DEPsys- & NASPI-Affiliated Distribution System Operators Surveys Results

Nov. 2020 NASPI Work Group Meeting

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Within DisTT updates

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Overview of presentation

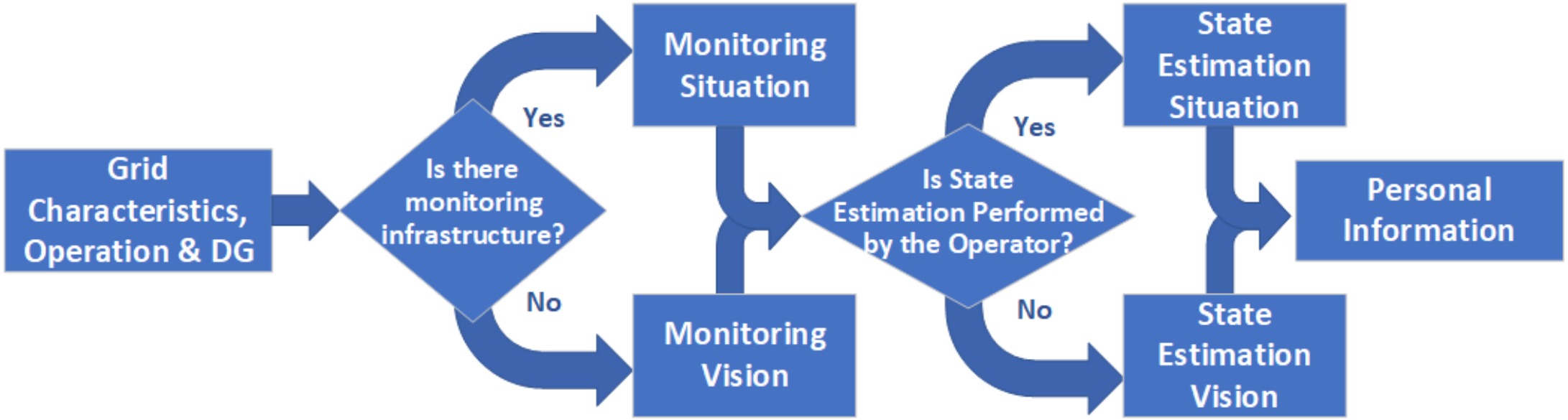
- The DEPsys (GEiMS) and NASPI questionnaires
- Structure of the GEiMS questionnaire to distribution system operators
  - Conclusions from the GEiMS questionnaire
- Structure of the NASPI questionnaires to distribution system operators
  - Conclusions from the NASPI questionnaire
- Path forward
- Appendix
  - Responses to GEiMS questionnaire
  - Responses to NASPI questionnaire

GEiMS & NASPI questionnaires

- Why GEiMS sought for distribution system operators' input
  - Assess the practical state estimation requirements
  - Opportunity for added insight for DEPsys
- Why NASPI sought for distribution system operators' input
  - Little data on distribution operators' aspirations/applications with phasors
  - Explore extensions of value to NASPI DisTT

NASPI

Structure of GEiMS questionnaire



Remarks on Grid & DG

- Most operators manage at least some extent of urban grid
- No monitoring for reliability or reinforcement; mostly reports/experience
- Huge push for reducing SAIDIs
- Monitoring to accommodate distributed resources
- Grid status is recorded seasonally (limited monitoring of distribution)
- Gap between operators' vision and practice

Remarks on Monitoring Situation

- Preference on SCADA implies legacy from transmission monitoring
- Monitoring data gathering and GUI important features of monitoring
- Low voltage grid sparsely monitored, customers on AMI
- Voltage quality primary concern for monitoring

Remarks on State Estimation & Monitoring Plans

- Low response rate
- Not consistent response by polled individuals (different few people answered different questions)
- No apparent correlation of responses that could be meaningful

Any ***1*** major question you would like to ask?

(Q&A time allocated at the end of the presentation)

Structure of NASPI questionnaire

- 7 questions with follow-ups & some write-ins
  - Measurement infrastructure
  - Monitoring Priorities
  - Wildfire mitigation
  - Distributed Generation management
  - State Estimation situation
  - Microrgrids plans
  - PMU concerns

Remarks on NASPI Questionnaire

- Fault detection & asset health primary reasons for monitoring plans
- DER concerns focus on voltage profile, protection and loss of generation
- PMUs underutilized although some deployed (SCADA widely used)
- No ‘actual’ state estimation at distribution systems
- Wildfire mitigation very trending concern wrt monitoring

Any *1* major question you would like to ask?

(Q&A time allocated at the end of the presentation)

Path forward (general remarks)

- The distribution system monitoring landscape is uncharted
  - Legacies from transmission affect it (SCADA, voltage concerns, data w/h)
- Customer-centered concerns for monitoring (faults, asset health)
- DERs push ‘advanced’ monitoring projects (relevant to previous)
- State estimation at distribution systems necessary, but unexplored
- Good timing to affect/standardize developments in all of the above

And a Request…

Can we count on some DSO experts who will volunteer for 30’ anonymous interviews as follow-up to the surveys?

