	Main Sessions		Round tables and RIF		Poster Sessions	
Tuesday 11 June	SESSION 1 Network components	SESSION 5 Planning of power distribution systems	SESSION 3 Network operation control and protection	SESSION 4 Distributed energy resources and efficient utilisation of electricity	SESSION 2 Power quality and electromagnetic compatibility	SESSION 6 Electricity market place and impact of regulation
Wednesday 12 June	SESSION 3 Network operation control and protection	SESSION 4 Distributed energy resources and efficient utilisation of electricity	SESSION 2 Power quality and electromagnetic compatibility	SESSION 6 Electricity market place and impact of regulation	SESSION 1 Network components	SESSION 5 Planning of power distribution systems
Thursday 13 June	SESSION 2 Power quality and electromagnetic compatibility	SESSION 6 Electricity market place and impact of regulation	SESSION 1 Network components	SESSION 5 Planning of power distribution systems	SESSION 3 Network operation control and protection	SESSION 4 Distributed energy resources and efficient utilisation of electricity

Session 2: Inhalte

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Main Session

Block 1: Electric and magnetic fields, earthing systems

Block 2a: High frequency disturbances

Block 2: Harmonics

Block 3: Voltage profile, voltage fluctuations and voltage dips

Block 4: Power quality monitoring, reliability, regulation and economic aspects

Round Table

RT2a: The target of quality regulation - opposite positions?!

Geleitet durch W. Friedl

RT2b: Guidelines for power quality monitoring – Intermediate results of CIGRE/CIRED JWG 4.112

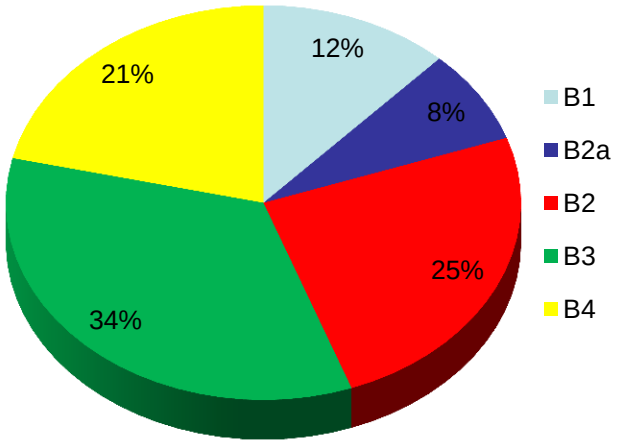
Research and Innovation Forum (RIF)

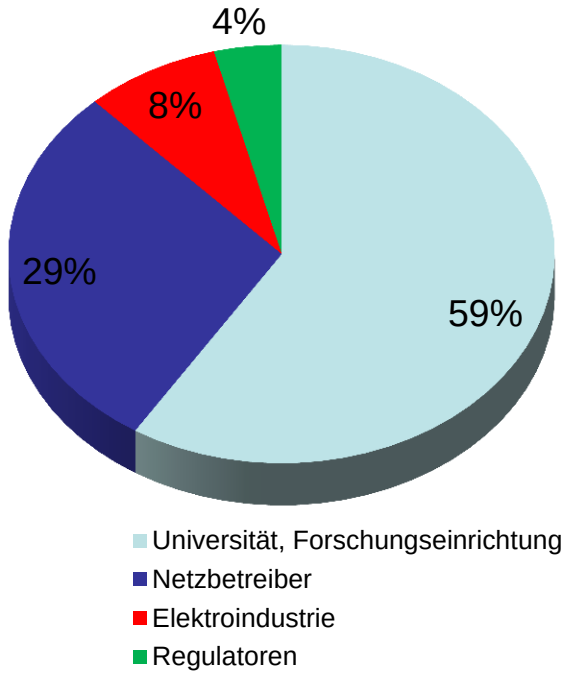
Session 2: Statistik

Eingereichte Kurzfassungen: **158**

Akzeptierte Beiträge: **112**

Ablehnung wegen
- Themenverfehlung,
- schlechter Qualität,
- falscher Session-Zuordnung





