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Elia HACKATHON

REIMAGINE THE GRID

18-19-20 MARCH 2025

Pre-session

Welcome
About us

Elodie Ciciriello

Asset Management

Morgane Dierickx

Asset Management

Pieterjan Espeel

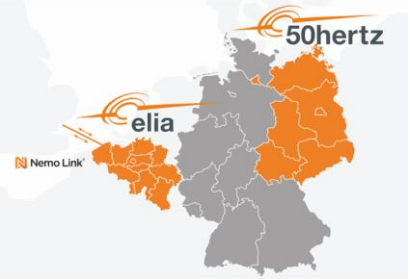
Internal Consultant Elia

Mathieu Thys

Energy Market Place

Elia

Transmission system operator (TSO) for Belgium



Session recording

1. We will be recording this session following this slide.
2. This is a non-public recording for those who can't attend this pre-session or for you, if you want to rewatch this afterwards.
3. The release of the video, will only be shared with the registered & selected participants of this Hackathon.
4. The recordings will be deleted after the hackathon.
5. If you do not want to be recorded, please switch off the camera now.

Agenda

1

2

3

4

Hackathon 2025

Short recap of Hackathon and explanation of the challenges **(Elodie)**

Technicalities

Explanation on:

- Models **(Pieterjan)**
- Datasets **(Pieterjan)**
- Platform **(Mathieu)**

Practicalities

Explanation on:

- Agenda **(Morgane)**
- Teams channels set up **(Morgane)**
- Practicalities **(Morgane)**
- Evaluation criteria **(Morgane)**
- Pitches **(Morgane)**

Q&A

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Overview Hackathon

HACKATHON
REIMAGINE THE GRID
MARCH 2025

1 Recap Hackathon 2025

- A 3-day Hackathon taking place on **18-19-20th of March**
- Location: Brussels, **Quartier Papier**
- You'll work in teams of 4 to 6 people
- Theme: **Substation overload**
- Be on time (8.00 AM)
- You'll receive your badge at the door

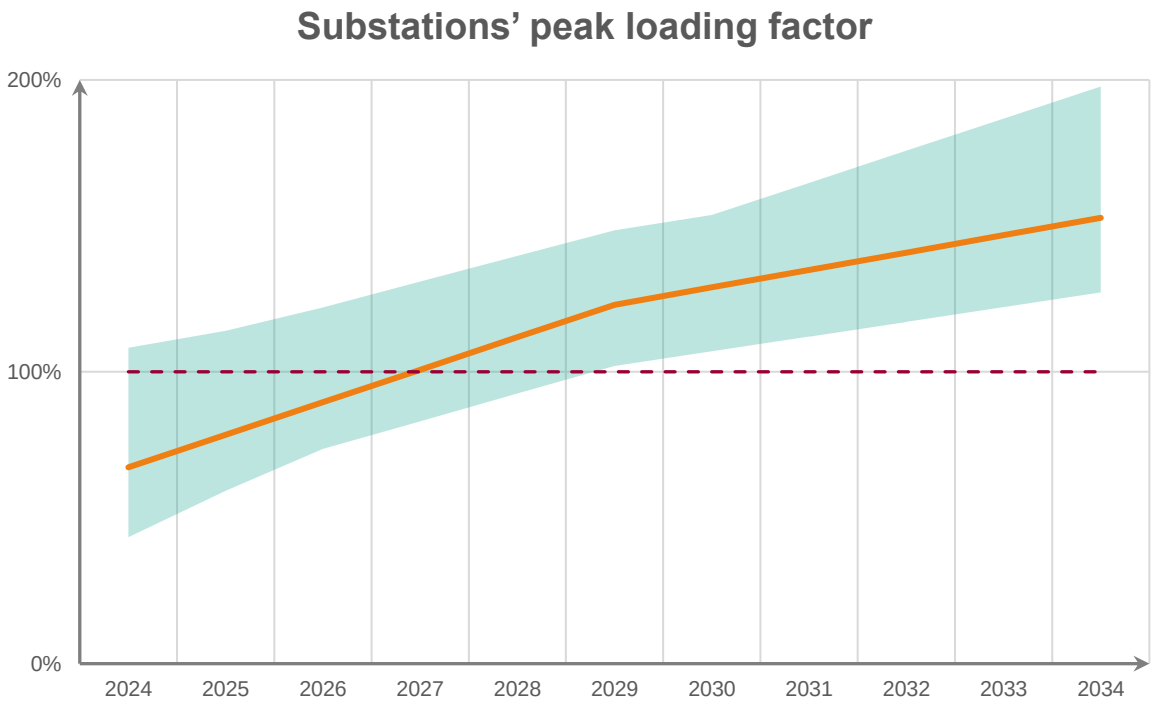
Context

With **massive electrification** ongoing, grid operators need to carry more and more load towards end-consumers.

Some substations are already pushed beyond their nominal load during peak periods and the **pressure will increase** in the coming years.

Reinforcements take time and require costly investments.

