



# 10845 – Impact analysis of residential batteries providing FCR and aFRR on low voltage grid

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## 1 Introduction

Distribution and Transmission System Operators (DSO and TSO) are encouraged to access **Low Voltage assets for flexibility services**:

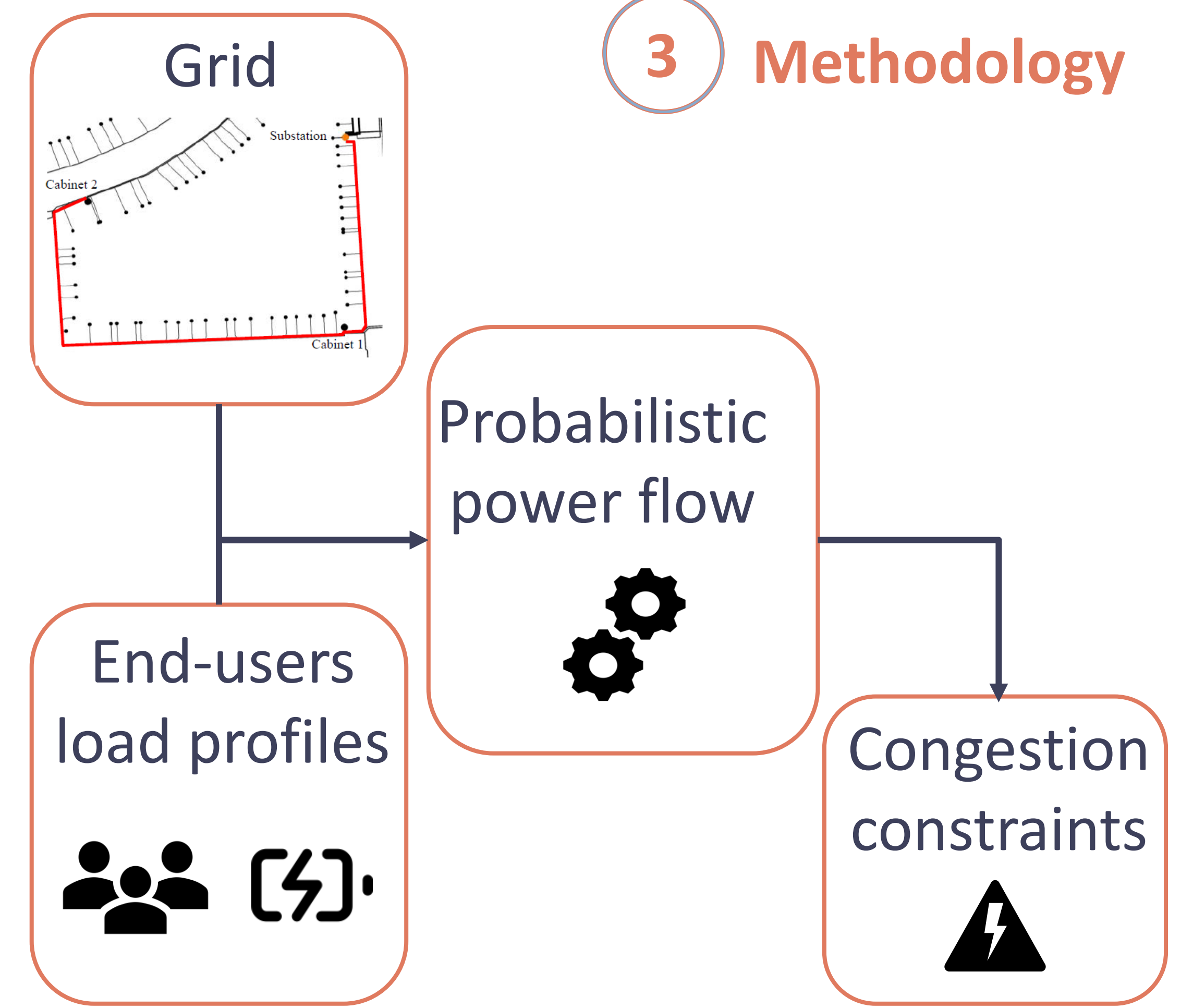
- It represents an **opportunity for DSOs** to better manage congestion
- Conversely, it is a **risk when TSOs use flexible low voltage assets**.