0035, *Verification of global earthing systems,* (Fickert, Schmautzer, Raunig, Lindinger)

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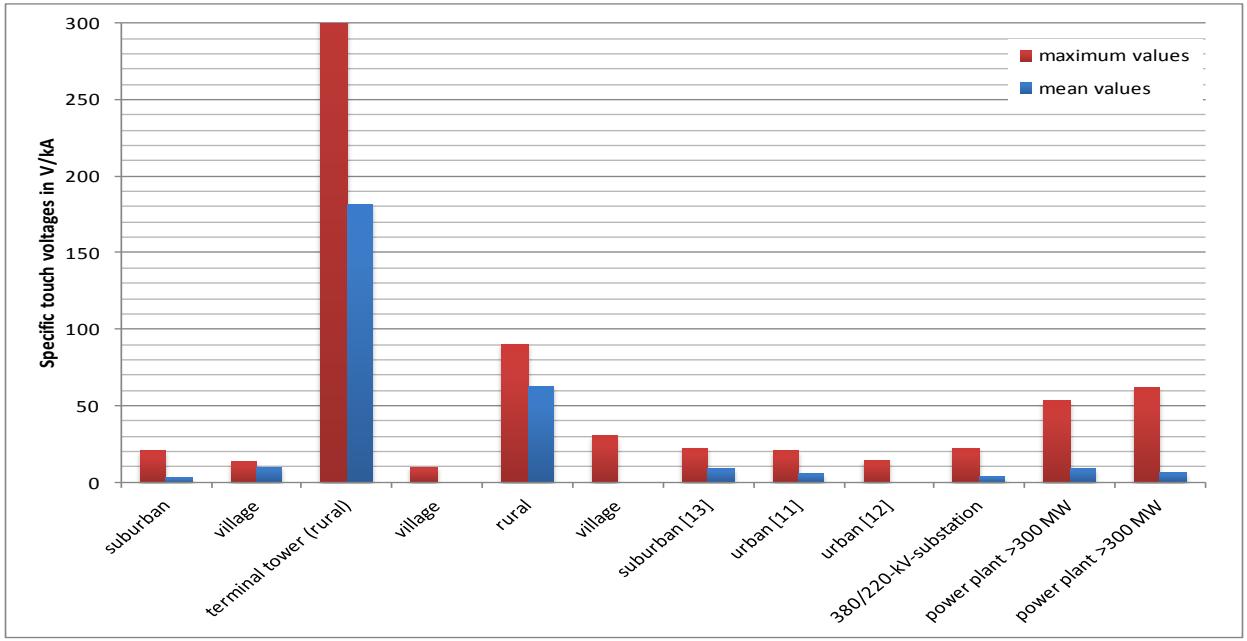
	I_F= 71 A (earthed shield)	I_F=948A (earthed shield)	I_F=1409A (earthed shield)
$I_{MV\text{-}shields,\ feeding\ cable}$	0%	80%	74%
$I_{MV\text{-}shields,\ no\ feeding\ cable}$	16%	6%	6%
$I_{LV,\ neutral\ conductors}$	15%	15%	20%
$I_{local\ earthing\ system}$	81%	3%	4%