Not necessary to interview the same surveyed experts/scholars

Questions?

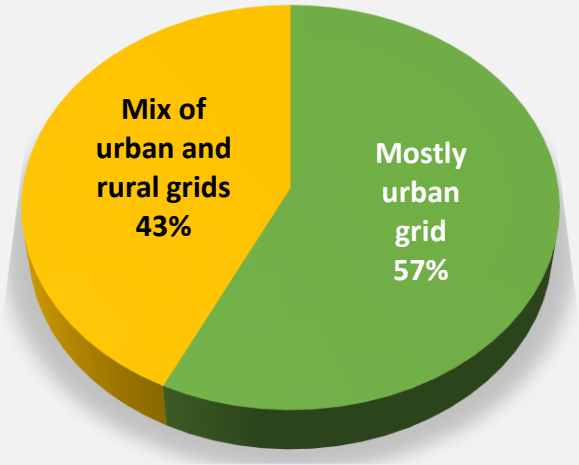
Clarifications?

Comments?

Appendix

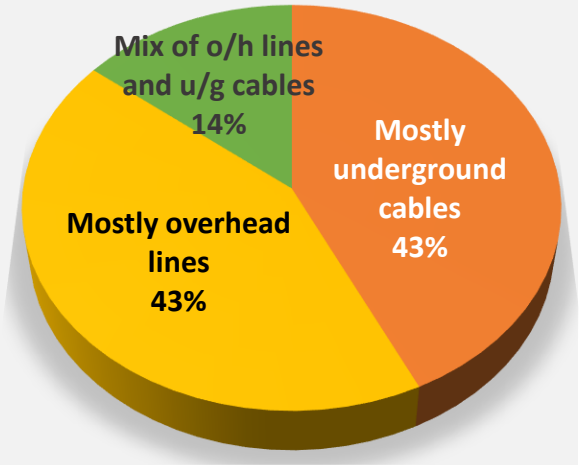
Responses to GEiMS Qs – Grid & DG (1/4)

Which option describes better the distribution grid of the utility?



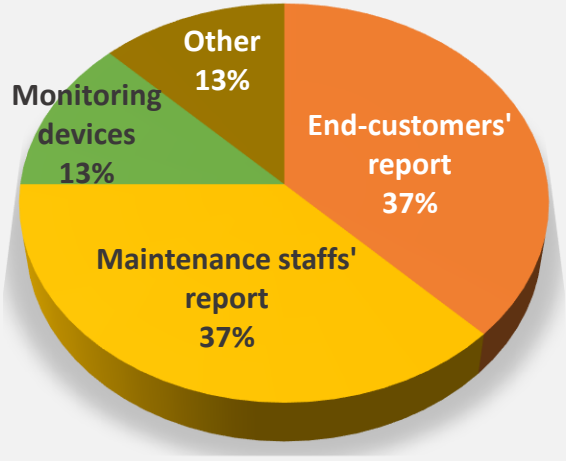
* 6/13: N. A.

Which option characterizes better the utility's grid?



* 6/13: N. A.

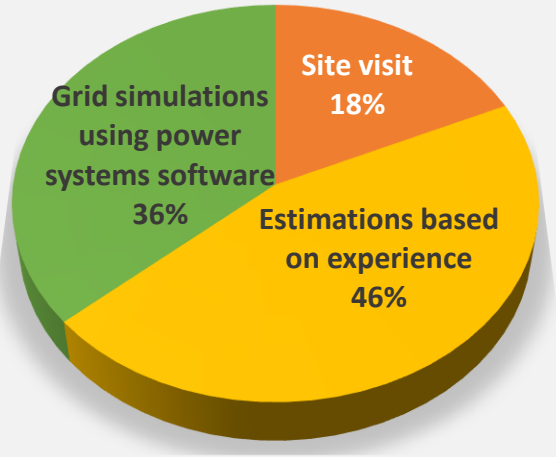
How has grid reliability been assessed?



*8/13: N. A.

Low response

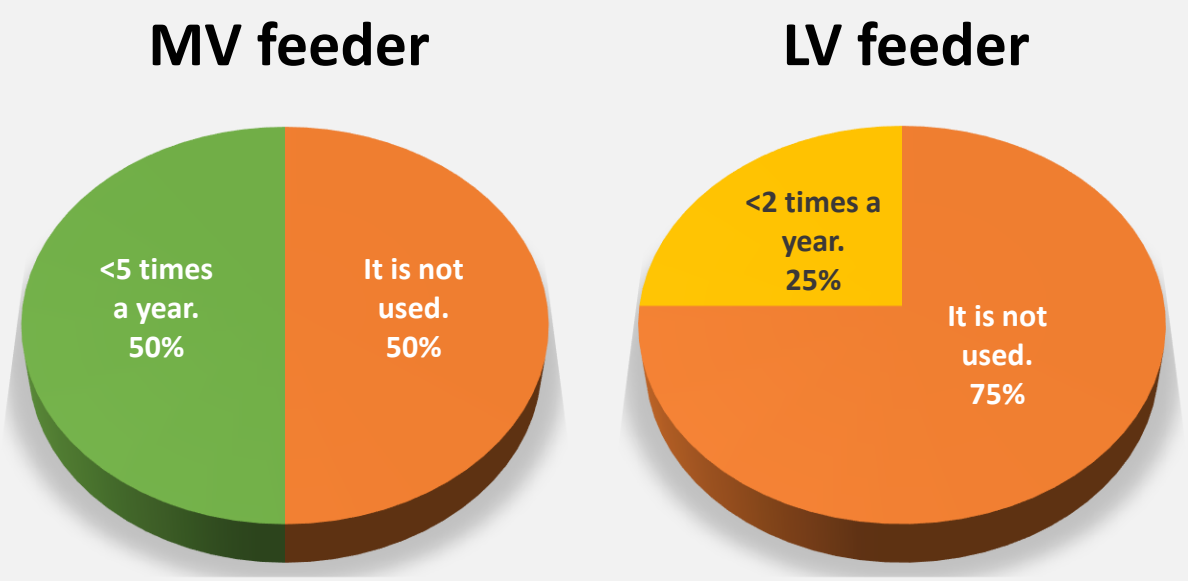
How are grid reinforcement decisions taken?