We need to make it happen. How to **optimize existing infrastructure** further?



Challenge

Help us reinvent substation management to safely exceed limits, handle more load, and delay costly upgrade.

Part 1
Transformer Temperature Modelling

- The maximum admissible load is mainly determined by the maximum temperature a transformer can handle.
- Develop a model to predict the temperature reached by a transformer based on its load.
- Send us your predictions on our test period.
- Use that model to assess how much and in which conditions we can safely overload the transformers.

Part 2
Substation Management strategy

- Define a forward-thinking strategy to support electrification within a constrained system.
- How do you handle increasing load on the substations? Which substations do you prioritize for reinforcements?
- Use the insights coming from the model to fine-tune your strategy.
- Build a tool supporting your strategy to get bonus points.

Technicalities

Challenge Part 1

2 Temperature Model

A model defined to extract the hotspot temperature in the transformers from the load it is expected to undergo.

We Offer a Baseline White Box Model

$$\theta_h - \theta_a = \left(\frac{1 + RK^2}{1 + R}\right)^x (\theta_{or} - \theta_a) + K^y(\theta_{hr} - \theta_{or})$$

Where θ_h : Hotspot Temperature
θ_{or} : Oil temperature (rated)
θ_a : Ambient Temperature
θ_{hr} : Hotspot Temperature (rated)
K : Fraction of Nominal Power
R : Dependent on TFO losses
x,y: Size measures

Your task is to improve it!

**For more info, see documentation*

2 Datasets

Transformer data

Transformers are identified by their equipment ID. Following data is provided:

- **Parameters** (rated load, location, heat run test parameters, cooling type, manufacture year, commissioning date, etc.)
- **Load [kW]**: quarter-hourly metering data as of May 2023
- **Hotspot temperature [°C]**: quarter-hourly hotspot temperature as of May 2023.

Weather data

Location is identified by a location ID.

Following weather data is provided:

- **Temperature** [°C]: hourly ambient temperature under shelter
- **Wind** [m/s]: hourly wind at 10m/s
- **Humidity** [%]: hourly relative humidity under shelter

Weather data were interpolated based on data from the Royal Meteorological Institute of Belgium.

2 Technicalities - Platform

- The traXes developer portal will be available in pre-production

  https://hackathon.traxes.io

  traXes

- Each team will be given credentials to access our traXes developer portal the day of the hackathon
  - One user ID per team (e.g. hackathon11@traxes.io)
  - One password per team

Sign in with your credentials → **Discover the services and related documentation** → **Fetch the API key** → **Start using the services**

2

Test your connection

API URL

API KEY

New Collection / **Ping**

Save | Share

GET | https://api-nprd.traxes.io/hackathon/ping | Send

Params | Authorization | Headers (7) | Body | Scripts | Settings | Cookies

Headers | 6 hidden

	Key	Value	Description	Bulk Edit	Presets
☑	x-api-key	b606609d-4a4d-4958-ab4a-4c96978614f4			
	Key	Value	Description		

Body | Cookies | Headers (12) | Test Results

200 OK • 125 ms • 647 B | Save Response

Pretty | Raw | Preview | Visualize | JSON


```
1 {
2     "apiKey": "b606609d-4a4d-4958-ab4a-4c96978614f4",
3     "date": "2025-03-12T07:42:06.3593383+00:00",
4     "correctApiKey": true
5 }
```


Result

Practicalities

Don't forget to provide your consent, food & travel preferences

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Participant Information Form

Thank you for participating in Elia's Hackathon! Please take a moment to provide us with some additional information to help us better accommodate your needs during the event.

Name *

First Name

Last Name

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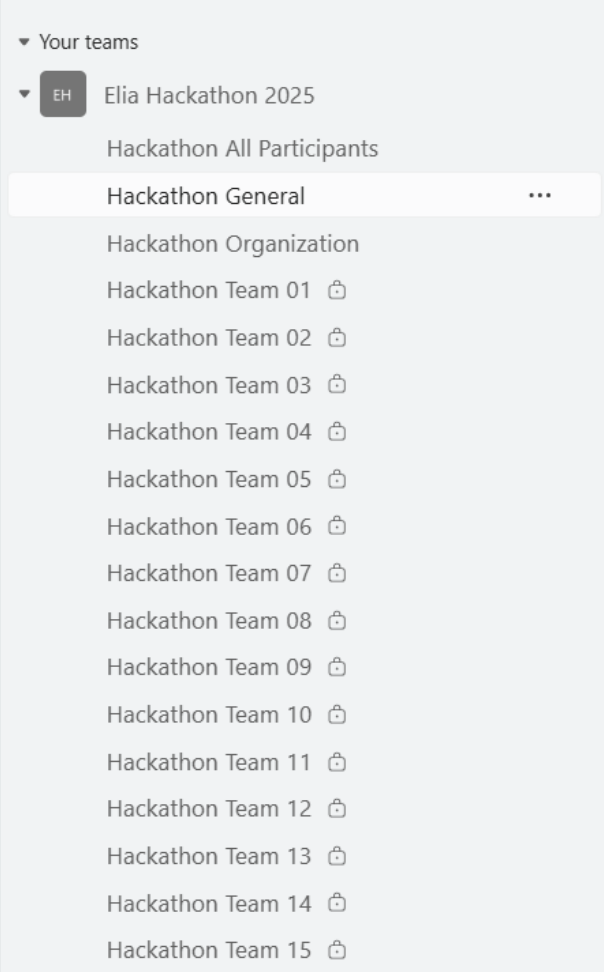
Please fill this out NOW!

3 Detailed agenda

March 18	March 19	March 20
	5:00 Doors open	5:00 Doors open
8:00: Breakfast & Registrations	8:00: Breakfast	8:00 Breakfast
9:00: Kick-Off	8:30 Kick-Off	8:30: Final day Kick-Off
9:30: Formation of teams	9:00: Technical coaching	9:00: Pitch preparations
10:00: Teamwork	11:30: Inspiration session	10:00: Pitch coaching
12:00 Lunch		
		13:30: Gathering of all presentations
		14:00: Pitching sessions 1
		15:15: Break
13:00: Teamwork	13:00: Teamwork	15:45: Pitching session 2
	16:00: Inspiration session	16:30: Jury deliberation
19:00: Walking dinner	19:00 Walking dinner	17:00: Winner ceremony & closing speech
21:00: Teamwork	21:00 Teamwork	17:30: Drinks
00:00: Doors closed	00:00 Doors closed	18:30: Walking dinner

3 Practicalities

- A Teams will be put in place to communicate information and material during the hackathon. A general channel will be used to share documentation and general announcements.
- Additionally, every team will have its own Teams.
- We'll also be present at the info point: don't hesitate to pass by in case of questions!
- Documentation (Introduction to substations and transformers, norm, model documentation and code examples) will be shared in the general channel on Friday 14th of March before noon.
- You'll be added to the general channel as soon as you have filled in the Participant Information Form!



3

Practicalities: Meet Your Jury

Damien Ernst

Professor University Liège
Chief Scientific Officer at Haulogy

Carlos Ferreira

Sustainability Software Principal
Product Manager at IBM

Miguel Garnacho

Asset Management Area
Manager at Red Eléctrica

David Zenner

Chief Asset Officer at Elia

3 Practicalities: Evaluation Criteria

/5 **Model accuracy**

How well does the model predict transformer overload and lifespan impact?

The model should be tested against a validation dataset to measure its accuracy in predicting overload conditions.

/5 **Strategy reusability**

Can the proposed strategy be applied to various scenarios?

Solutions should be scalable and adaptable to different substations and grid conditions.

/5 **Affordability & Technical Feasibility**

Is the strategy practical and realistic within technical and financial constraints?

The proposed strategy should strike a balance between achieving grid optimization goals and minimizing costs. Technical feasibility will be assessed based on the ability to implement the solution with existing infrastructure and realistic investments.

1	3	5
Insufficient	Meets objective	Exceeds objective

3 Practicalities: Evaluation Criteria

/5 **Innovation**

How creative and original is the proposed strategy?

Teams should demonstrate out-of-the-box thinking in addressing the problem.

/5 **Impact of the strategy**

How effectively does the strategy address the problem?

The solution should demonstrate a clear positive impact on substation operations and electrification potential.

+2 **Tool development** Bonus

Has the team developed a tool to support their strategy?

Additional points will be awarded to teams that create a functional tool that helps visualize or implement their strategy.

1	3	5
Insufficient	Meets objective	Exceeds objective

3 Practicalities: Pitches

March 20
5:00 Doors open
8:00 Breakfast
8:30: Final day kick off
9:00: Pitch preparations
10:00: Pitch coaching
Lunch
13:30: Gathering of all presentations
14:00: Pitching sessions 1
15:15: Break
15:45: Pitching session 2
16:30: Entertainment
17:00: Winner ceremony & closing speech
17:30: Drinks
18:30: Walking dinner

- Pitch
  - 3 min Pitch
  - 3 min Q&A
  - Jury rating

Dry run with agile coaches as of 10 AM.
Don't forget to book your slot with them!

3

A great pitch makes the difference between an idea and winning solution!

Your pitch is your chance to convince the jury that your solution is innovative, feasible and impactful.

Best practices for an effective pitch

Clear & structured messaging

- Follow a logical flow: Problem → Solution → Impact
- Be concise—avoid unnecessary details

Strong value proposition

- Clearly define what makes your solution unique
- Highlight the key benefits & feasibility

Engaging Delivery

- Keep energy and enthusiasm high
- Make your pitch memorable through storytelling

Visual support

- Use clean & clear visuals to reinforce key points
- Keep visual elements simple and relevant

Prepare for Q&A

- Anticipate tough questions
- Keep responses short & data-driven.

Practice

- Rehearse your pitch multiple times
- Time yourself to stay within the 3-minute limit

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Q&A

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