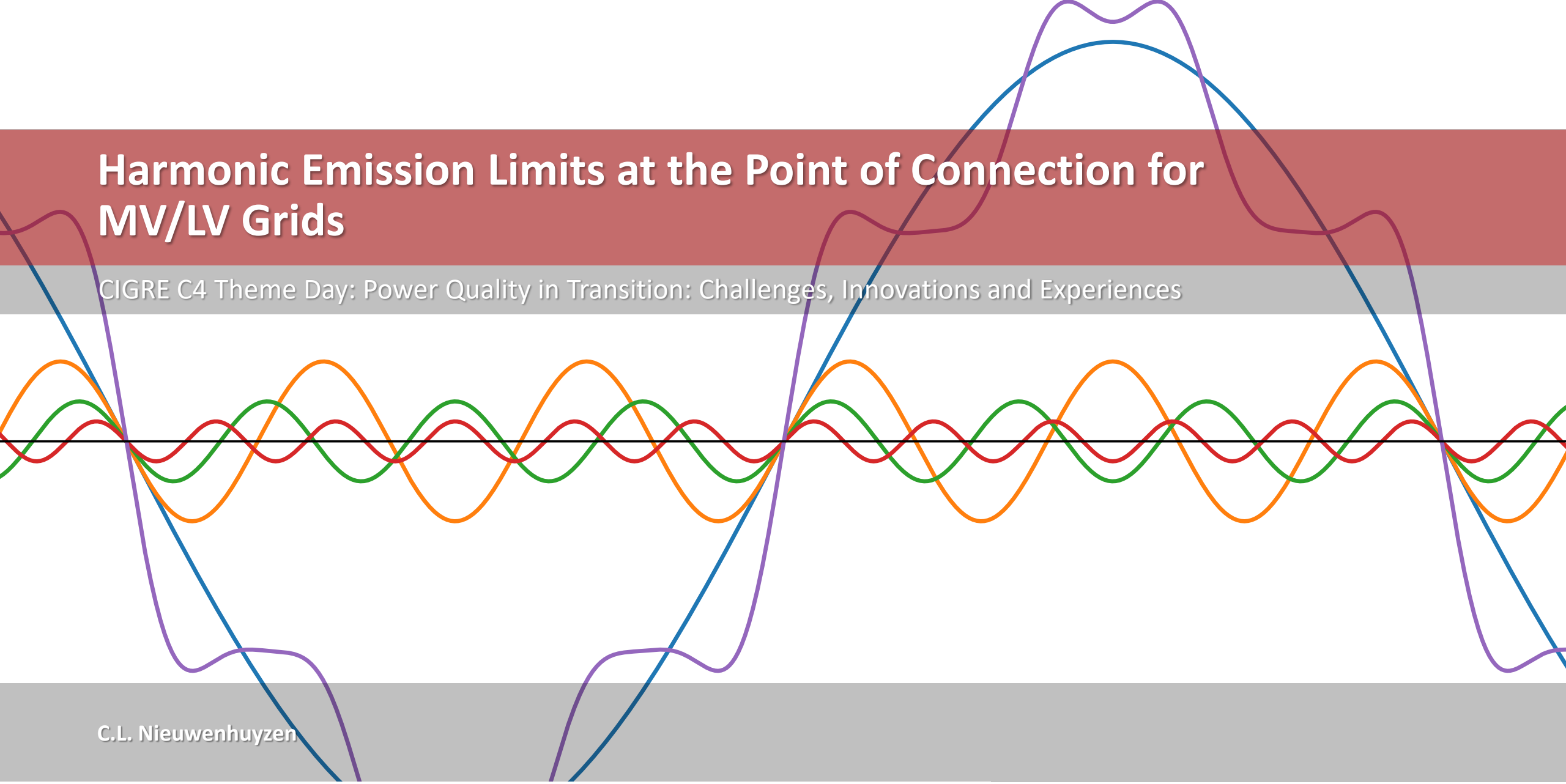
Harmonic Emission Limits at the Point of Connection for MV/LV Grids

CIGRE C4 Theme Day: Power Quality in Transition: Challenges, Innovations and Experiences



C.L. Nieuwenhuyzen

Electrical Engineering, EES

CIGRE Working Group C4.63

Harmonic power quality standards and compliance verification – a comparative assessment and practical guide

