FLORENCE SCHOOL OF REGULATION

ROBERT SCHUMAN CENTRE

Unlocking flexibility through transparent grid information

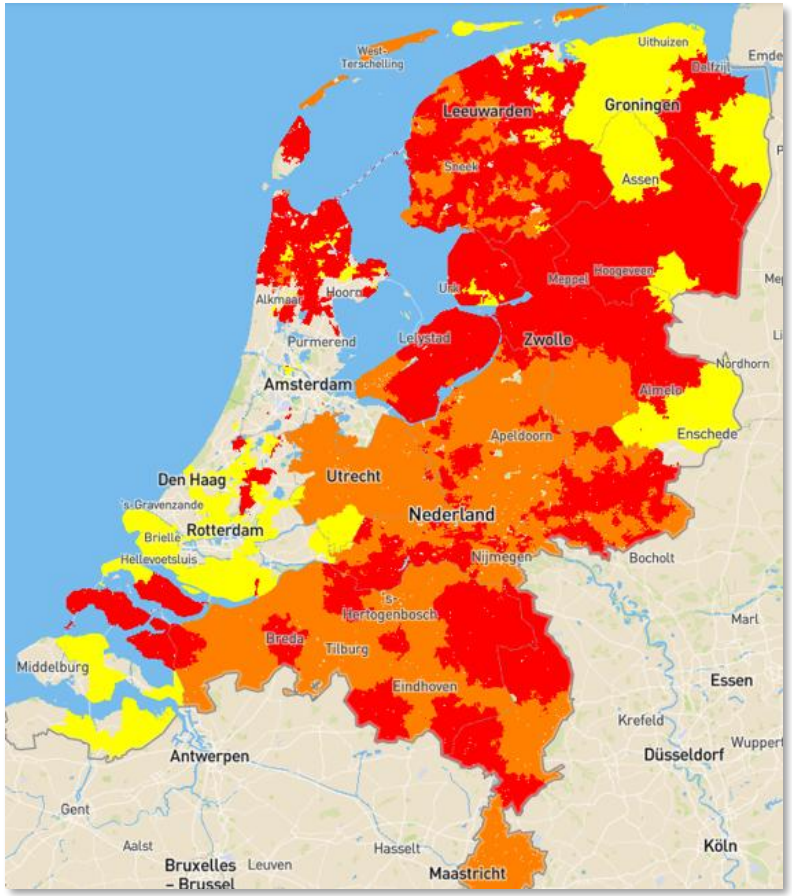
Dr. Ellen Beckstedde
SustainED, Copenhagen
12 September 2025

The traditional flexibility toolbox

	Distribution network tariffs	Flexible connection agreements	Local flexibility markets
Participation	Mandatory	Voluntary	Voluntary
Price setting	Administrative	Administrative	Market-based
Contracts/ Settlements	Recurring charges in the bill	Long-term agreements	Long-term auctions or short-term markets

Co-funded by the Erasmus+ Programme of the European Union

Hosting capacity maps as a “new” way to unlock flexibility



Source: Netbeheer Nederland, January 2023.

Co-funded by the Erasmus+ Programme of the European Union

Is there a consensus on how these maps calculate available grid hosting capacity?

In practice? We compare differences in the methodologies behind five hosting capacity maps in Belgium, France, Ireland, the Netherlands and Spain

In academia? We examine whether some technical assumptions that might influence hosting capacity calculations are typically overlooked in scientific literature

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Calculating hosting capacity seems simple at first sight…

<< (…) the amount of new resources that can be hosted by a network before facing any issues, i.e., compromising its operational limits or violating safety constraints. >>

Source: Benzerga et al. (2025). “A Unified Definition of Hosting Capacity, Applications, and Review.” IEEE Access.

Country	Level	Connection type	Unit
BE	DSO	Generation+Demand	MVA
FR	DSO+TSO	Generation	MW
IE	DSO	Generation+Demand	MVA
NL	DSO+TSO	Generation+Demand	MW
ES	DSO	Generation	MW

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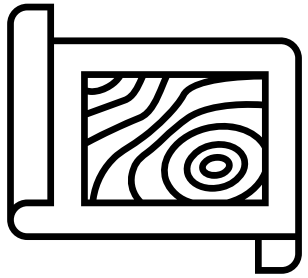
…but the devil is in the details

Uncertainties

both in grid parameters and user profiles

Modelling Shortcuts

simplifications in power flow models



Infrastructure Expansion

future grid developments and connections

Temporal Aspects

operational limit violations might be allowed for short time intervals?

Flexibility Quantification

end-user flexibility if present may increase capacity

Data Quality Issues

e.g., inaccurate/incomplete topology data

Bottlenecks

accounting for congestion at "parent" substation

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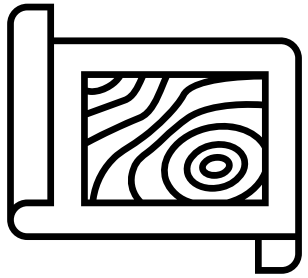

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The devil is in the details – an illustration

How is the capacity occupied by already connected users considered?

Contracted capacity

🔍 Does this always represent the actual used capacity?

Measured/estimated peaks

🔍 How to consider future grid usage/growth?

How is the flexibility of existing and new grid users considered?

Indicate opportunities for congestion management

Indicate opportunities for non-firm connections

🔍 How is flexibility quantified?

🔍 What about technical flexibility?

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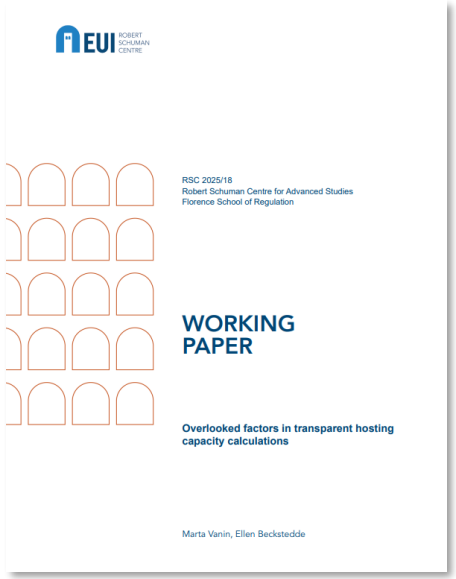
A first mapping exercise



Will be published as CIRED 2025 Conference Paper 319.

Table 2: Overview of the factors affecting hosting capacity (HC), including their qualitative impact and discussion in HC maps or relevant references. Abbreviations: Belgium (BE), Ireland (IE), France (FR), the Netherlands (NL), and Spain (ES).

Overlooked factor	Effect on HC (over- or underestimation)	Examples of HC maps or relevant references
Modelling shortcuts and power flow simplifications	Both, but some simplifications like [14] embed underestimation	[11], [12], [13], [14]
Data quality issues and system reconfigurations	Both, depending on the error type	BE, [15]
Uncertainties in grid parameters and end-user profiles	Both, but likely underestimation	BE, IE, NL, [8], [16]
Temporal aspect of operational grid limit violations	Underestimation if neglected	[17]
Future infrastructure expansions and grid connections	Both, depending on realisation of projects	BE, IE, ES, FR
Flexibility quantification by grid operators and users	Both, but underestimation if omitted	IE, NL, [18]
Bottlenecks at “parent” substation	Overestimation if not included	BE, ES, NL

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Some concluding thoughts

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2024/1711 — 26.6.2024

DIRECTIVE (EU) 2024/1711 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 13 June 2024

amending Directives (EU) 2018/2001 and (EU) 2019/944 as regards improving the Union's electricity market design

3. Distribution system operators shall provide system users with the information they need for efficient access to, and use of, the system. In particular, distribution system operators shall publish in a transparent manner clear information on the capacity available for new connections in their area of operation with high spatial granularity, respecting public security and data confidentiality, including the capacity under connection request and the possibility of flexible connection in congested areas. The publication shall include information on the criteria for the calculation of the available capacity for new connections. Distribution system operators shall update that information on a regular basis, at least quarterly.

EUROPEAN COMMISSION

Brussels, 28.11.2023
COM(2023) 757 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Grids, the missing link - An EU Action Plan for Grids

Action 6: ENTSO-E and EU DSO Entity to agree on harmonised definitions for available grid hosting capacity for system operators and to establish a pan-EU overview

Probably these rules are necessary, but are they sufficient?

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