## 2 Objective

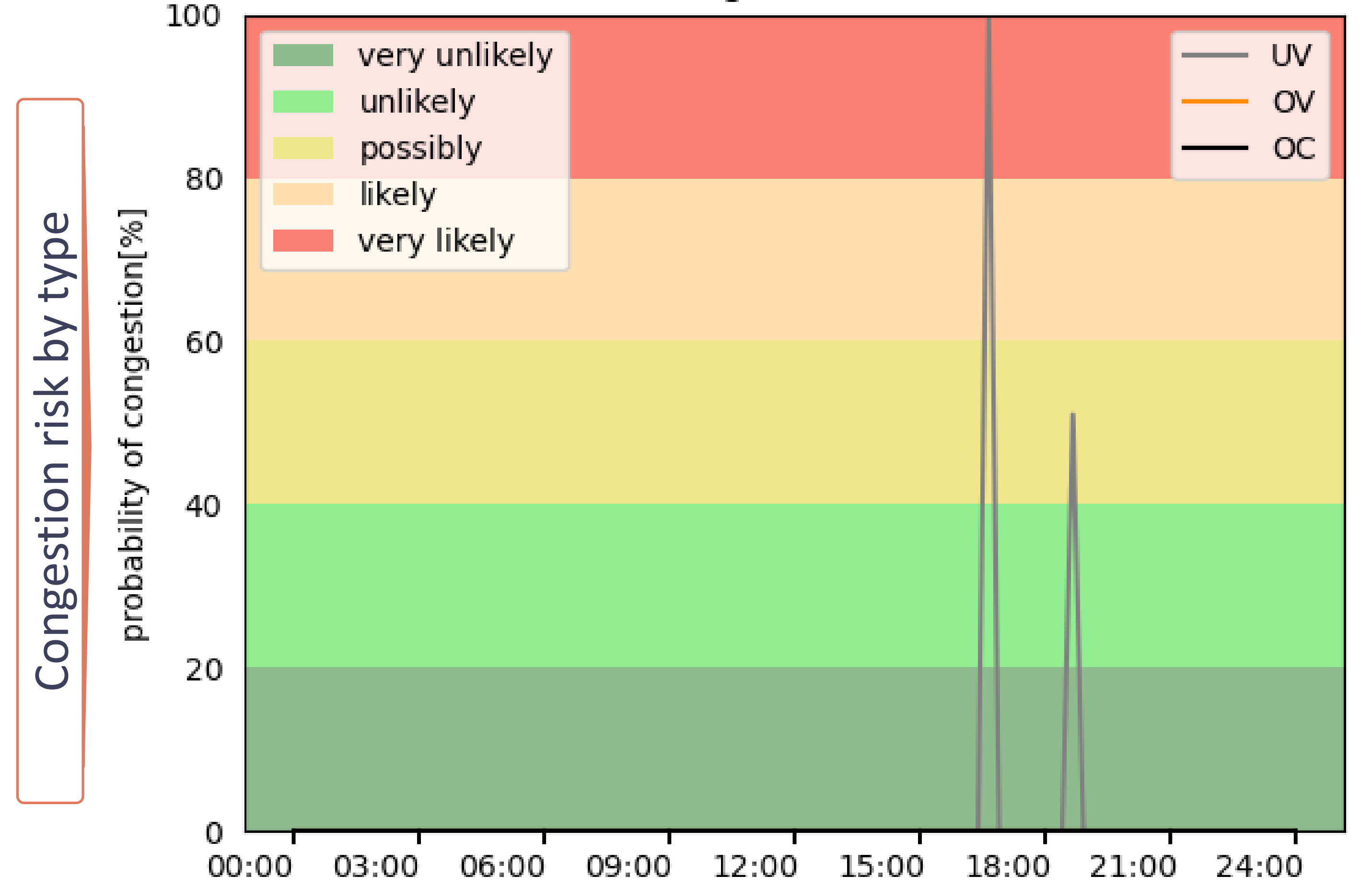
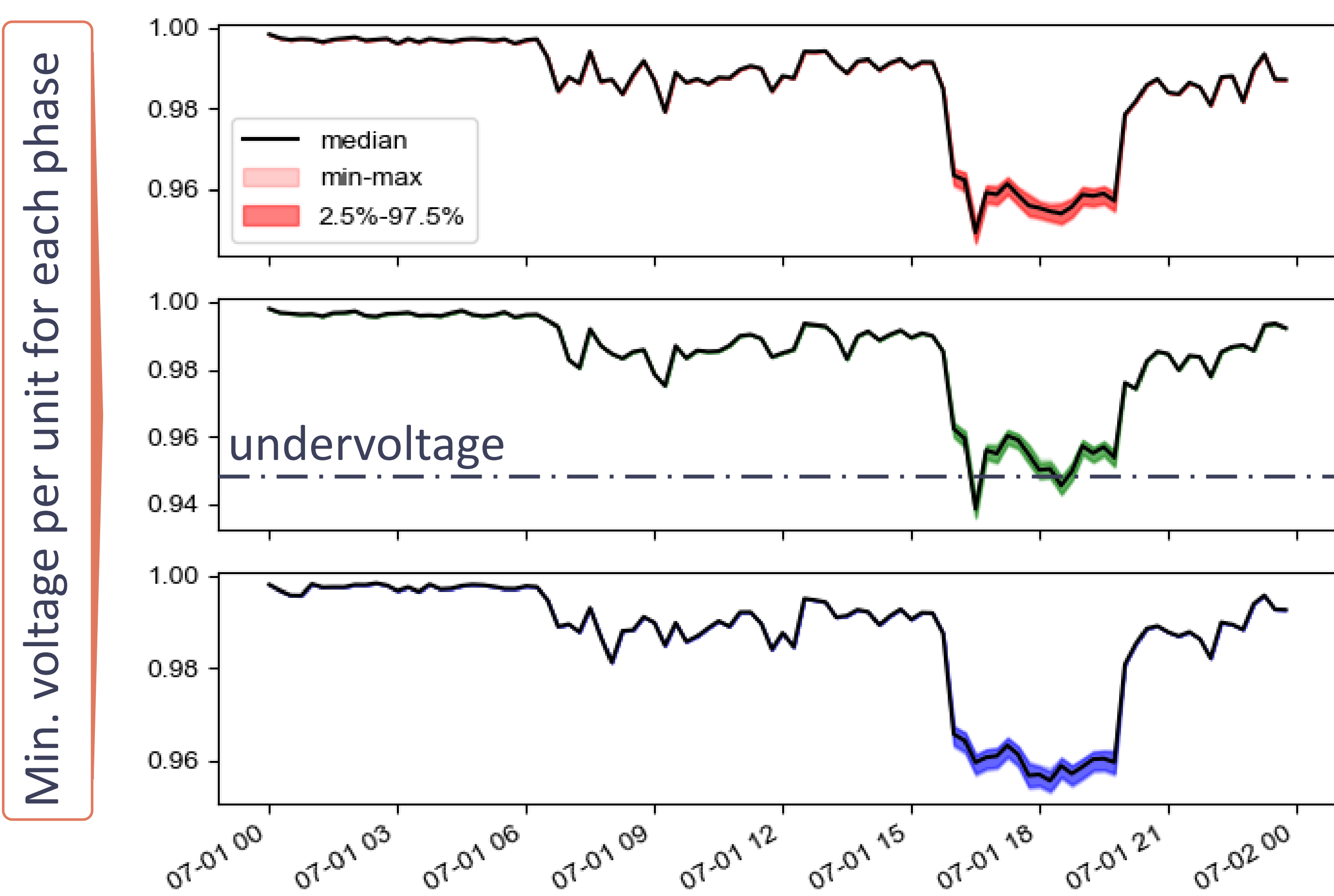
The paper aims to study the **probability congestion of residential batteries** providing:

- Frequency Containment Reserve (**FCR**) or
- automatic Frequency Restoration Reserve (**aFRR**) on a low voltage feeder operated by Sibelga, the Brussels DSO.

## 3 Methodology



## 4 Impact Analysis for 35 batteries providing aFRR, consuming between 4p.m. and 8p.m.



## 5 Results

		Scenarios				
		0	25	30	35	40
Historic FCR		0%	0%	0%	0%	0%
aFRR	P 0-4a.m.	0%	0%	0%	0%	0%
	P 4-8a.m.	0%	0%	0%	0%	0%
	P 8-12a.m.	0%	0%	0%	0%	0%
	P 0-4p.m.	0%	0%	0%	0%	0%
	P 4-8p.m.	0%	0%	0%	0%	0%
	P 8-12p.m.	0%	0%	0%	0%	0%
	N 0-4a.m.	0%	0%	0%	0%	0%
	N 4-8a.m.	0%	0%	0%	0%	0%
	N 8-12a.m.	0%	0%	0%	UV [0-20%]	UV [40-60%]
	N 0-4p.m.	0%	0%	0%	0%	0%
N 4-8p.m.	0%	0%	UV [40-60%]	UV [80-100%]	UV [80-100%]	
N 8-12p.m.	0%	0%	0%	UV [40-60%]	UV [80-100%]	

Table summarizing type and % probability risk of congestion, considering the number of batteries distributed and the type of service

## 6 Conclusion

For this case study, the probability of undervoltage congestion is non-zero when at least 30 (N 4-8p.m.) or 35 (N 8-12 a.m., N 8-12p.m.) batteries provide full capacity for negative aFRR products.

## 7 Acknowledgments

In collaboration with:

