2025 European Light Rail Congress

Your panellists for this session are:

Inma Lebron – Alstom (moderator)
David Crespo – CAF
Jose Miguel de Frutos – Metro Malaga
Matt Johnston – Rail Intel

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2025 European Light Rail Congress

Dan Hill

UKTram

mainspring

UKTram
The voice of light rail

Future Generations

Dan Hill
Technical Officer/Executive Assistant

Dan Hill

Technical Officer

UKTram

The voice of light rail

Who We Are

We bring together all organisations with an interest in current and future developments of Light Rail in the UK, ensuring it remains a viable, cost effective and consistently improving transport option.

As a not-for-profit, membership body, we represent all Light Rail and ‘Other Guided Transport’ systems in England, Wales, Scotland, Ireland and the Isle of Man.

Our membership is built up of organisations from all aspects of the industry, including network operators, infrastructure and rolling stock maintenance organisations, Transport Executives, Suppliers and Industry Experts.

Members & Stakeholders

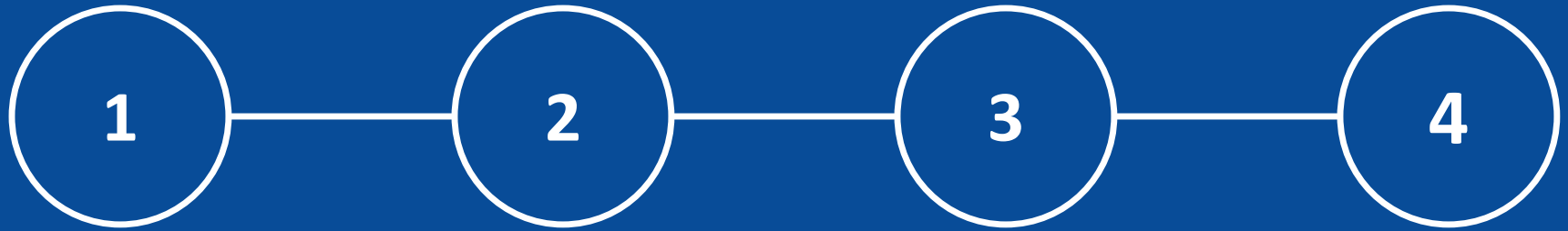
UKTram
The voice of light rail

What We Do

- Promote Trams, Light Rail, Metro's, VLR & Other Guided Transport Systems
- Government Lobbying & Liaison
- European & International Liaison
- Centre of Excellence
- Group & Industry Best Practice
- Academic Development & Training
- Training, Competency & Development

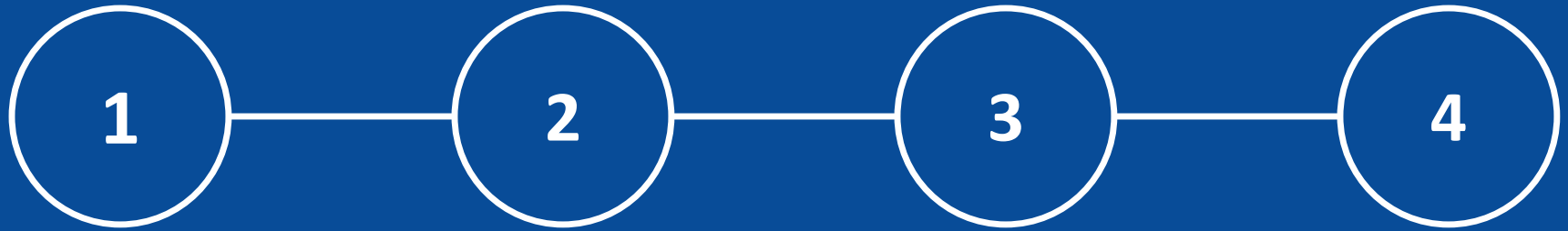
Lack of Awareness

- The Light Rail industry is often overlooked by young job seekers
- Limited exposure to transportation careers in education



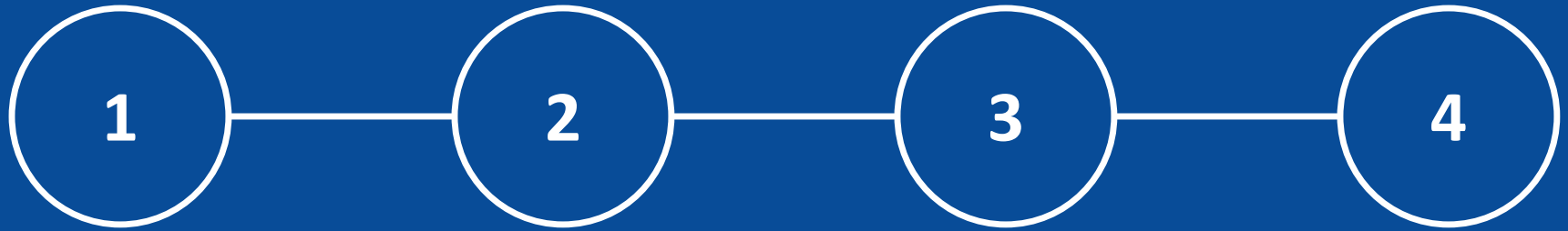
Perception of Industry

- Seen as a traditional, “old-fashioned” industry
- Low visibility of technological innovation



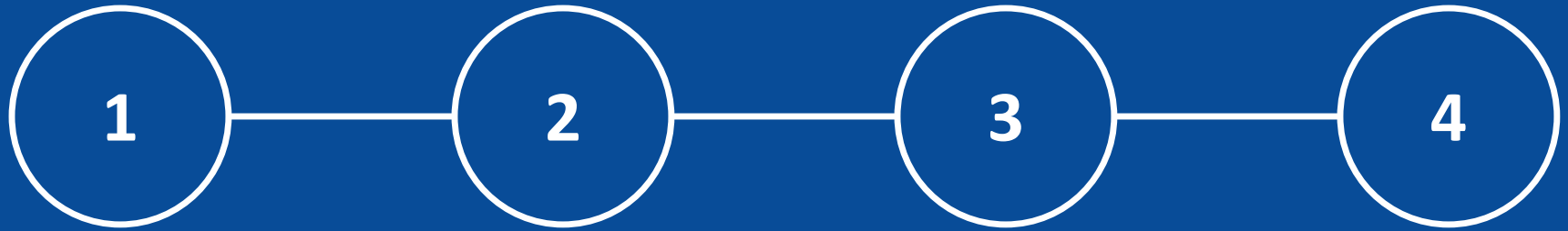
Competitive Industries

- Tech and digital sectors often draw younger talent with modern appeal
- Light Rail doesn’t present itself as a cutting-edge field



Barriers To Entry

- Specialised skills are required, which can often be intimidating
- Perceived lack of career progression or flexibility compared to other industries



Great Opportunities

1

2

3

4

Great Opportunities

1

Growing Demand for Green Transportation

Light Rail is key to future sustainable cities, offering meaningful work in a socially impactful field.

2

3

4

Great Opportunities

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Growing Demand for Green Transportation

Light Rail is key to future sustainable cities, offering meaningful work in a socially impactful field.

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Technology Integration

Smart cities, automation and digital tools are transforming the sector, creating opportunities for innovation.

3

4

Great Opportunities

Growing Demand for Green Transportation

Light Rail is key to future sustainable cities, offering meaningful work in a socially impactful field.

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Technology Integration

Smart cities, automation and digital tools are transforming the sector, creating opportunities for innovation.

2

Career Stability & Growth

Long-term job security with opportunities for skill development and career progression.

3

4

Great Opportunities

Growing Demand for Green Transportation

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Technology Integration

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2

Career Stability & Growth

Long-term job security with opportunities for skill development and career progression.

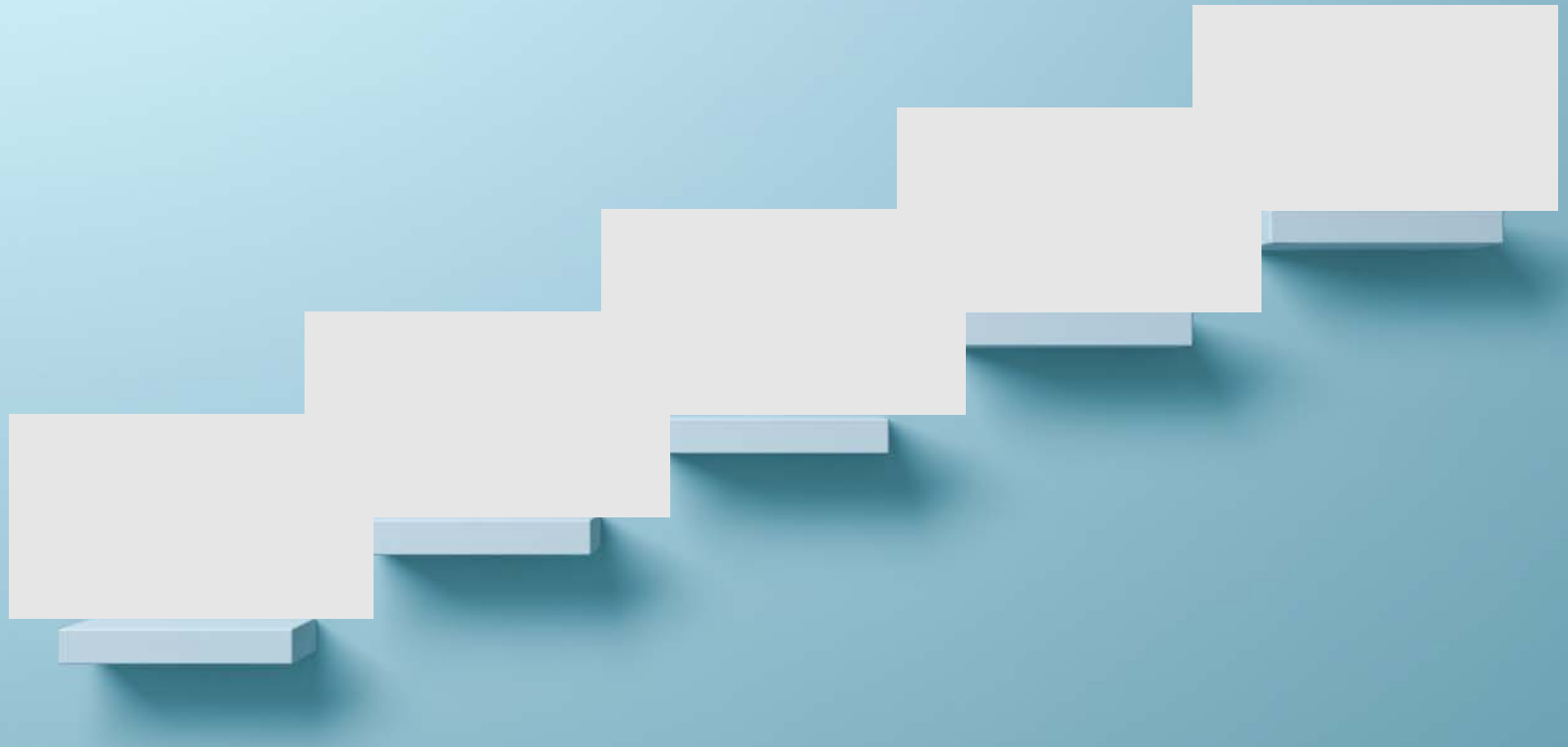
3

Variety of Roles

Opportunities range from engineering and design to operations, management and policy making.

4

Steps to Success



Now it is Siesta Time!

2025 European Light Rail Congress

Ferran Rovira

Kruch Railway Innovations

Leo Vliegenthart

Rotterdamse Elektrische Tram

Sponsored by Kruch Railway Innovations

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Speakers' presentations

Ferran Rovira

- Since 2013 by KRUCH now as a Head of Mobility 4.0
- Developer of the EFS
- Founder KRUCH SIDOS SL

Leo Vliegenthart

- Since 1999 in RET now as Asset Manager Energy RET (energy traction, high voltage, overhead lines and DC electric bus)
- Since 2011 board Member of NEC 9
- Early adopter of EFS (10+years)
- Ambassador for Energy Innovations in Public Transport

EFS - The Energy Bank for the Rotterdam Tram Network

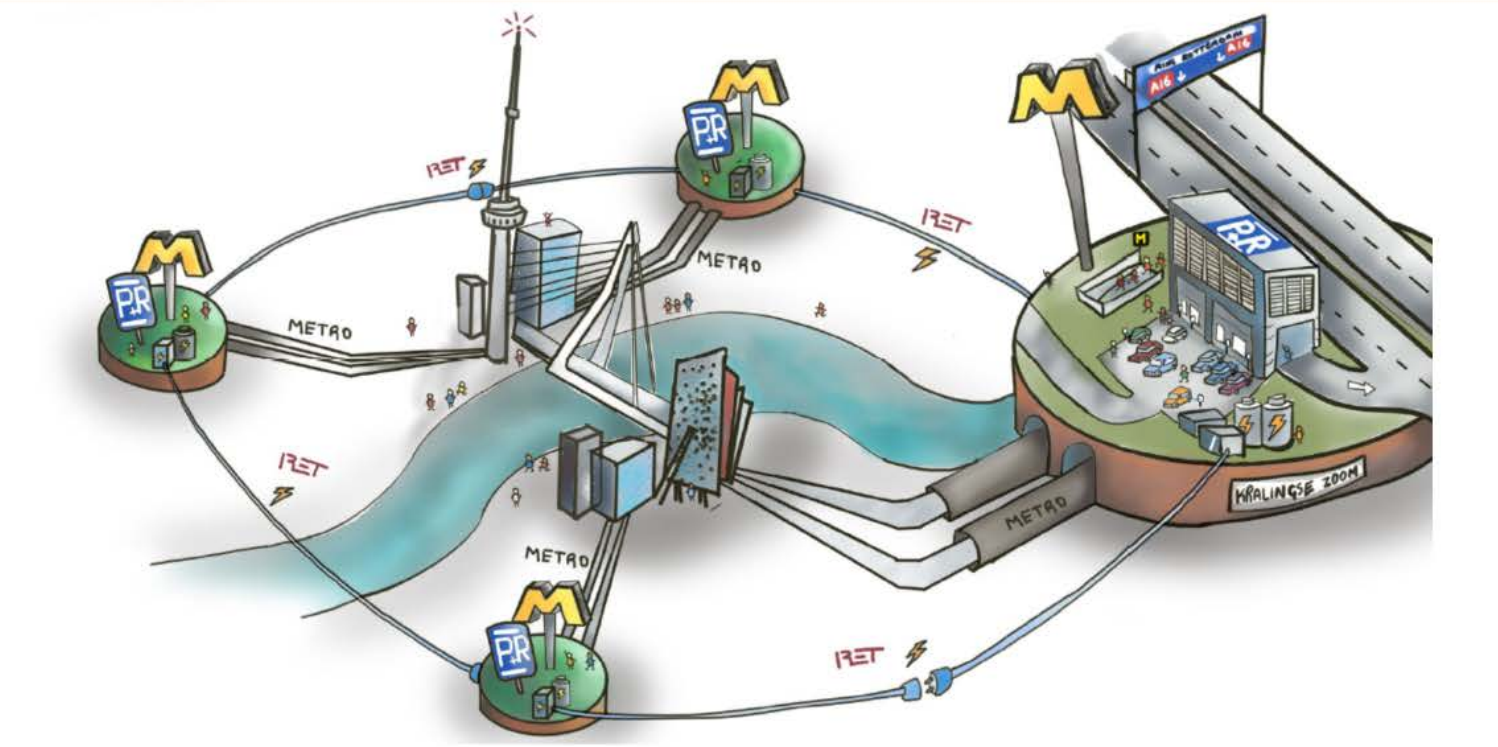
European Light Rail Congress

Málaga 19.03.2025

The RET

- Energy consumption 2024 140 GWh
- Tram 600 Vdc:
  - 220 km catenary
  - 110 Vehicles
  - 31 Substations
- Metro 750 Vdc:
  - 120 km 3rd Rail + 90 km catenary
  - 120 Vehicles
  - 51 Substations
- 90 electrical buses (2024) → 250 (2030)
- 11 charging points for Ebus (4 from Metro MV)

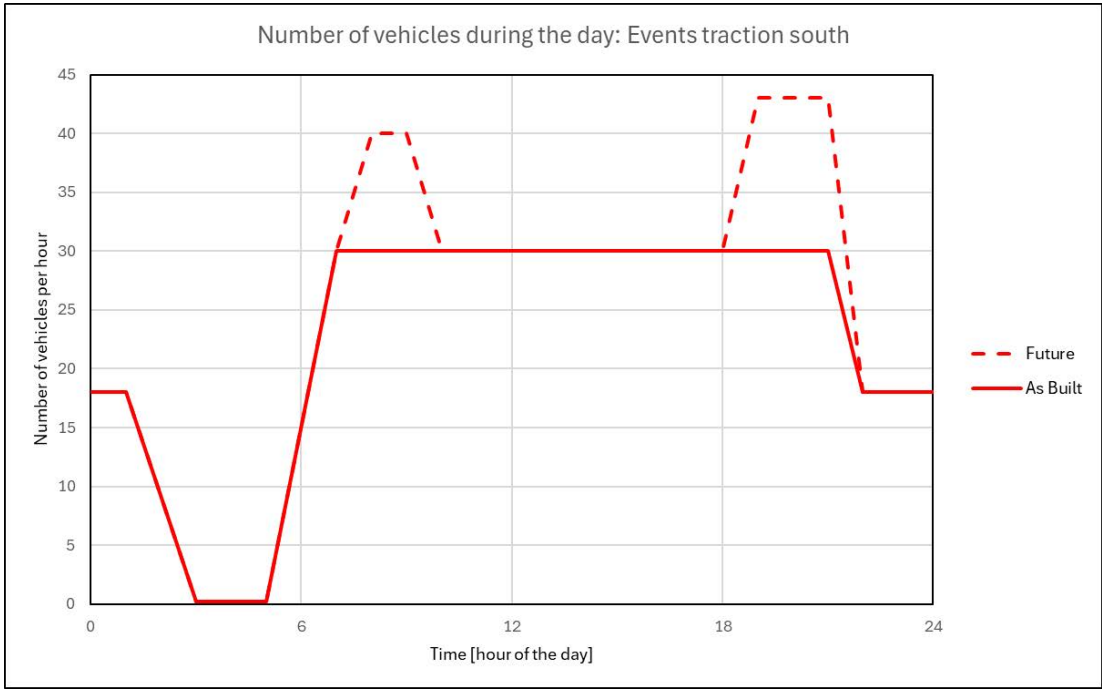
The network of the future (SMART GRID)



The challenge

- From 30 vehicles to 42 vehicles per hour

The challenge



How often? 40 Times/Year
Can we make it different?

The traditional solution

- Substations:
  - Need for medium voltage connection → Network congestion until 2032
  - Costs: 1,7-2,0 M€

  - GS Kleiweg (standard)
  - 2 x Transformers 2x800 kVA
  - 2 x Rectifiers 12p. 2x1200 A

The innovation

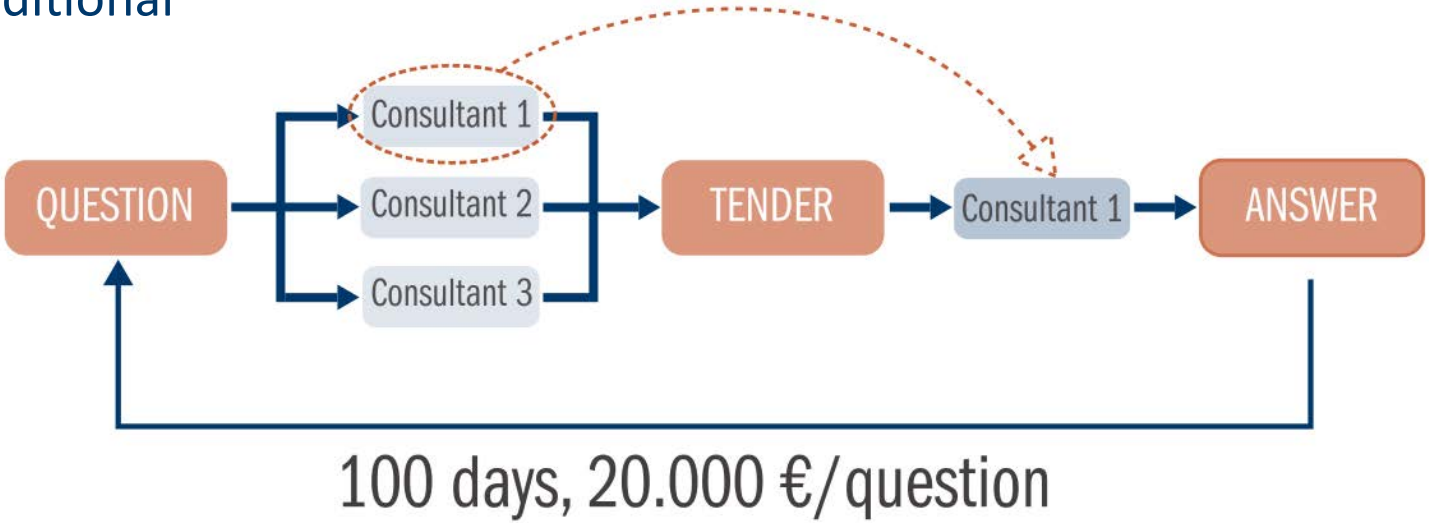
- Battery:
  - No need for medium voltage connection
  - Costs: 900k€ (2024) and reducing
  - Time needed: 6-1 year
  - Size (lxbxh): 5,11x2,9x3,0m
  - Weight: 18,9 Ton
  - Surface: <15m2

  - Movable
  - Possible use for Ebus old batteries
  - Modular solution (3xbranches)

The solution

- How RET sized the battery?

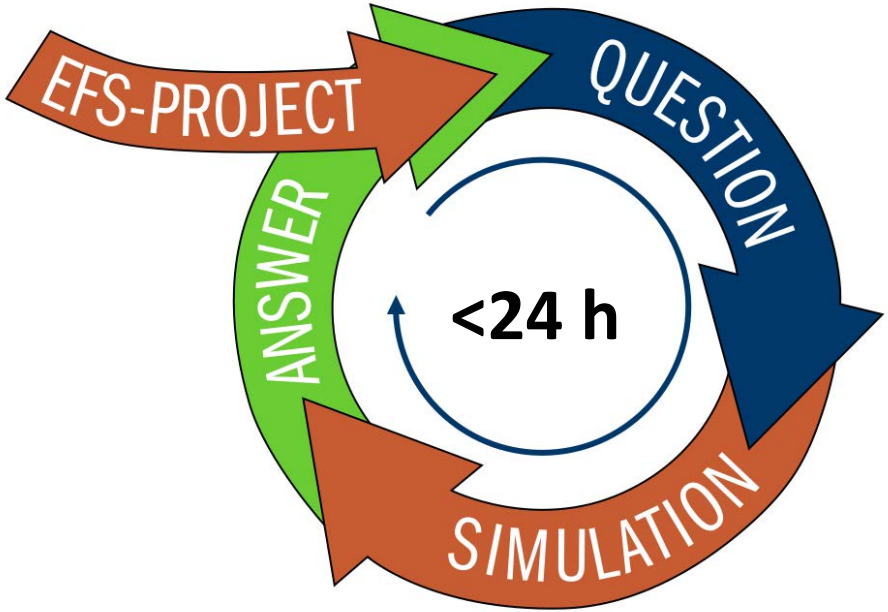
Traditional



The solution

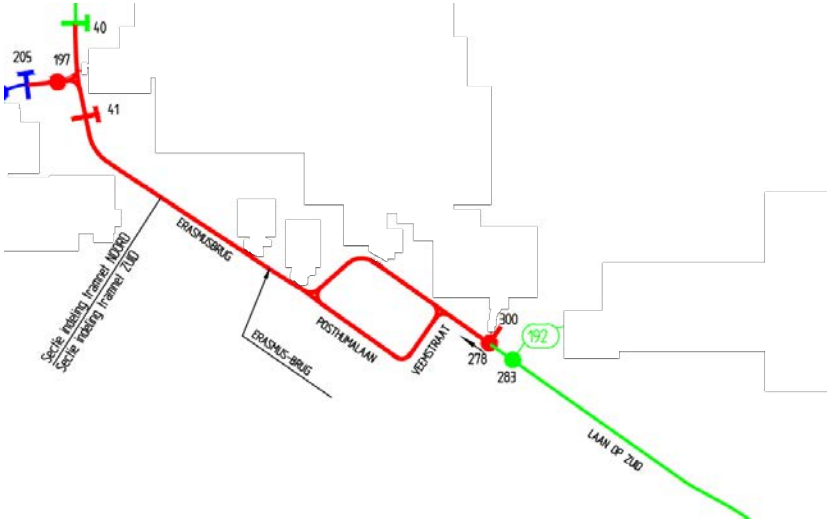
- How RET sized the battery?

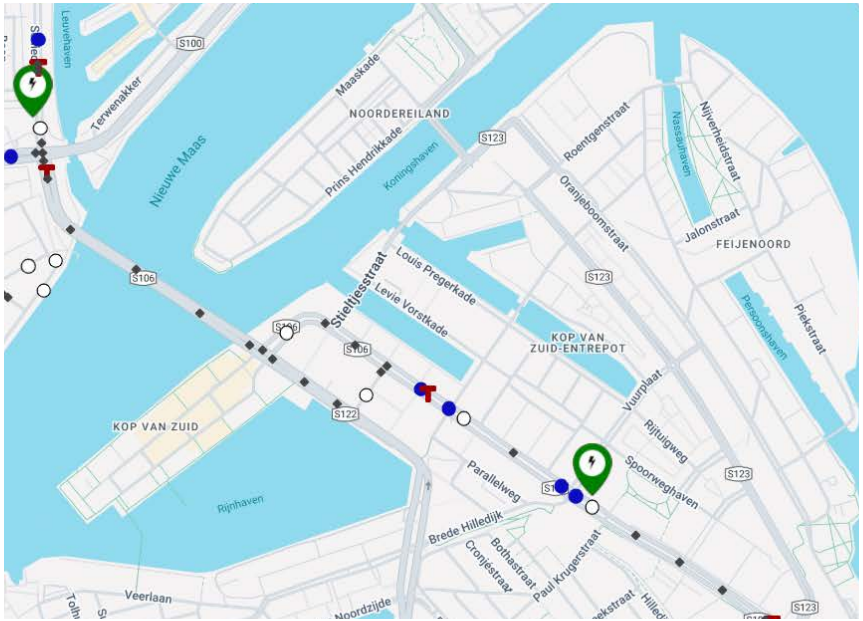
With EFS



The solution

- Using the EFS

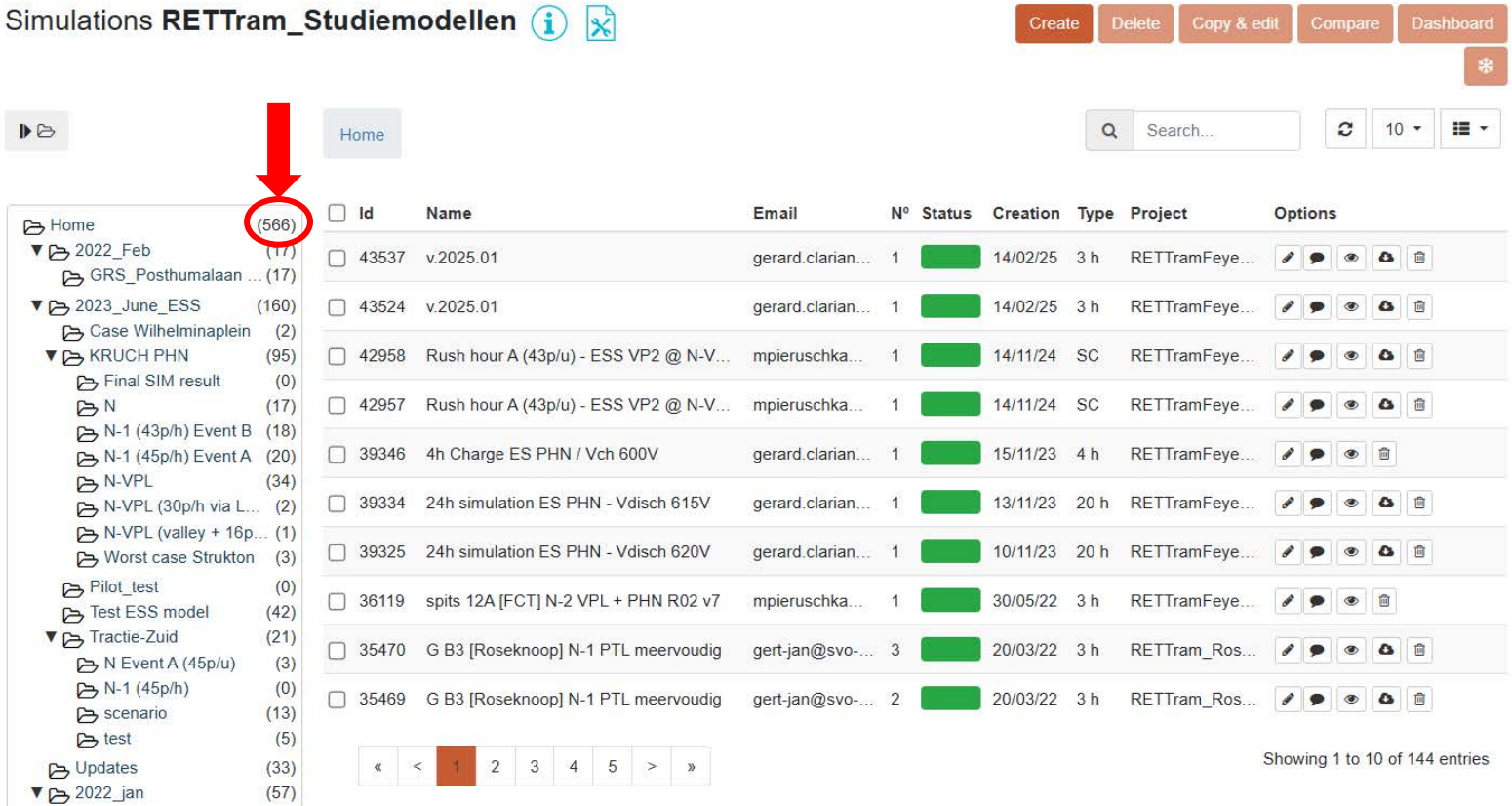




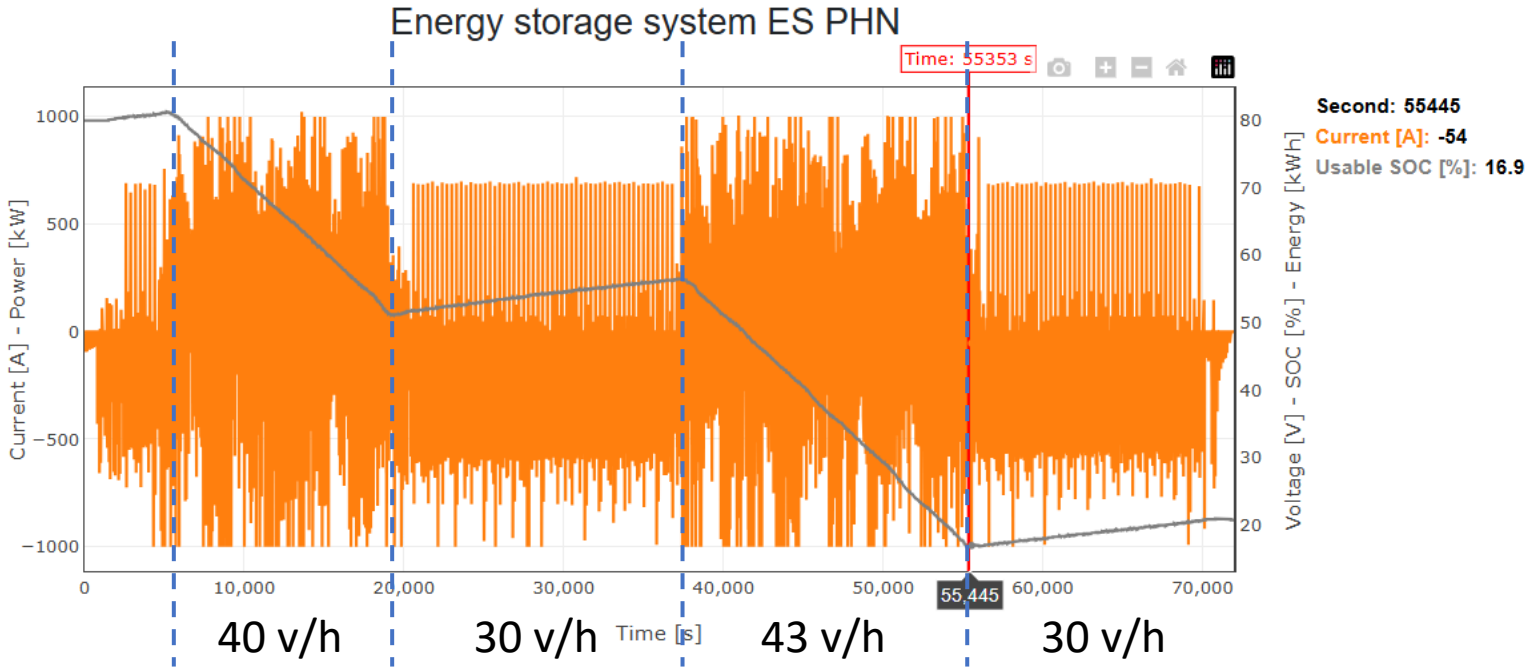
The solution

- Parameters for the simulation
  - Max wear for contact wire and rails
  - 100% passenger occupation
  - 40% HVAC
  - Voltage > 425 V in N-1 situation
  - Capacity battery: 816 kWh
  - Peak load: 1600A * 1.2 MW
  - SOC>10%