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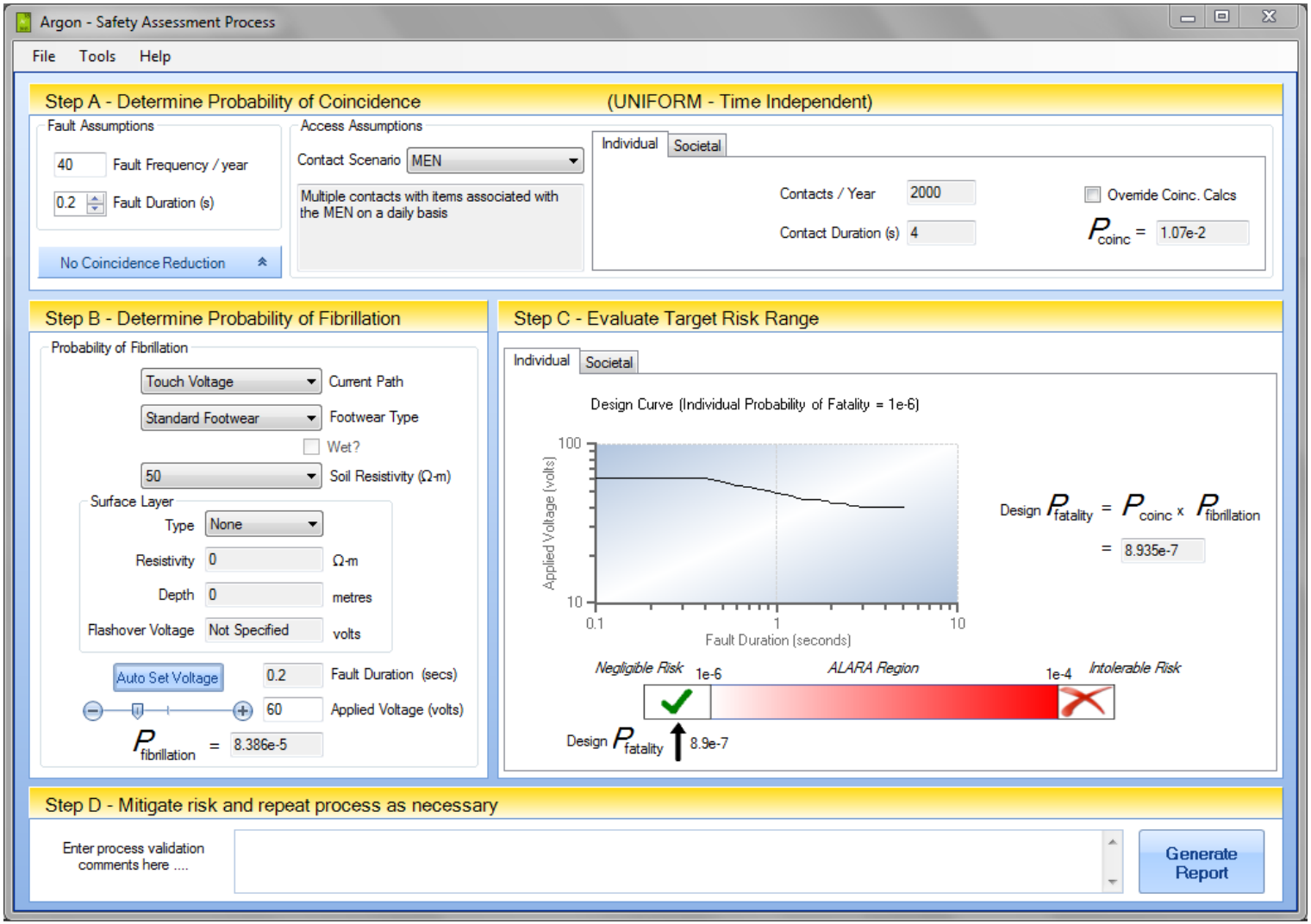
Fibrillation Probability

- P_{fib} = “percentage of population that would enter V.F. if exposed to V_t”
- Use statistical modelling to estimate P_{fib} with a ‘representative sample’ of the population
- ‘Representative’ ≠ ‘Random’

1511, *Use of Finite Probabilistic Modelling to Establish Earthing Hazard Limits* (Griffith e.a.)



Contributions 2-150 kHz

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0209	Bollen	Spread of high frequency current emission
0999	Meyer	Impact of higher frequency emission above 2kHz on electronic mass-market equipment
1052	Larsson	A proposal for a standardized measurement method for voltage and current distortion in the frequency range 2 to 150 kHz
1120	Gronwald	Efficient immunity testing of smart meter appliances in the frequency range 2-150 kHz
1168	Klatt	Emission levels above 2kHz - laboratory results and survey measurements in public low voltage grids
1271	Bartak	EMI of emissions in the frequency range 2-150 kHz
1391	Pakonen	Electromagnetic compatibility between electronic loads and automated meter reading systems using PLC
1417	Roggo	On-line 2 to 150 kHz grid impedance meter
1435	Jahn	PLC noise and impedance measurements on loads and in the distribution grid

1271, *EMI of emissions in the frequency range 2-150 kHz, CENELEC SC 205A* (Bartak, Abart)

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- **High non-intentional emission**
  - ≠ harmonics, but harmonics to be considered e.g. of switching freq.
  - from different equipment in the supply networks
  - also without EMI: risk of accelerated **ageing & reduction of lifetime**
- CE-marked or not …. **EMI cases are a numerous reality, will increase**
- Several **different types of equipment as a source or a victim**

  ⇨ **No basic focus on MCS or Smart Grids**

  EMI also to broadcast **time-signal systems**

  Increased EMI risk from **small power supplies**
- Conducted & **Radiated path** to be considered
- Common & **Differential mode** emissions to be considered
- **Waveshape** of **discontinuous** emissions as an additional parameter for determining effect of emissions / equipment immunity
- **Gaps in standardization / installation rules / regulation**
  - technically
  - frequency utilization: voluntary standards vs. protected utilization

0778, *Preliminary tests results about e-car harmonic emissions* (Noce, Riva, Sapienza)

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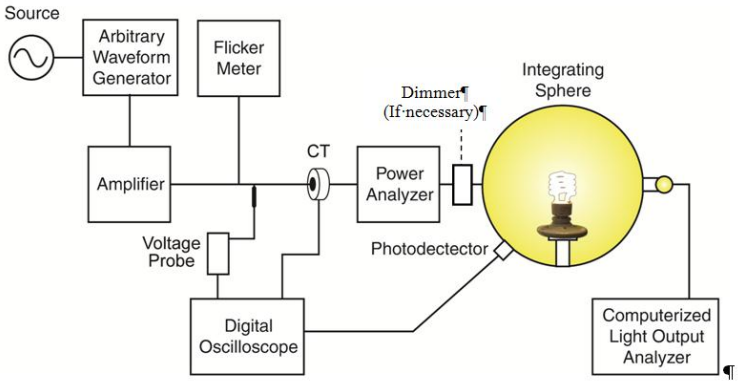
- With reference to the harmonics amplitude the measures was frequently close to the limits, but the main topics is that the harmonic pollution is pretty stable when the recharge power is decreased;

  - **modulate the power to solve problems in the fundamental regime, can create problems with harmonics (two cars charging at 50% of the nominal power can have harmonic emission strongly higher than a single car charging at the rated power).**

- With reference to the harmonics phase the measures indicate a relevant stability for the same EV with respect the modulation of the recharge power, but, also, for different EVs;

  - **in several papers this problem is studied with the hypothesis that the harmonic phases will assume random values, but in the present tests, this hypothesis is not verified**

0425, *Flicker Response of Modern Lamps including Dimmers and other equipment* (Sharma e.a.)



- Gain factor of all CFLs and dimmable LED lamps less than that of incandescent
- Gain factor of non-dimmable LED lamps (hard to find samples) higher
- Increase in gain factor when dimmed for all the test frequencies

- Equipment Tested:
  Three TV's (CRT, plasma and LCD), Gaming consoles
- Voltage modulation was increased to as high as 10 %
- Even at such high voltage fluctuation levels, no visible ill effects were observed

Round Table Discussions

The target of quality regulation - opposite positions?!

- CEER
- ECRB
- EURELECTRIC
- IEEE
- SINTEF

Guidelines for Power Quality Monitoring – Intermediate Results of CIGRE/CIRED JWG 4.112

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- Lulea University of Technology
- Technical University of Dresden
- Qualitrol
- IREQ
- Endesa

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EURELECTRIC recommends:

- Appropriate **voltage quality** in distribution networks is a **shared responsibility between TSOs, DSOs, equipment manufacturers** and **connected end-users**
- **Examine** the **cost of mitigating impact of voltage disturbances on equipment and network**
  - Conduct a study to evaluate the need for and feasibility of establishing (an) immunity curve(s)

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Summary recommendations

- We consider the standard EN 50160 a complete and a good tool for achieving a sufficient level of power quality.
- We recommend regulators to use this tool in their regulation.
- We recommend regulators to support DSO's PQ monitoring efforts in their regulation.
- We suggest to further work on emission/immunity standards for equipment.

5. Recommendations from regulators

Recommendations from 5th BR on Quality of Supply:

1. Perform cost-estimation studies of voltage disturbances

   GGP on Estimation of Costs due to Electricity Interruptions and Voltage Disturbances

2. Ensure individual voltage quality verification
3. Set reasonable emission limits for end-users
4. Broaden the scope of continuous monitoring programs

   GGP for the implementation and use of voltage quality monitoring systems

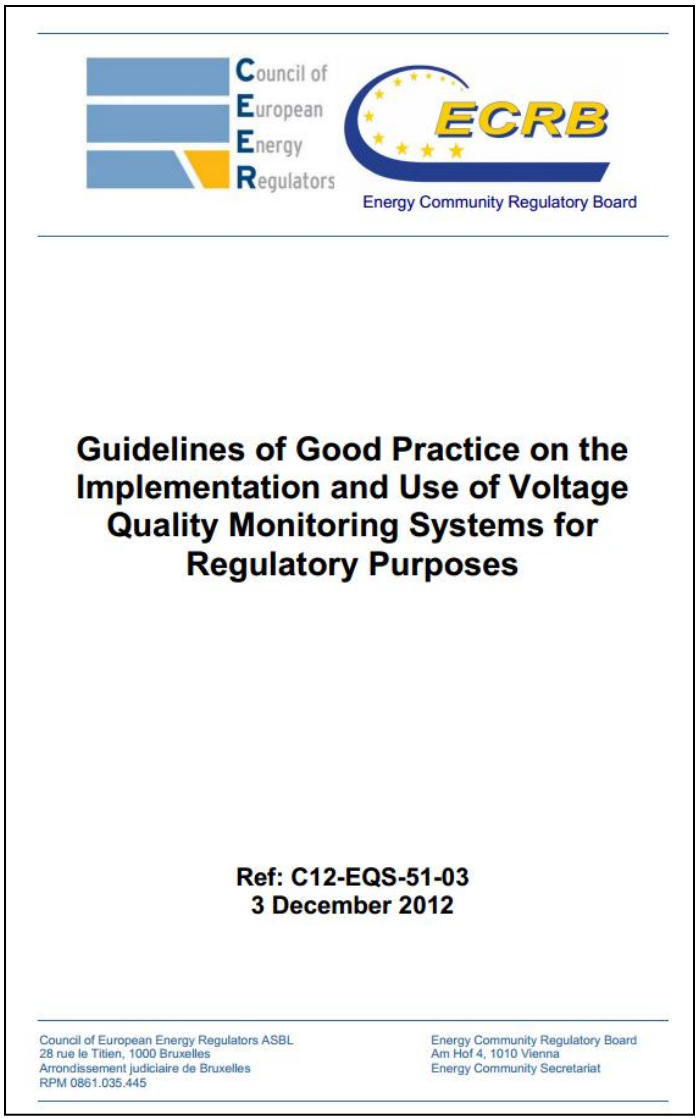
5. Define harmonised characteristics and indices for dips
6. Ensure availability and regular publication of data

CIGRE/CIRED JWG 4.112 (report due spring/summer 2014):

The JWG should provide guidelines on

- Choosing locations to install monitoring equipment and the number of monitors needed to get a sufficiently-accurate picture of the power quality.
- Possibility and potential advantages of installing a monitoring function in a large number of the metering devices and/or protection relays.
- Methods for reliable estimation of relevant power quality indices at non-monitored locations.
- Which parameters should be recorded and at what sampling rate/resolution
- How and where should the monitoring results be stored (locally or centrally)?
  - If the data are to be transmitted to central location should raw data or processed/compressed data be transmitted.
- How to present the results of monitoring?
  - These quidelines will address the way of presenting statistical/probabilistic results over the whole or a large part of the service area and results for individual events or over a short period of time.

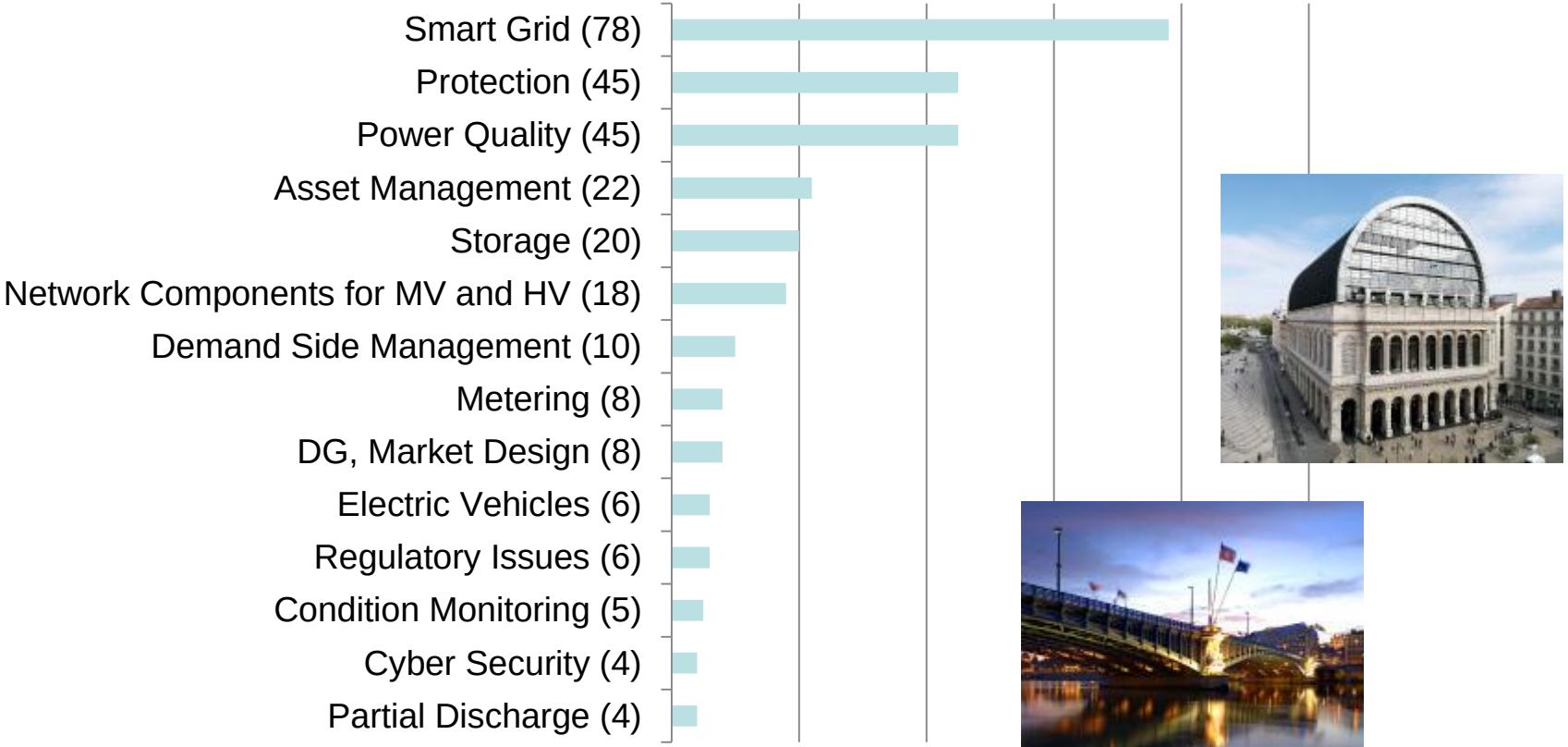
Math Bollen, Luleå University



- Joint publication
- CEER European Union
- ECRB Non-EU
- Broad international support

http://www.energy-community.org/pls/portal/docs/1838177.PDF

Ausblick CIRED 2015 Lyon, topics of interest



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