3rd GRIFOn Workshop | 04 October 2023

WP11 - T11.4 Scalability and replicability analysis

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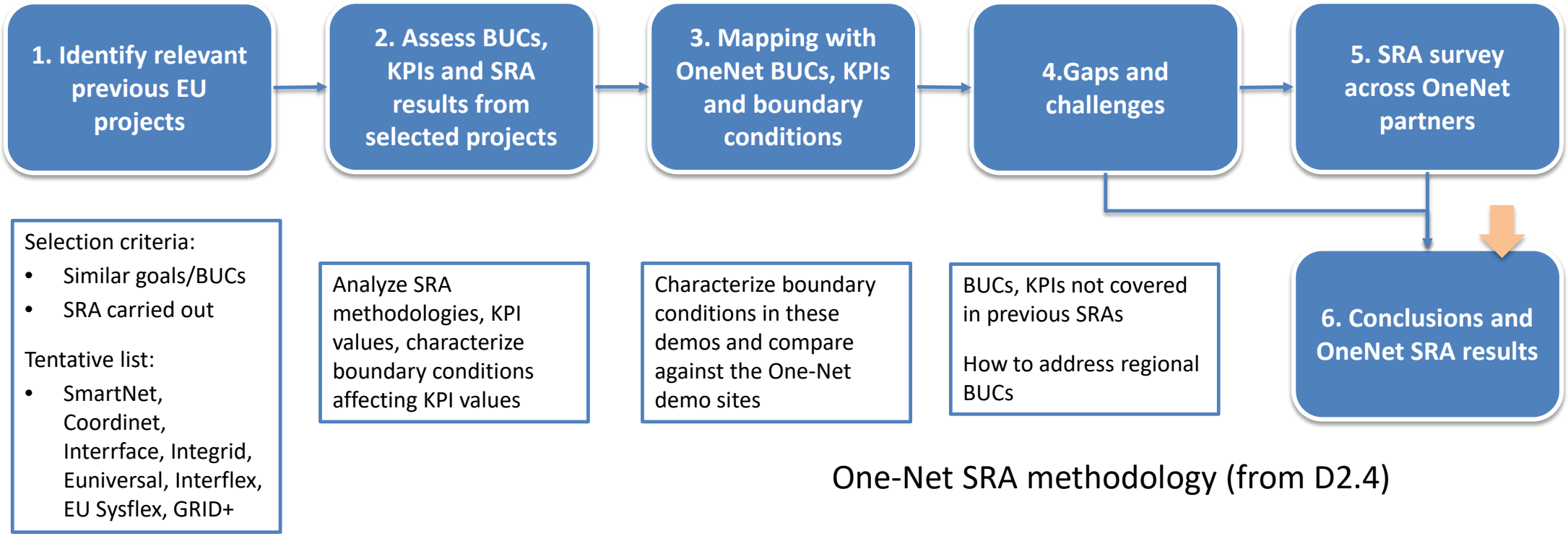
T11.4 Methodology Overview



One-Net SRA methodology (from D2.4)

Selected EU projects and mapping

coordiNET

EU-SysFlex

TDX-ASSIST

integrid bridging the gap

EUniversal UMEI

crossbow

Platone
PLATFORM FOR OPERATION OF DISTRIBUTION NETWORKS

INTERRFACE

ONENET one network for Europe

BUC ID	BUC Title	Coordination scheme	Market Model	Services tested	Time horizon for flexibility procure.	Matching BUC (ID & Project)	Coordination scheme	Market Model	Services tested	Time horizon for flexibility procure.
SOCL-CY-02	Reactive power flexibility and power quality	Market based DSO coordination	Local Market	Congestion Management, Voltage Control, Phase balancing	Intraday and Near Real Time	FI-RP (EU-SysFlex)	Market based DSO coordination	Local (Market + bilateral)	Voltage control	Weeks ahead
						HLUC01 (Integrid)	Market based DSO coordination	Local	Congestion management voltage control	Week-ahead to hours ahead
						DE-RP (EUniversal)	Market based DSO coordination	Local	Congestion management voltage control	Short term

BUCs: services, products, KPIs, market model

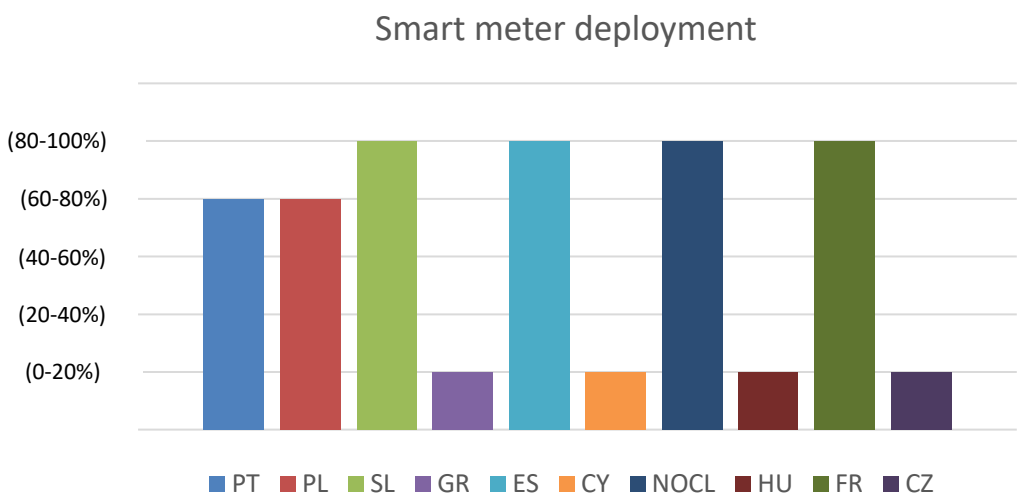
BUC ID	Network Characteristics	Resource Characteristics	BUC ID	Network Characteristics	Resource Characteristics
WECL-PT-02	T & D: EHV, HV, MV	Commercial: 236 supermarkets (power plant, storage system, customer, EVs, ...):	SE-1a (Coordinet)	T&D interface (management of subscription levels) D: HV	Uppland: residential, commercial industry 13 FSPs 173 MW Cleared flexibility 9 965 MWh Skane: residential, commercial and industrial 12 FSPs 188 MW Cleared flexibility 206 MWh Gotland: commercial and industry 4 FSPs 25 MW Cleared flexibility 879 MWh

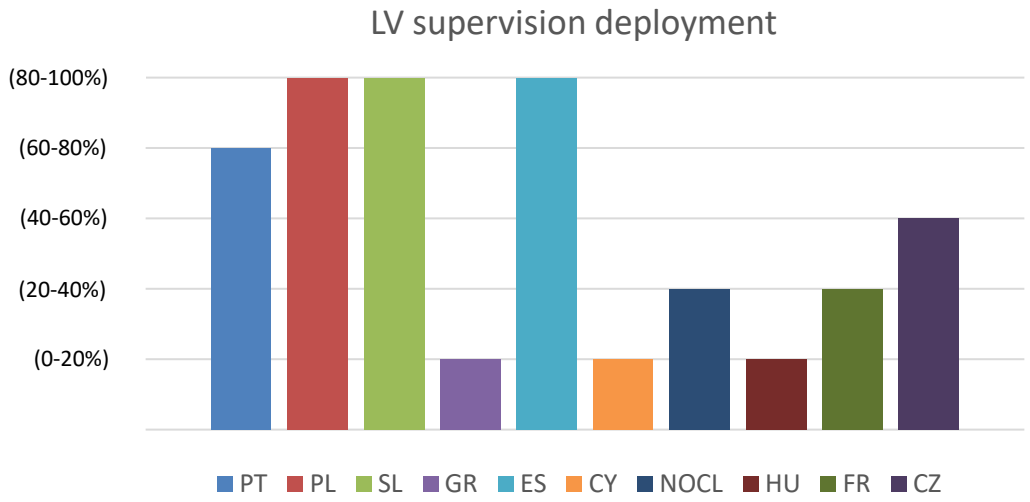
Demo sites: grid characteristics, FSPs

SRA scope, methodology & lessons learnt

	Coordinet	Euniversal	Platone
Business layer	**Qualitative** (regulatory analysis, market rules)	**Qualitative**: Regulatory analysis remuneration of services and activities, role of the different agents, tariffs, metering deployment, data management, etc. **Questionnaire** (stakeholder analysis: DSOs, FSPs, MOs, TSOs and regulators perspective)	**Quantitative:** Replicability: Regulatory analysis (different voltage limitations, different tariff schemes)
Functional layer	**Simulation** -Wholesale Market + congestions market + balancing market -active power -T-Grid + D-Grid -Load profile: Set of representative days -Common Central and multi-level markets -Objective: minimize costs **Simulation** -Wholesale Market + voltage control -T-Grid + D-Grid Profiles: Load and generation to estimate flex needs -market models: common, central, local, multi-level markets -Objective: minimize costs **Simulation** -LFM (sensitivity factors for network) -Power flow: D-Grid MV -Profiles: Load and generation to estimate flex needs -Congestion management -Active power -Residential, commercial and industrial loads DG	**Simulation**: LFM (sensitivity factors for network) Power flow: D-Grid (MV &/or LV) Profiles: Load and generation to estimate flex needs: Congestion management &/or Voltage Control Active &/or reactive Aggregators DG, batteries, electrical heat storage	**Simulation**: Local energy community Energy management system Islanding/Flex provision/Bulk import/Bulk export Load profiles: Spring Winter and summer, representative days Representative networks DG, EVs, storage

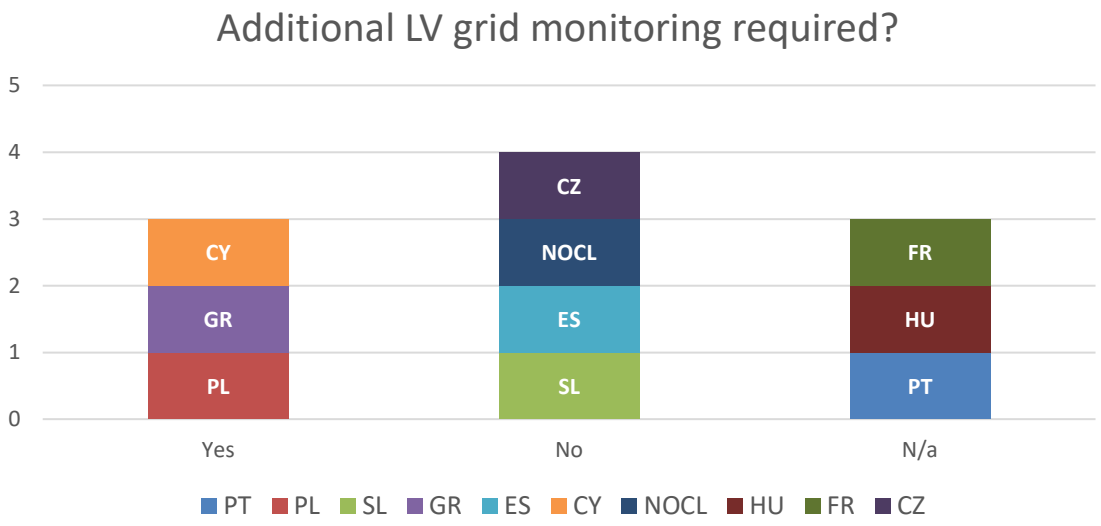
Current state of grid monitoring vs. needs

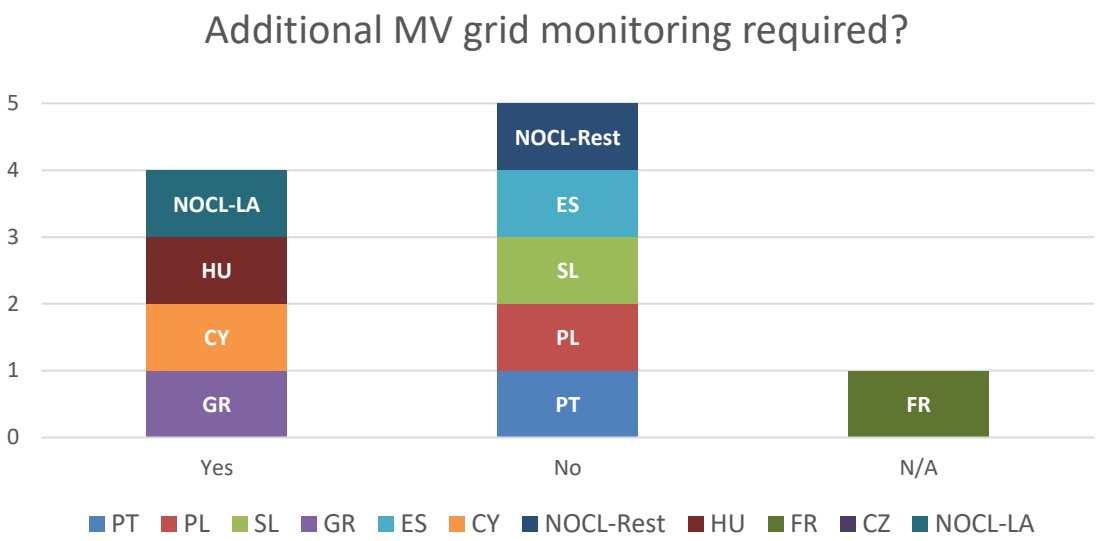




- Lack of LV monitoring capability constitutes a barrier for replicability for BUCs where LV constraints are to be solved and/or LV flexibilities are used
- Monitoring devices are not enough → state estimation tools are required

Need for additional grid monitoring





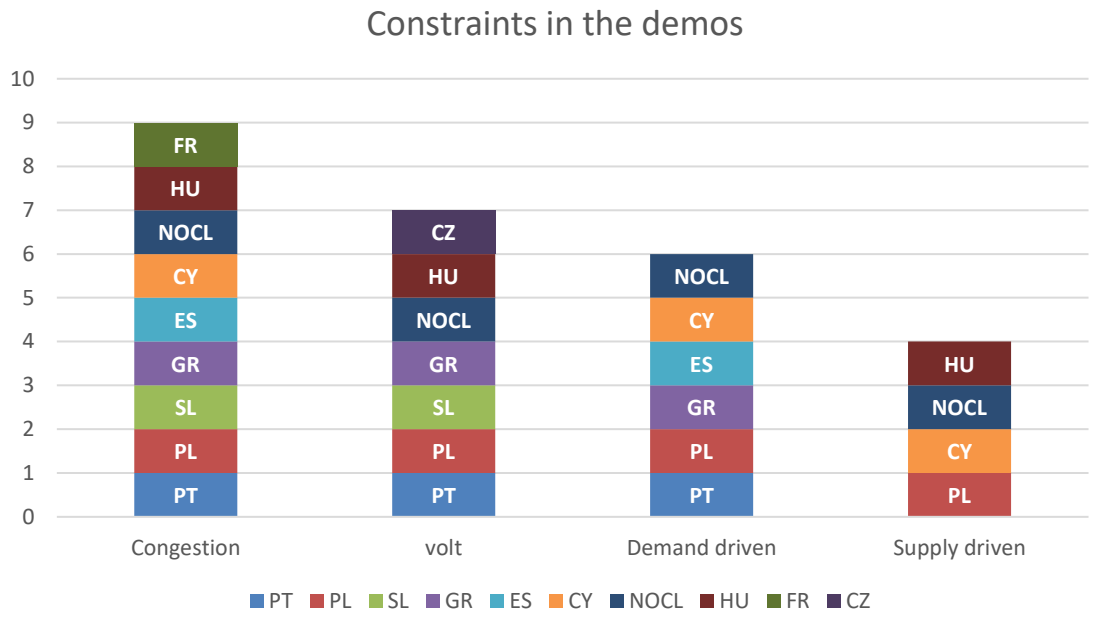
Progressive enhancement of LV grid monitoring enables more advanced BUCs:

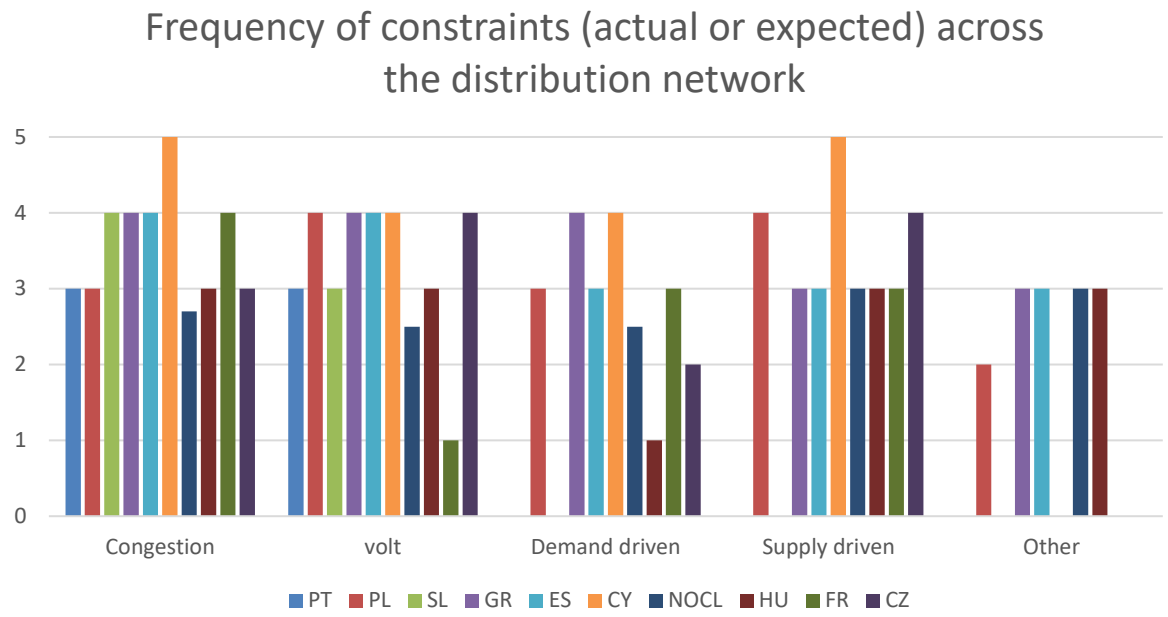
1. Smart meter deployment
2. LV supervisors
3. State estimation
4. **Sub-metering**

Some reasons why no additional monitoring is required:

- Already monitored
- Only MV grid is included in the demonstration
- **The traffic light scheme would not require additional LV monitoring**
- **We would need additional monitoring of MV lines, but not in all cases**

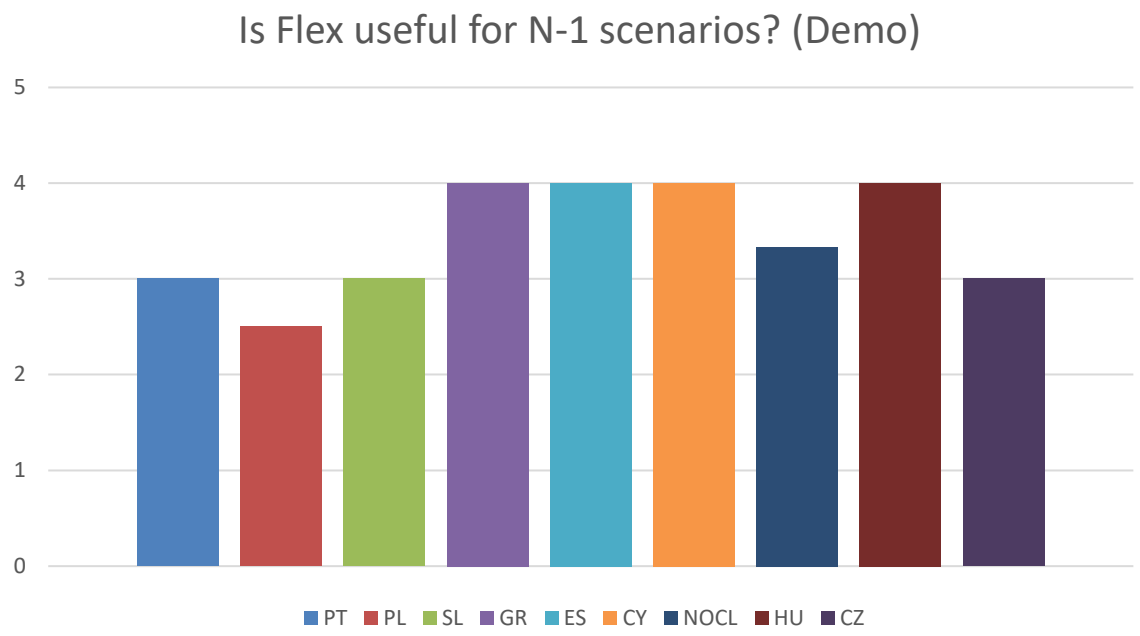
Type of constraints in demos vs. actual grid conditions





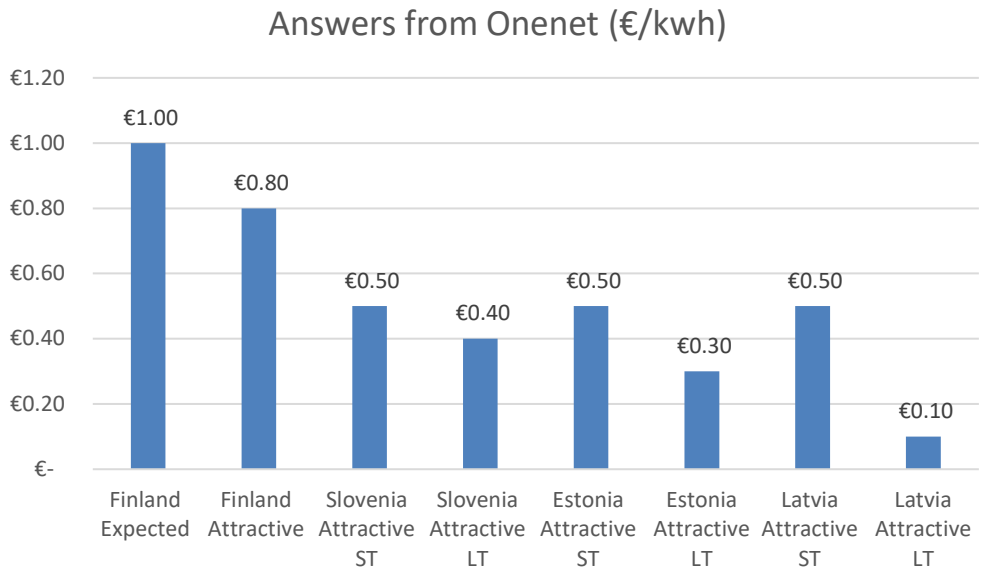
- **Demand-driven issues more present in demos** than supply-driven ones, whereas **supply-driven constraints** expected to be **more common across the grid** → potential misalignment between demo and actual conditions
- Both demand driven and supply driven expected in all countries
- Other network problems (e.g. scheduled maintenance) are generally expected to benefit from flexibility use

Flexibility potential for supporting N-1 scenarios



- >90% of responses from the DSOs consider flexibility is moderately or very useful for N-1 scenarios
- Main alternatives to flex.: network reinforcement, network reconfiguration, generation curtailment, OLTC…
- In line with previous projects, flexibility is particularly **valuable for scenarios with low probability of occurrence that would otherwise require reinforcements**

Flexibility costs - Expectations vs some real data points

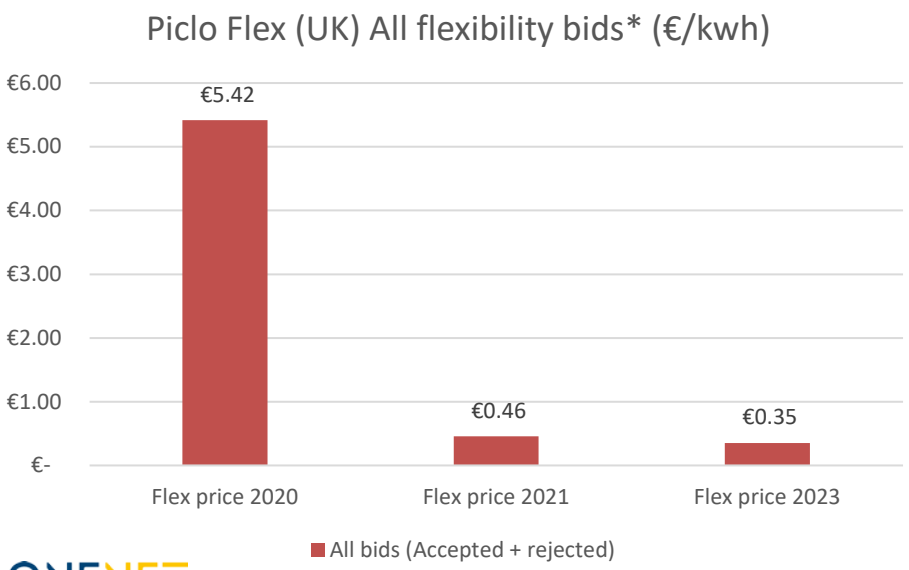


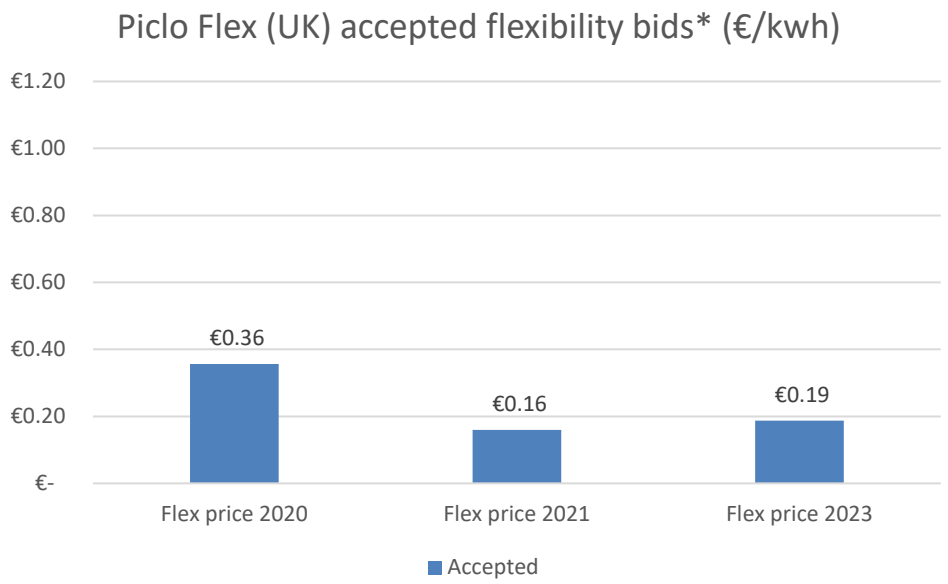
Local flexibility prices observed in the UK

- In 2020: range around the range of attractive prices indicated by OneNet partners
- In 2021 &2023: prices have evolved to be below that range

OneNet demos expect higher prices mostly due to:

- Less mature and/or liquid flexibility markets (generalized)
- Intrinsically higher flexibility costs (a few cases)



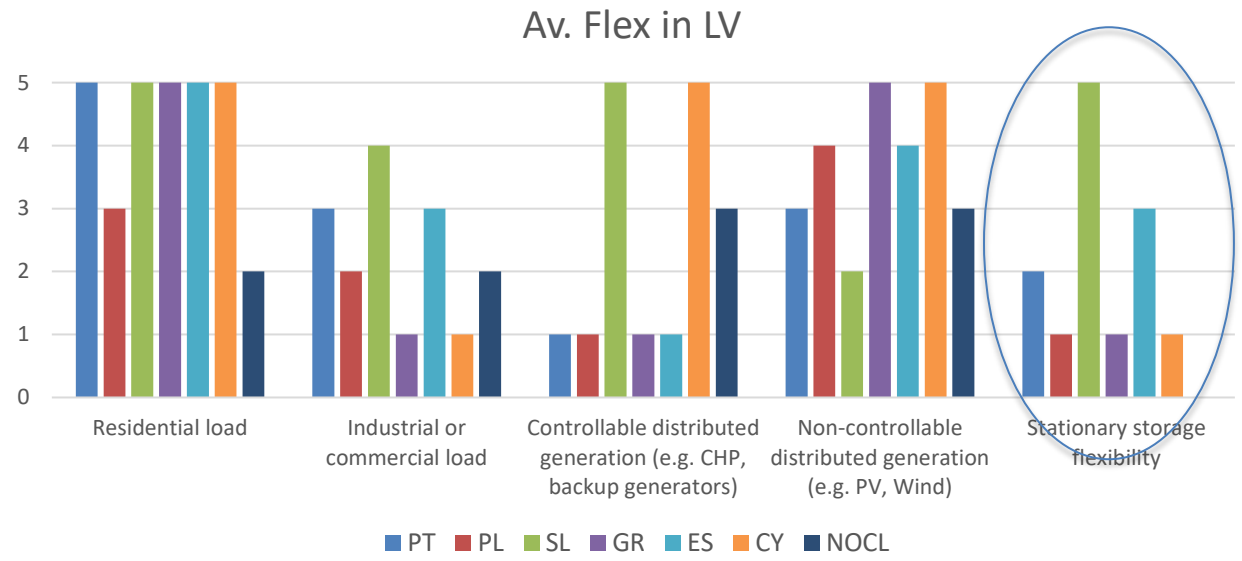


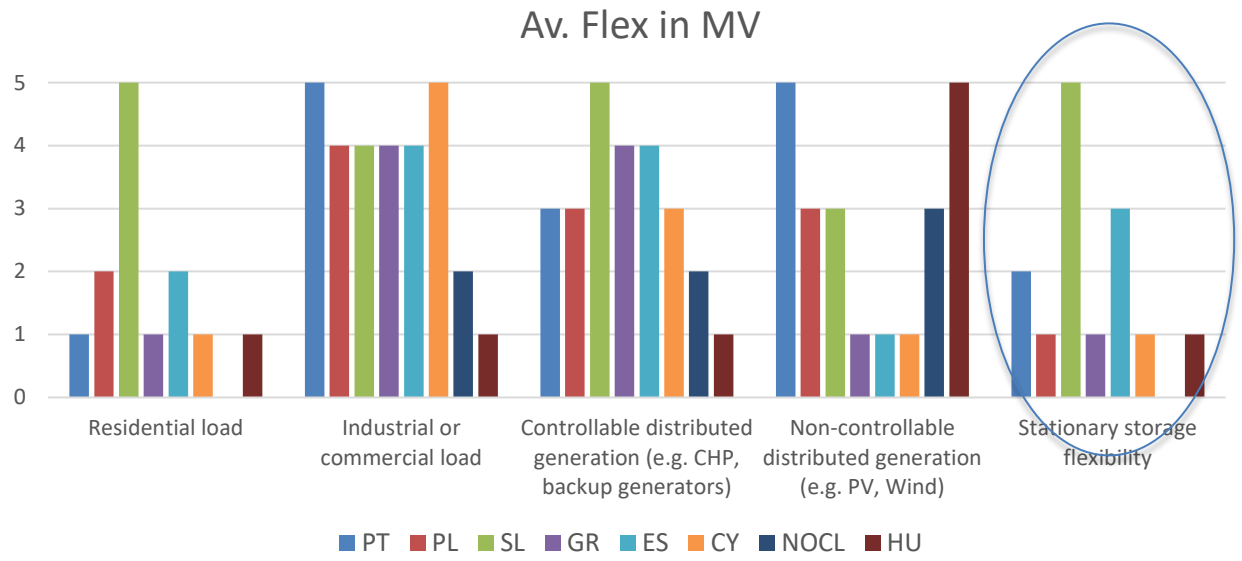
Average flexibility bids (Piclo-Flex UK) 2020-2023 (Sep)
prefault and post fault excluded.
2 DSOs:

- **SP Energy Networks**
- **UK Power Networks**

1 £ = 1,15 € Exchange rate

FSPs Availability

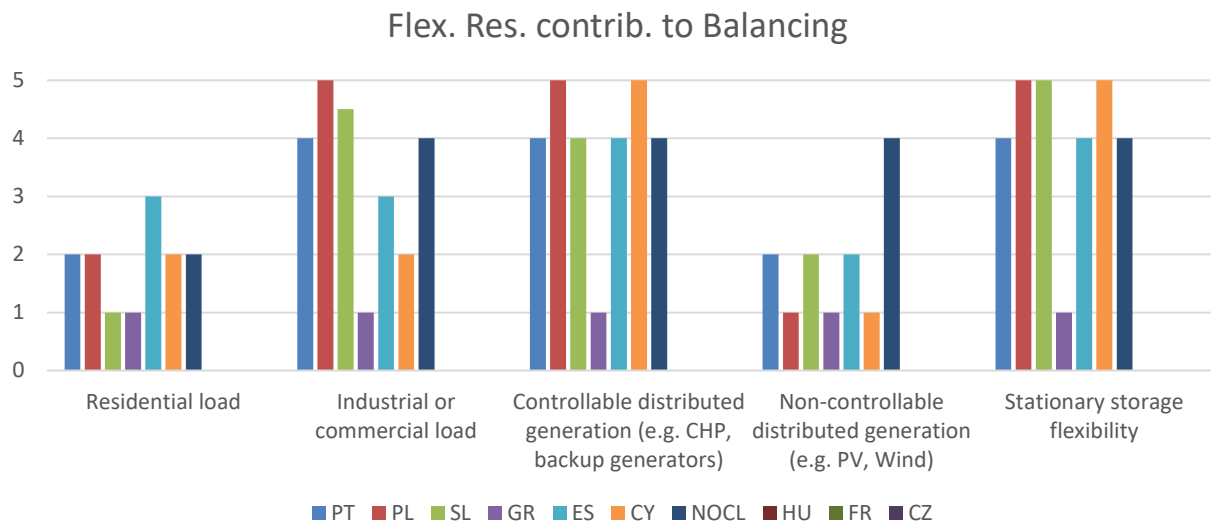


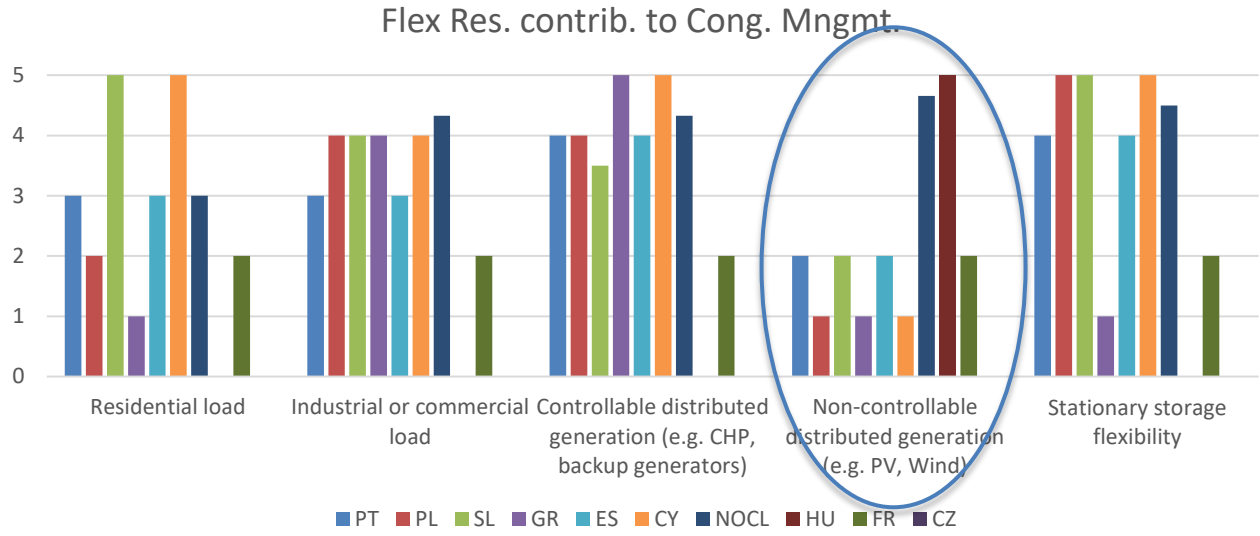


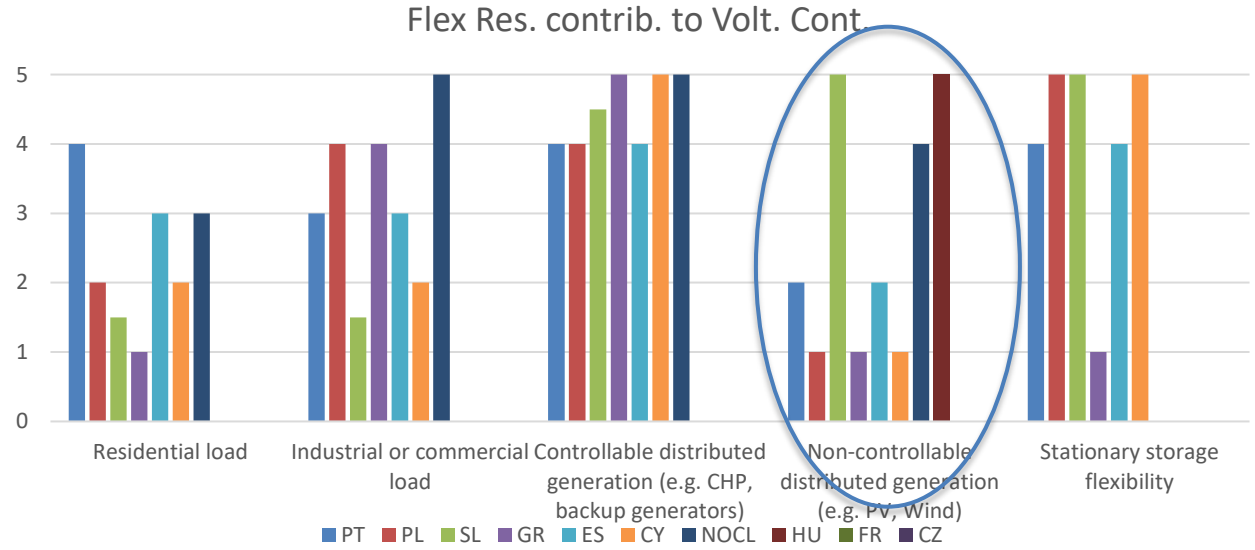
Differential issues:

- CY & SL: Controllable distributed generation available in the LV grid
- Stationary storage has low availability except for Slovenia
- Slovenia is the country with more FSPs availability of all kinds

FSPs contribution to System needs



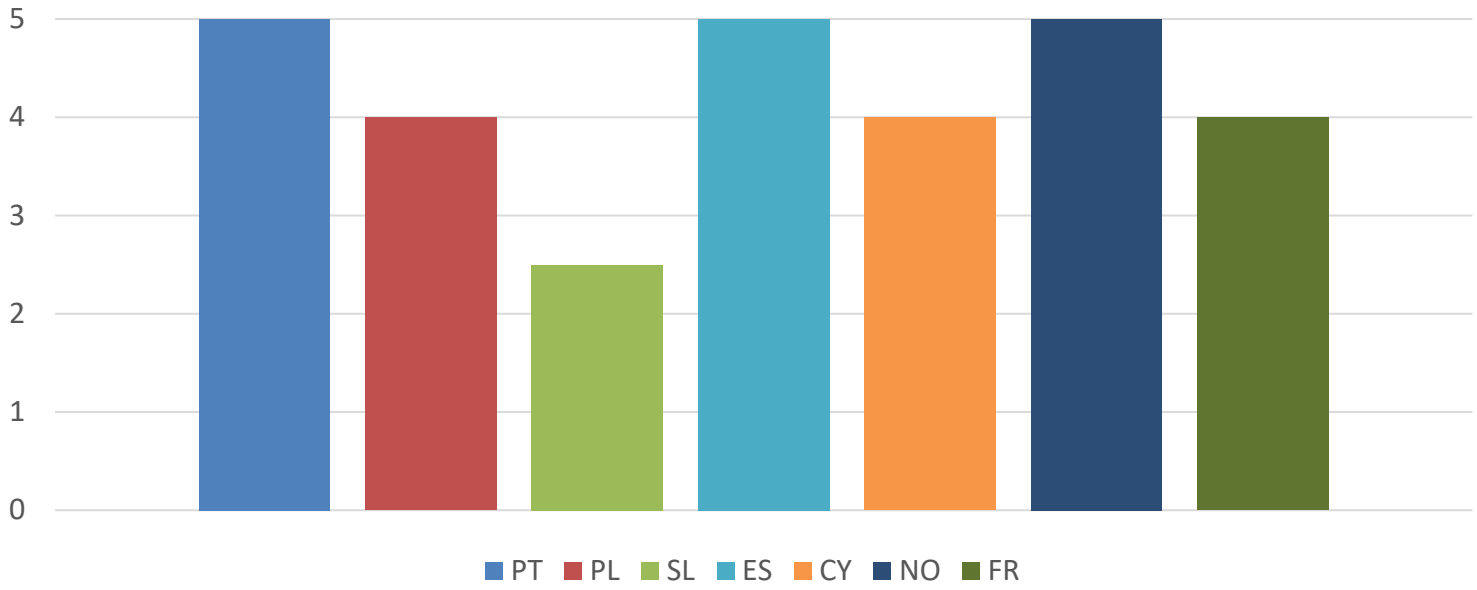




Highest difference concerning non-controllable DG. Mainly driven by:

- Differences in regulation: DSO ability to use flexibility, connection requirements (e.g. cosϕ)
- Technical limitations by FSPs
- Not located where needed (no voltage needs or high R/X ratio)

On the allocation of responsibilities for non-delivered flexibility



Slovenia is the country with highest availability of FSPs among the demos, and is the one less concerned with the allocation of responsibilities

- Due to already established relationship of **trust and experience with FSPs**
- When other demos were asked whether the relevance of this topic may diminish as more experience is gained, a majority mentioned they agreed or strongly agreed. However, a few disagreed

Regional use cases

OneNet platform objective: sharing key flexibility market/utilization data

Key barriers identified by demos:

- Harmonization: products, services
- Governance and coordination: procurement cost allocation, grid data sharing, bid optimisation, register
- Connectivity and cybersecurity issues implementing the OneNet interconnector

Open discussion

i. **Monitoring requirements** for using MV and LV flexibility: what drives the need for additional monitoring (e.g. LV state estimation, sub-metering) or opt for flexibility schemes with lower requirements (e.g. traffic-light)

ii. Will **flexibility costs** fall as these markets evolve? Will we see persistent high costs in some countries/regions due to some intrinsic factors?

iii. Do you think the importance of **responsibility allocation** may diminish as more experience is gained and reliable relationships with FSPs develop?


Thank you!