Many different practices

Categorize **similarities**

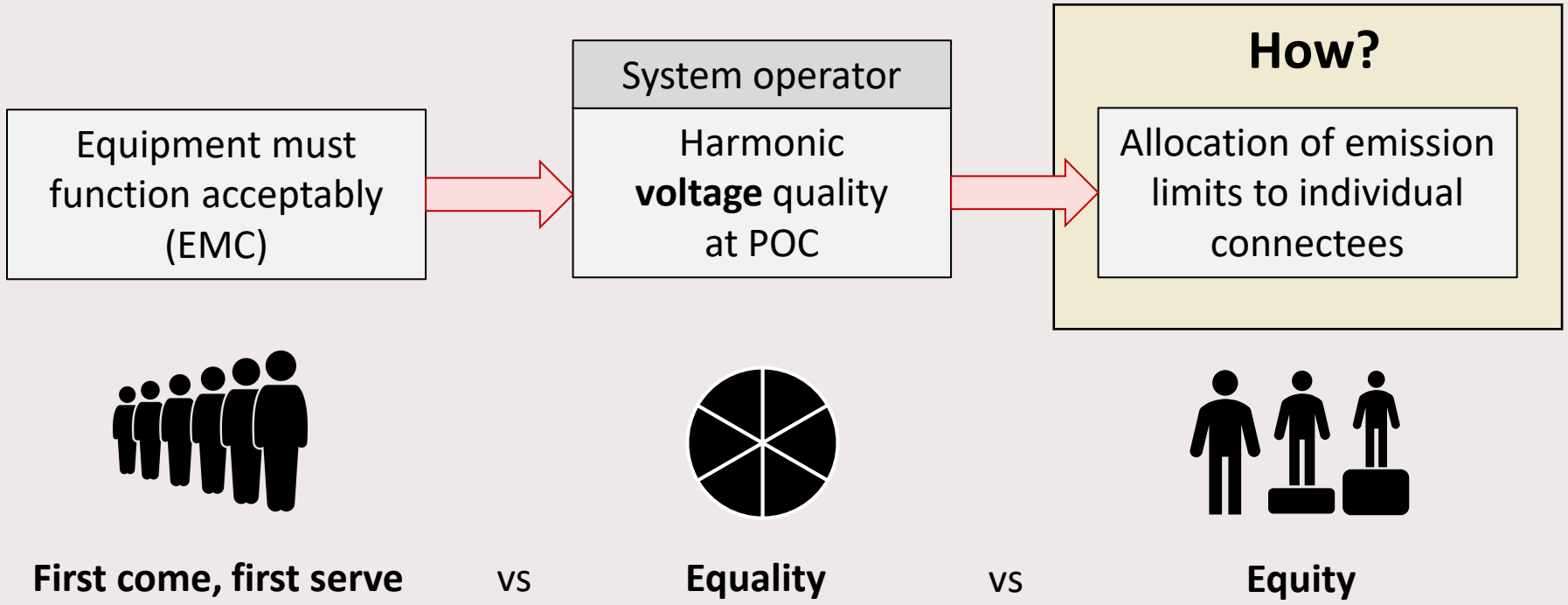
Indicate **differences**

Chapter	Title
1.	Introduction
2.	Overview of harmonic standards and grid codes
3.	Questionnaire and analysis of responses
4.	Harmonic management – philosophy and strategy
5.	Harmonic management – specified parameters
6.	Management of new connections
7.	Network impedance and background distortion
8.	Compliance verification
9.	Harmonic power quality management practice
10.	Relevance of harmonic controls to de-carbonization
11.	Conclusion

CIGRE Working Group C4.63

Chapter 4: Harmonic management – philosophy and strategy

- What are the underlying philosophies?
- What strategy is implemented?



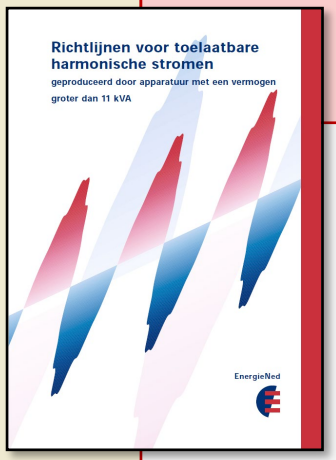
CIGRE Working Group C4.63

Chapter 4: Harmonic management – Philosophy and Strategy

Summary strategies for defining specified emission limits					
	Key objectives				
Options	**Consistency and equity among connectees**	**Robustness to network changes**	**Minimum risk of exceeding target voltage levels**	**Speed, simplicity, efficiency and maintainable for utility**	**Simplicity or predictability for connectee**
Harmonic voltage	**Qualitative rating** + = −				
Harmonic current					
Background amplification					
Headroom					
No individual limits					

Harmonic management in the Netherlands

Dutch Grid Code: connection requirements



(Dutch) Guidelines for allowable harmonic currents

- Latest version: 1997
- Equipment based emission limits in **currents**
- No limits apply to the POC

Outdated

Philosophy/strategy

1. "Reasonable" requirements
2. Consider European legislation
3. Polluter pays principle

New technology

Complexity of installations

Revised practice to manage harmonics

Revised method
Key objectives

1.	Consistency and equity
2.	Simple, maintainable, and assessable for network operator
3.	Simple, predictable, and transparent for connected parties
4.	Acceptable risk for network operator of exceeding reference level
5.	Efficient utilization of the network
6.	Coordination between voltage levels
7.	Robustness of emission limits relative to network modifications
8.	Robustness of emission limits relative to other (new) customers
9.	Robustness of emission limits relative to installation modifications
10.	Clear relationship with other (international) standards

Balance

Challenges

High number of new customers

High penetration of DERs

EN 50745 - Harmonic, Interharmonic and Supraharmonic emission limits <9kHz for installations (<1 kV and >75 A)

Contact me

Levijne Nieuwenhuyzen

c.l.nieuwenhuyzen@tue.nl

linkedin.com/in/levijne/