REVISE

Revisiting and Evaluating Environmental Inputs on Line Ratings

Energy Innovation Summit

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Scottish & Southern Electricity Networks

TRANSMISSION

Presenters

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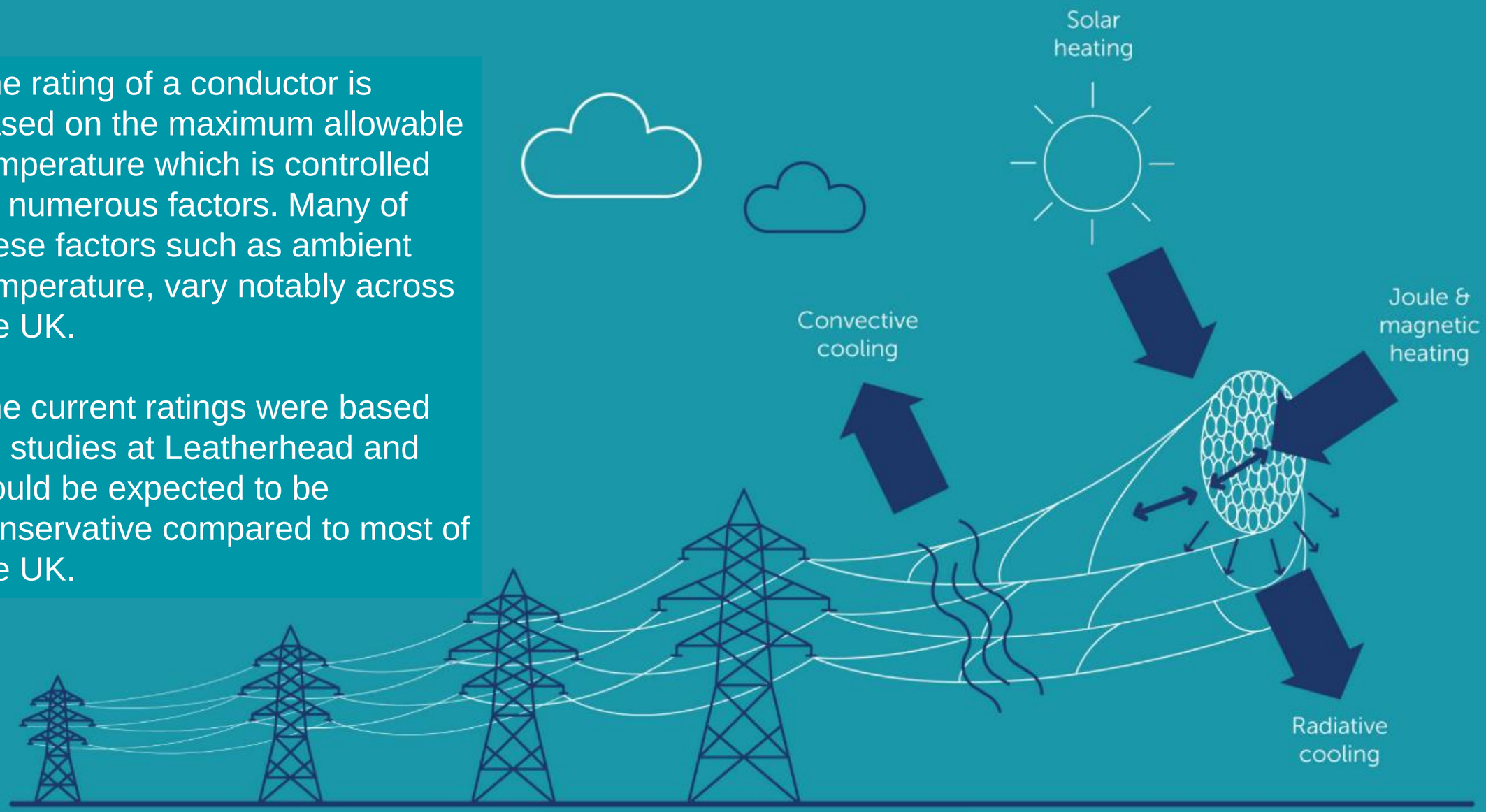
Problem

The rating of a conductor is based on the maximum allowable temperature which is controlled by numerous factors. Many of these factors such as ambient temperature, vary notably across the UK.

The current ratings were based on studies at Leatherhead and would be expected to be conservative compared to most of the UK.



Opportunity & Benefits

REVISE aims to update the methodology that the TGN26 standard for applying static line ratings is based upon (established in the 1980s). The outputs are believed to lead to:

An enhanced grid via an increase in capacity

AND/ OR

A safer network by highlighting areas for reinforcement

Benefits

- Reduce the costs of managing power flow constraints and connection costs by allowing smaller and less costly overhead lines to be viable for a larger number of connection schemes.
- Alleviating constraints on renewable generation.
- Circuit rating increase can be achieved with little or no physical works required, with associated embedded carbon savings.

