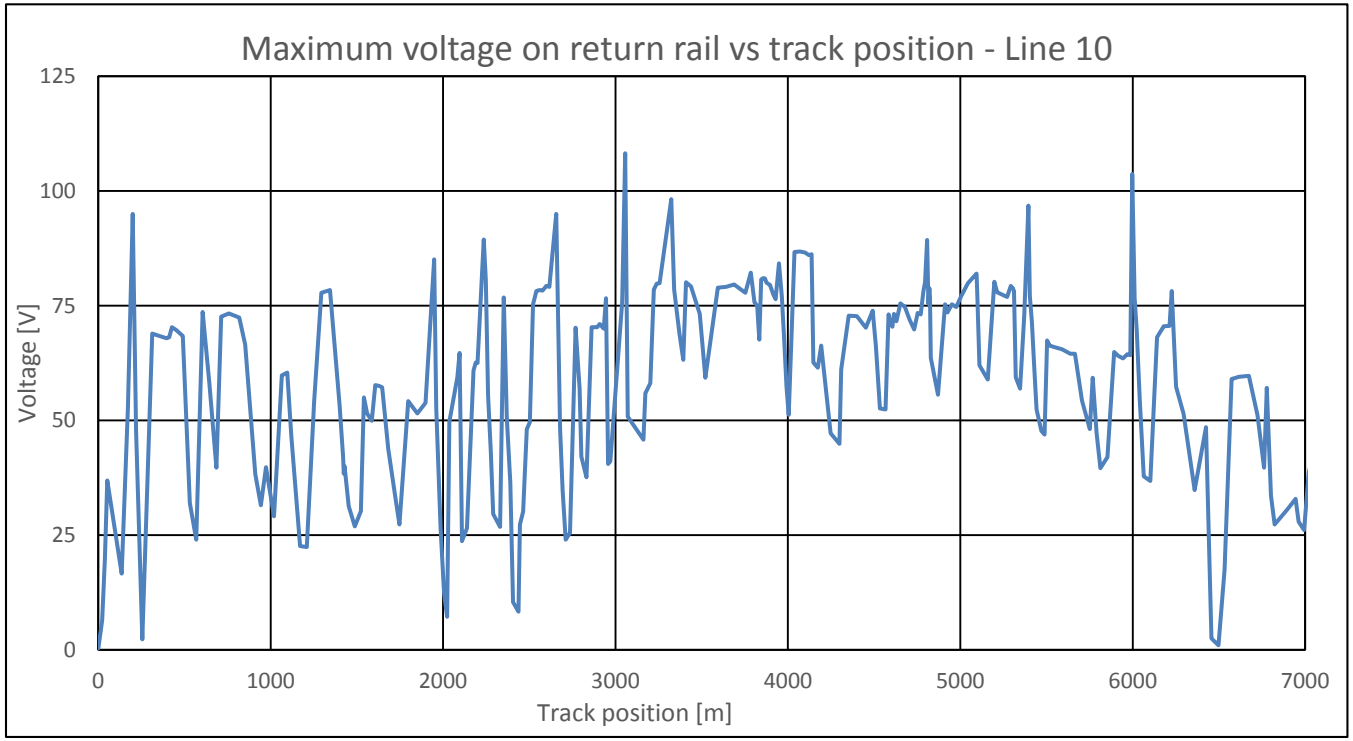
Results of EFS

Example a): Displaying the functionality of a sub-station when adapting the time table: In this case a 4min time table is not approvable, a 5min timetable would however be within the allowed range of the sub-station.



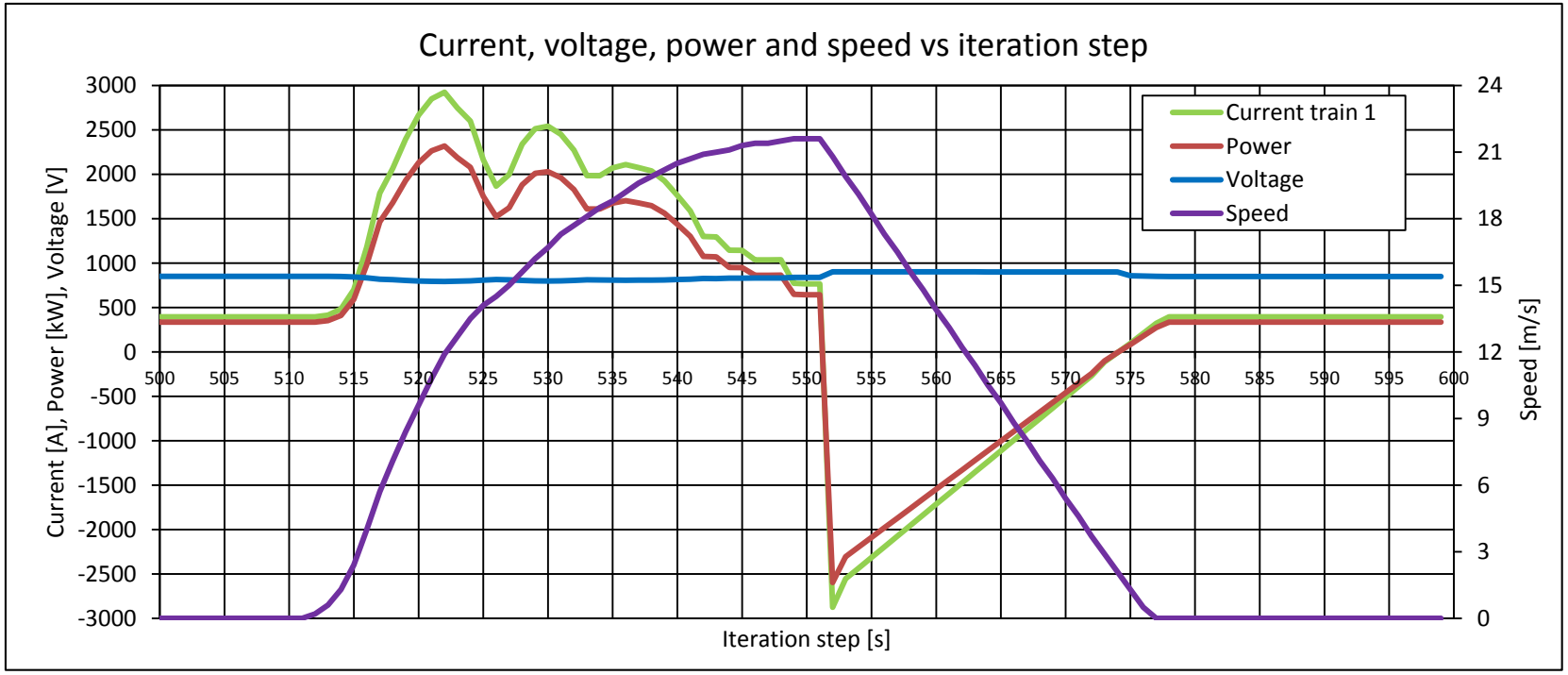
Results of EFS

Example b) Displaying the voltage behaviour along geographical points of the line



Results of EFS

Example c) Displaying the voltage, current and power consumption of one train



Summary

EFS allows you to:

- **Simulate** the electrical values in your network (energy flow, power, voltage and current)
- **Predict** the consequences of exceptional circumstances.
- **Find** the causes of an overload.
- **Optimise** the power distribution.
- **Analyse** the cost benefit of an investment.

Thank you
for your attention!

How can EFS help you in your case?

For further questions or to arrange a web presentation please contact:

Mr. Fridolin Prukl

fridolin.prukl@kruch.com

+43 6991 662 4519

www.kruch.com