The solution



The solution



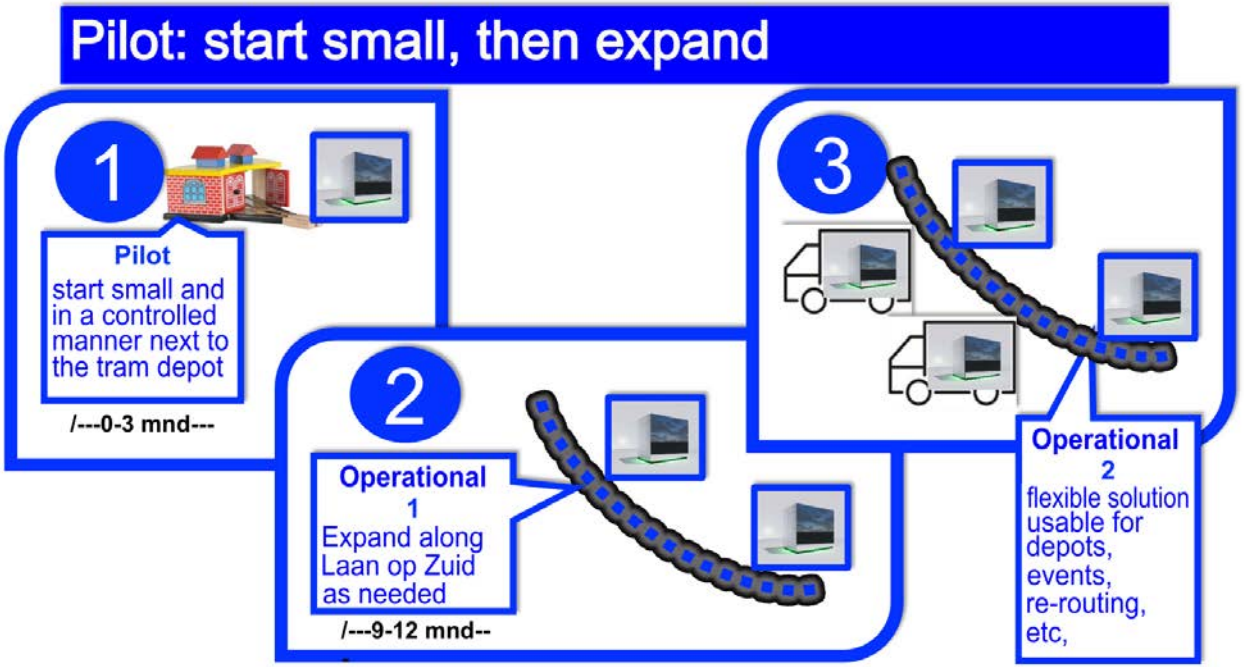
Conclusions

- The battery is the most cost-effective solution in this situation
- A simulation package is needed for Energy Management Systems

	Battery	Substation
Costs	9 M€ (8 battery)	26 M€ (8 Substations)
OCS changes	No	Yes (N-1)
Medium voltage grid conection	No needed	Needed
Energy savings	Possible	No possible

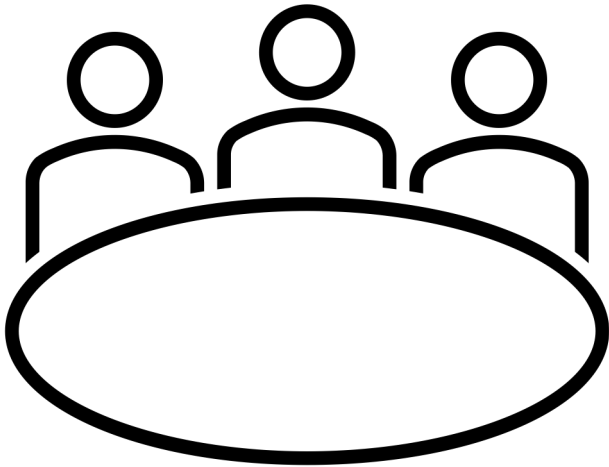
Nex steps for RET

- 10-15 Battery packs for the Tram and Metro (RET & HTM)
- 2nd life of 16 MV from Ebus (80-200 kWh)



Questions / Discussion

- Has anybody though to introduce a battery to re-inforce the catenary?
- Are you making simulation to solve your daily problems?
- How you avoid under- or over- sizing?



Other projects with RET

- Metro / Tram / EBUS
  - Maximum frequency for the As-built network
  - Assets needed to decrease frequency from 5 min to 120 Seconds
  - Calculate needed energy costs
  - Determine energy reduction in the network (goal 15%)
  - Calculate the spare power for third party connections
  - Selling energy using current infrastructure

EFS References

Thank you for your attention

“Simulations are needed to answer complex questions”

Further discussion? Visit us in the booth

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The Metro de Malaga depot tour and simulator visit will be leaving at 15.30, returning to site at 17.30.

Please check the app for more details, or speak to one of the Mainspring staff.

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We look forward to welcoming you to this evening's networking drinks and dinner reception at at La Pergola Restaurant at 19.00.

Please check the app for more details, or speak to one of the Mainspring staff.

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