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Project Overview

Strategic Innovation Fund Project

Discovery

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Alpha

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Beta

SIF Discovery phase – March to May 2024

SIF Alpha phase – October 2024 to March 2025

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Project Lead

ESO nationalgrid energyline

University of Strathclyde Glasgow

Met Office

Project Partners

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Key Outputs & Learnings

- Sensitivity Analysis – key parameters and those with minimal impact on calculations.
- Issues identified in standards (IEEE738, CIGRE601 and TGN026).
- Potential implications and resulting interactions:
  - Safety limits.
  - Route-specific design parameters.
  - Implications on other electricity transmission system components.

Stakeholder engagement - Consistent themes

Risks:

- ❑ Alignment and buy-in
- ❑ Existing assets
- ❑ Implementation and timing
- ❑ De-rating of circuits
- ❑ Cross-boundary circuits

Important parameters:

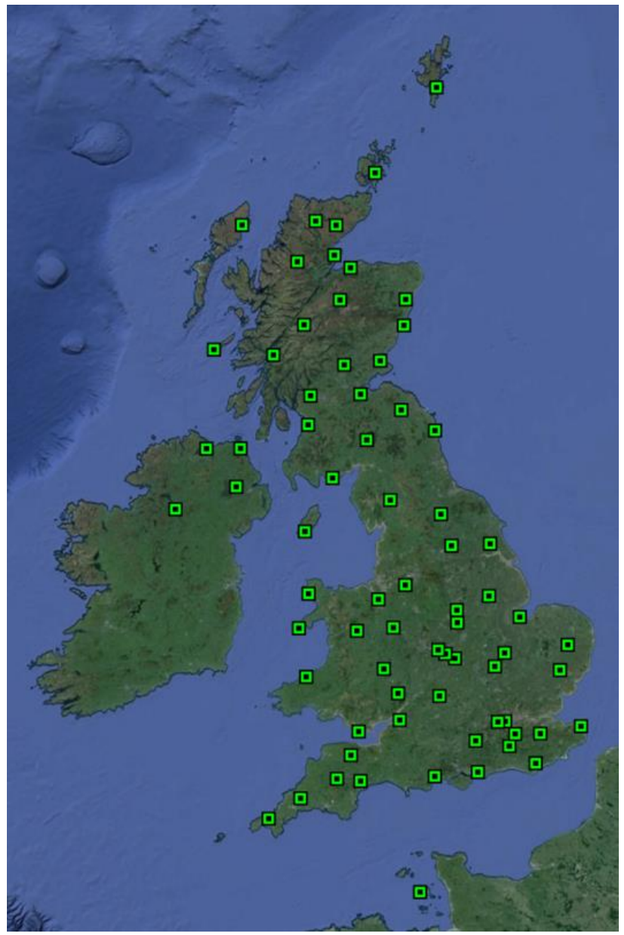
- ❑ Consistent format
- ❑ Common approach among TOs
- ❑ Reliable, well-documented methodology

Key Outputs & Learnings

- Site observations of key weather parameters should be used for benchmarking other datasets and initial prototype work.

- Gridded datasets of modelled weather will provide the best spatial coverage. Further assessment in future project phases can:
  - Ensure they capture key weather events.
  - Investigate the need for further processing to ensure data quality.

- Regions should be defined in later project phases after further analysis of the weather data:
  - Combination of weather parameters result in high-risk scenarios for OHL temperatures. This needs to be understood before we can define regions.
  - Consideration of user needs.



Locations of 71 open SurfaceNet weather stations recording observations of Temperature, Wind, Solar Irradiance, Rainfall, and relative humidity. [Image: Google Earth]

What's next?

Discovery

SIF Discovery phase – March to May 2024

Alpha

SIF Alpha phase – October 2024 to March 2025

- Develop an understanding of conductor heating and cooling rates.
- Explore limits of the heat balance input parameters.
- Review historical exceedances of OHL ratings and the magnitude and frequency of this on the existing GB transmission system.
- Identify worst-case weather scenarios required for calculating static line ratings.
- Assess the quality of gridded data sets.
- Produce a proposed methodology that has been tested for a small number of sites or lines.

Beta

- Physical validation
- Processing of individual regions
- Visualisation via data modelling tool
- Agree process of adoption of new methodology
- Delivery and roll out of final solution

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Summary

Where we are now

Current practice

TGN26

Outdated - Not revisited since created in 1980s

Calculations not fully understood

Based on limited weather data

Seasonal values based on a single site

Where we want to be

Business as usual

New methodology for assigning line ratings as standard practice

Revised existing OHL ratings

Thank you for listening

For further information on the project, please contact katie.fergus@sse.com