* 6/13: N. A.

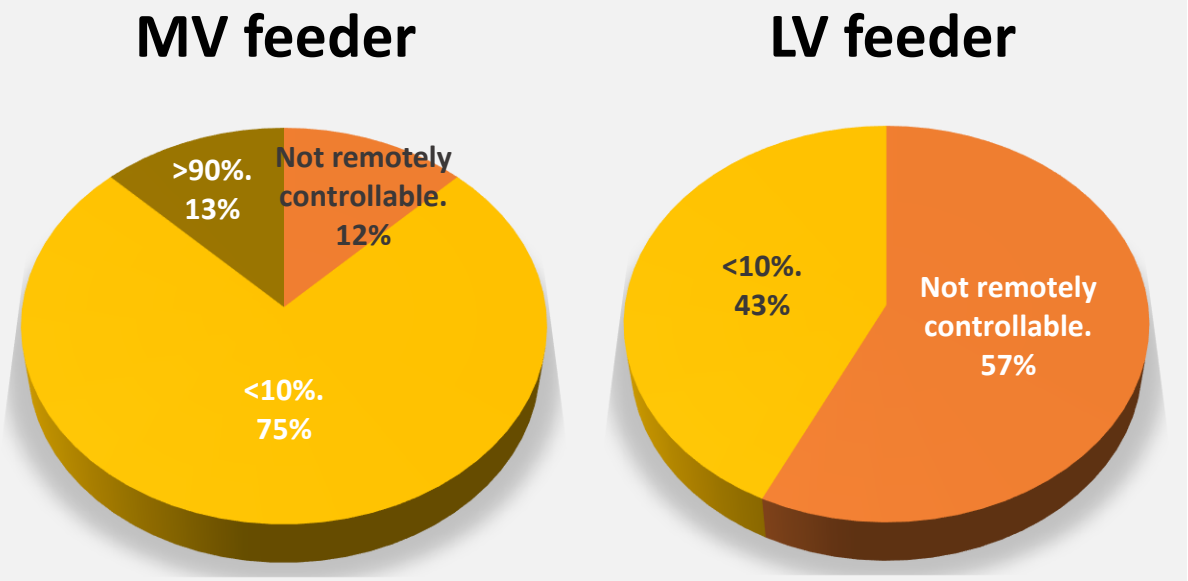
Responses to GEiMS Qs – Grid & DG (2/4)

How frequently is system reconfigura-tion employed in average/year) for a…?



* 9/13: N. A.

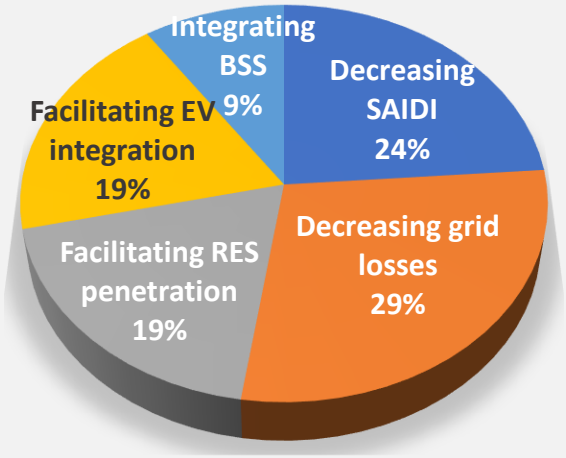
What percentage of… feeders are remotely controllable?



* 6/13: N. A.

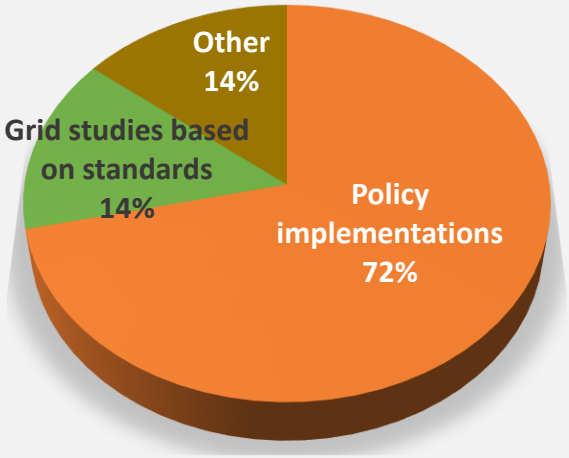
Responses to GEiMS Qs – Grid & DG (3/4)

Which might be interesting for the utility in the future?



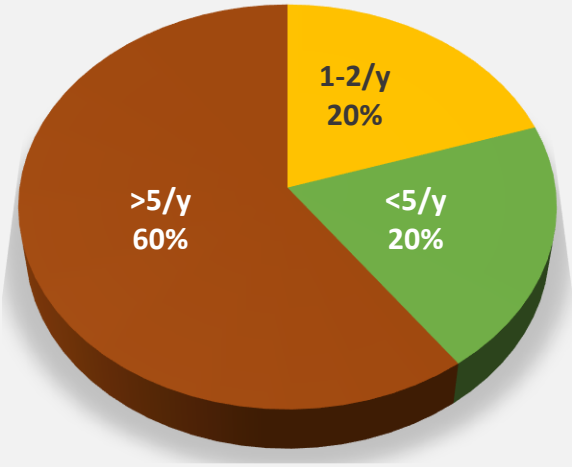
*** 6/14: N. A.**

How is the maximum penetration of DG determined?



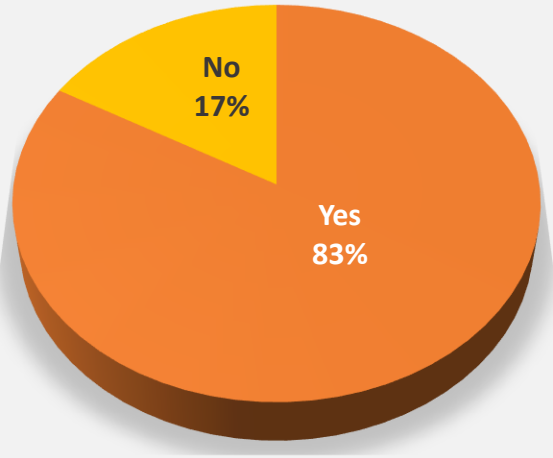
*** 7/14: N. A.**

How many times per year (/y) are grid voltages & loads recorded?



*** 8/13: N. A.**

Has any monitoring system been used in the grid?



*** 7/13: N. A.**

Responses to GEiMS Qs – Grid & DG (4/4)

Last year System Average Interruption Duration Index (SAIDI)?

Average = **49’±36.6’** *Median* = **42.5’**

Average last 5 years SAIDI?

Average = **135’±167’** *Median* = **59’**

Annual energy consumption?

Average = **6747±13464 GWh** *Median* = **526 GWh**

Average/peak loading (%)?

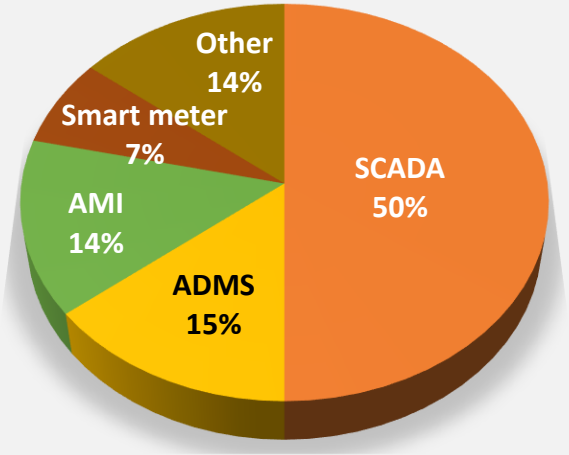
Average = **33.5±18%/36±14%** *Median* = **30%/31.5%**

Total installed capacity of DG?

Average = **523±1215 MW** *Median* = **26.5 MW**

Responses to GEiMS Qs – Monitoring Situation (1/3)

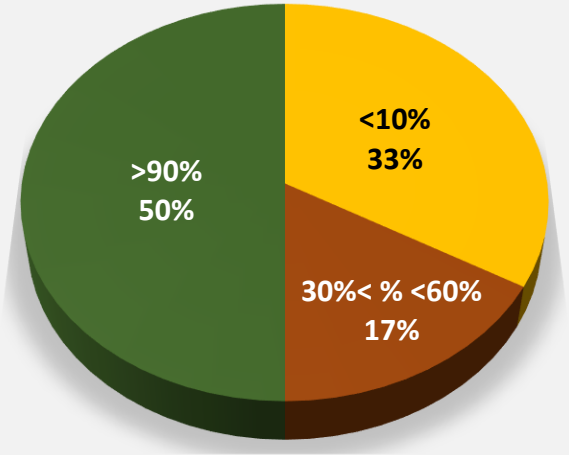
Which monitoring systems are used?



* 4/13: N. A.

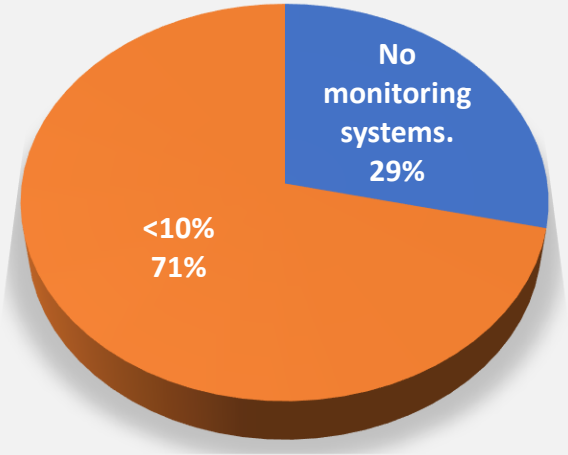
What percentage of … are equipped with monitoring or smart meter systems?

MV feeder



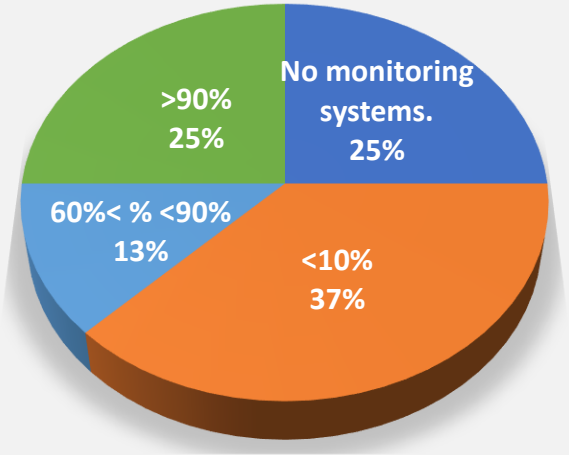
* 7/13: N. A.

LV feeder



* 6/13: N. A.

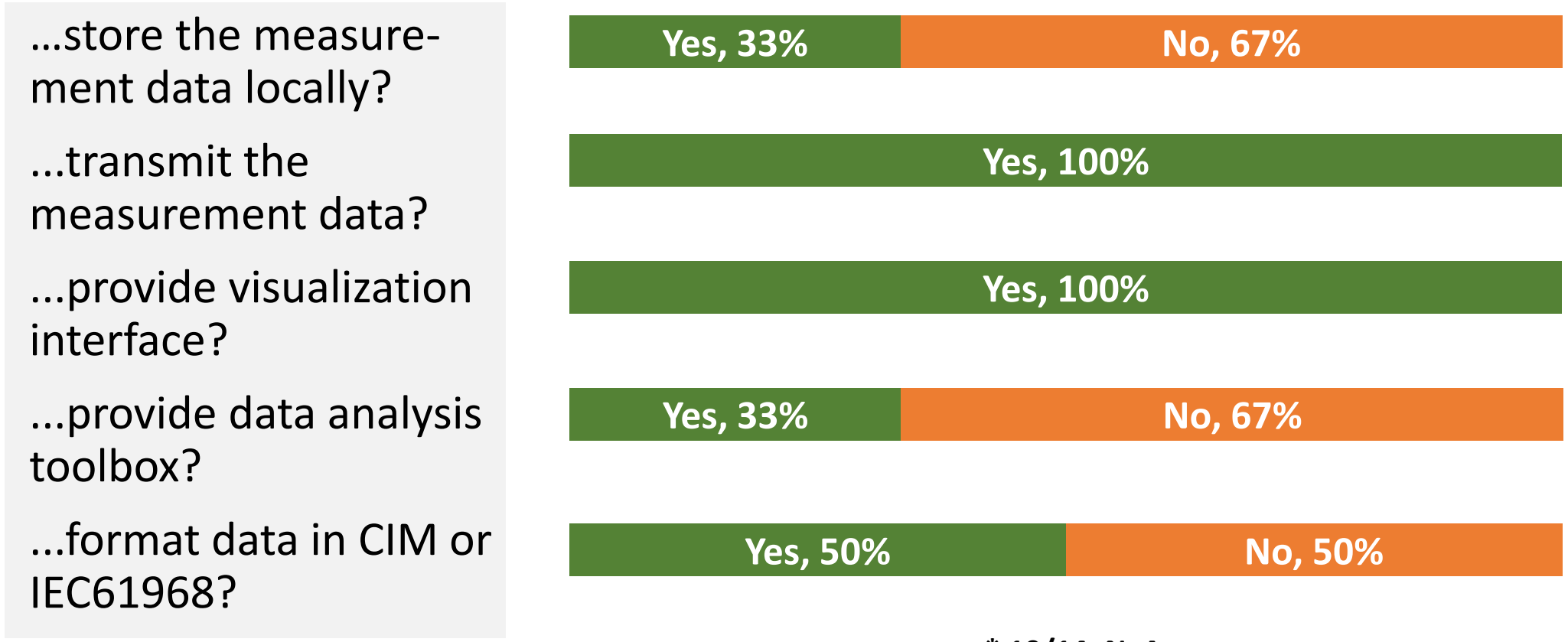
End Customers



* 5/13: N. A.

Responses to GEiMS Qs – Monitoring Situation (2/3)

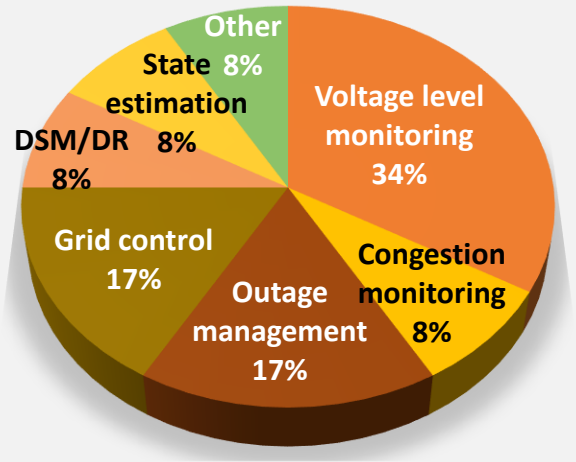
Does the employed monitoring system...



*** 10/14: N. A.**

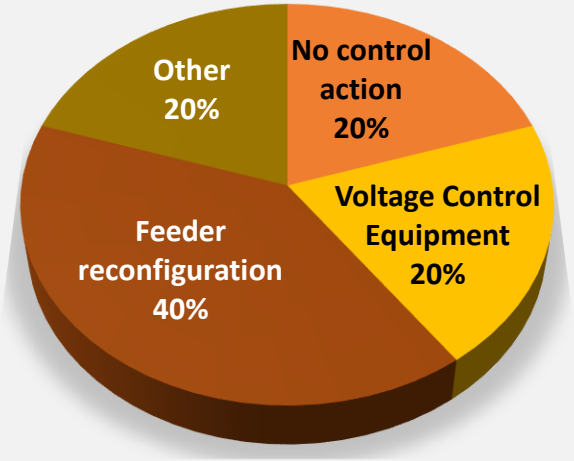
Responses to GEiMS Qs – Monitoring Situation (3/3)

What are the functionalities of the monitoring systems?



* 8/13: N. A.

What control actions does the monitoring system support?



* 9/13: N. A.

Has any state estimation been used in MV and/or LV distribution grids?

* 9/13: N. A.

Responses to GEiMS Qs – Monitoring Plans (…)

. . .

The plans of monitoring infrastructure deployment and the expected results are unclear…

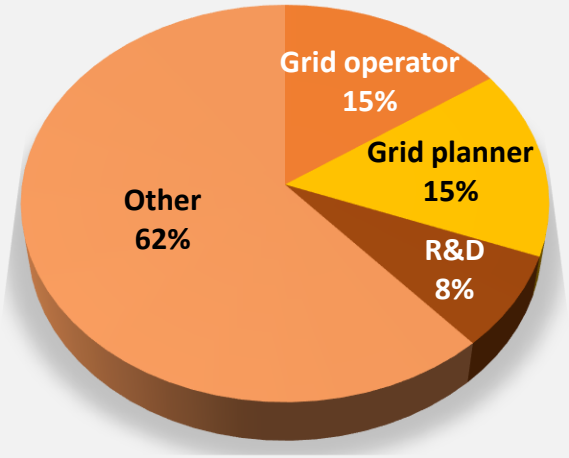
Responses to GEiMS Qs – State Estimation (…)

. . .

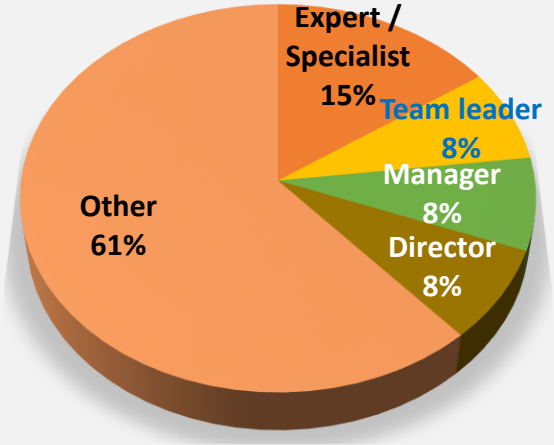
Practiced and planned state estimation of distribution grids has unclear results and aims…

Responses to GEiMS Qs – Survey ID

Which of the following best describes your role?



What is your seniority level?

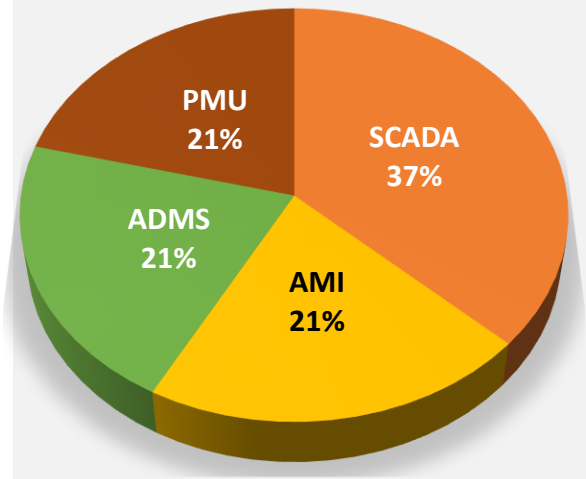


In which country is your organization active at?

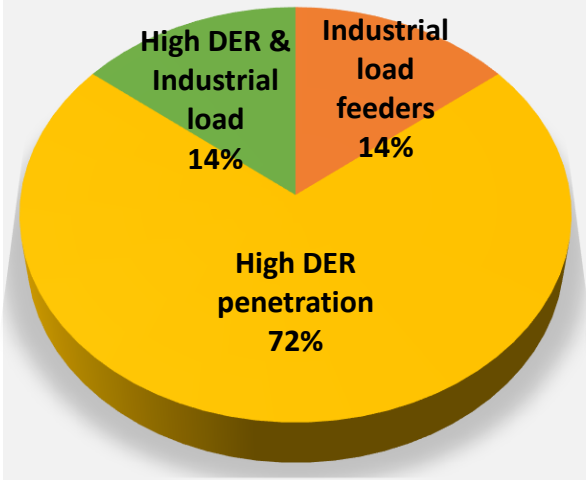
Answer: *Switzerland, Spain, Greece, Lithuania, Iran, Nigeria, Ecuador/Argentina, India*

Responses to NASPI Qs (1/4)

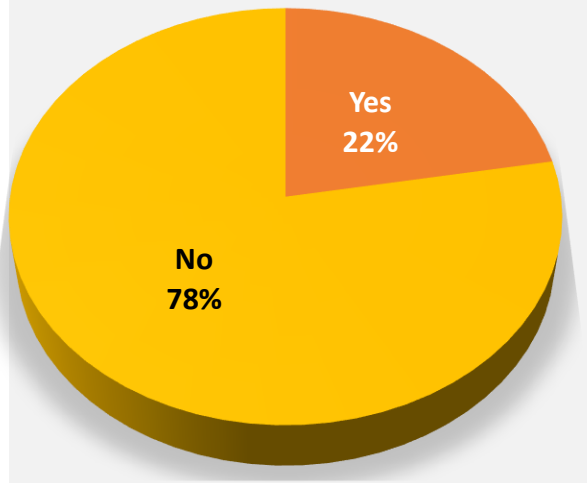
Which monitoring systems are used?



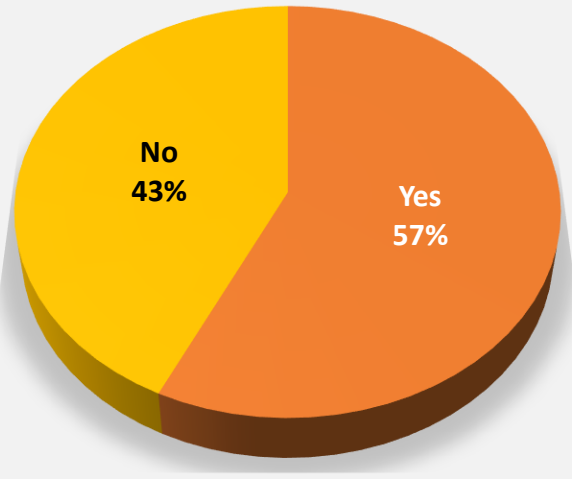
Which types of feeders are valuable to monitor?



Is State Estimation performed at the feeder?



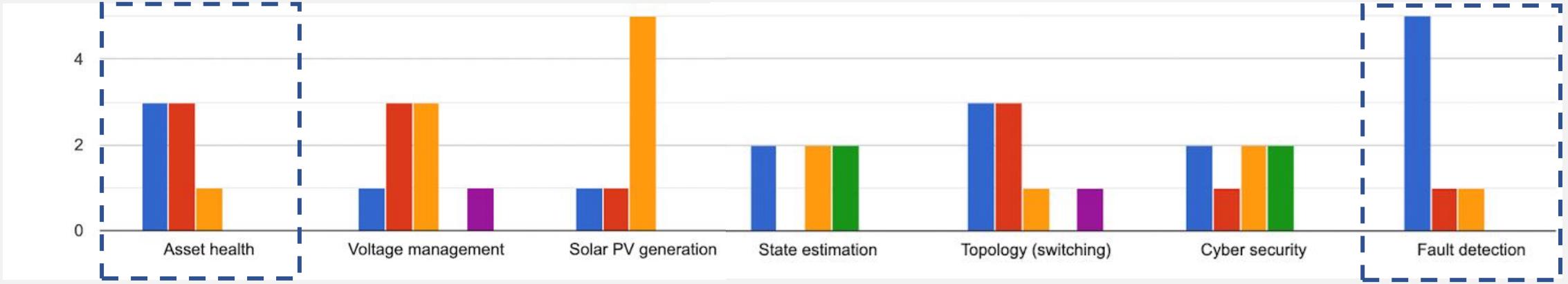
Are microgrid projects* in the utility planning?



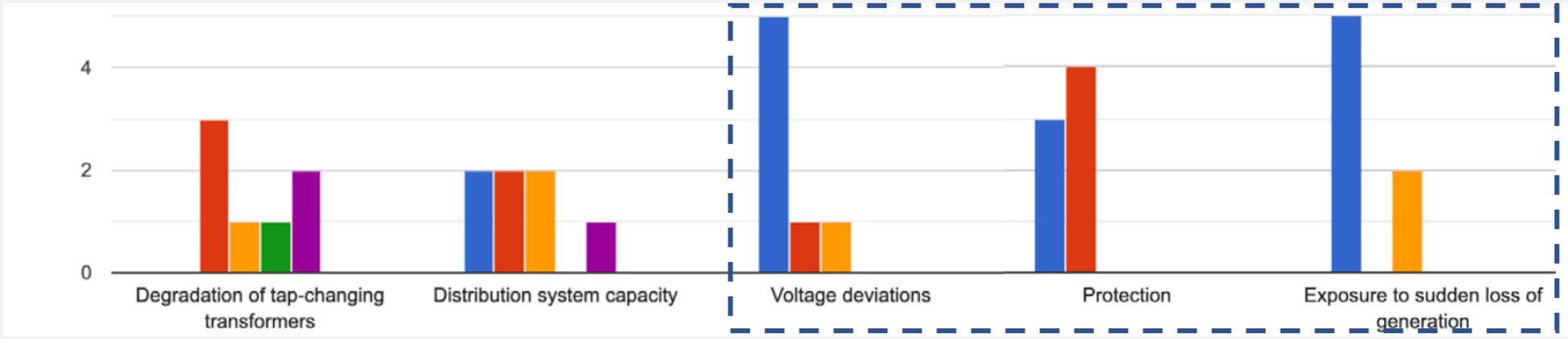
*** assuming use of PMUs**

Responses to NASPI Qs (2/4)

Rate the priority of concern for monitoring each of the following aspects of distribution systems?



Rate the challenges associated with higher penetration of DER for your utility?

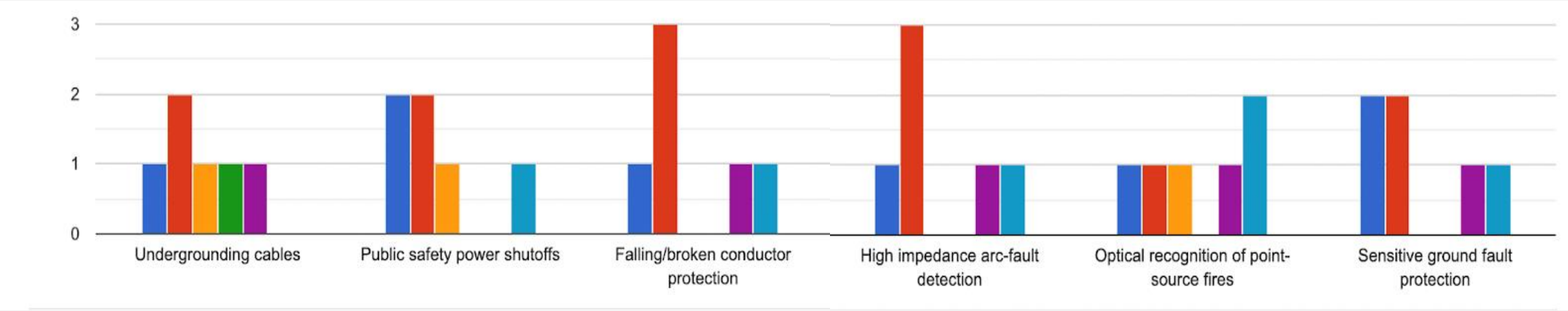


1 Top 2 High 3 Medium 4 Low 5 Not relevant

Responses to NASPI Qs (3/4)

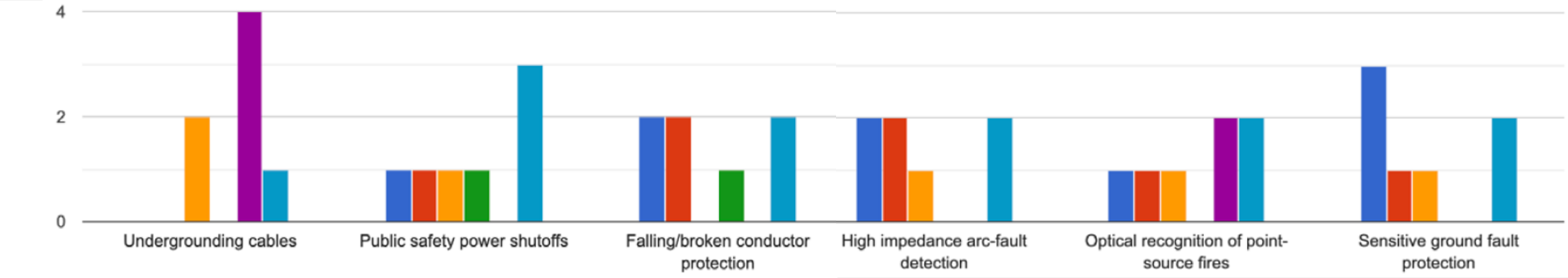
Which wildfire risk mitigation strategy does your utility use?

How important is each of the following wildfire mitigation strategies to your utility?

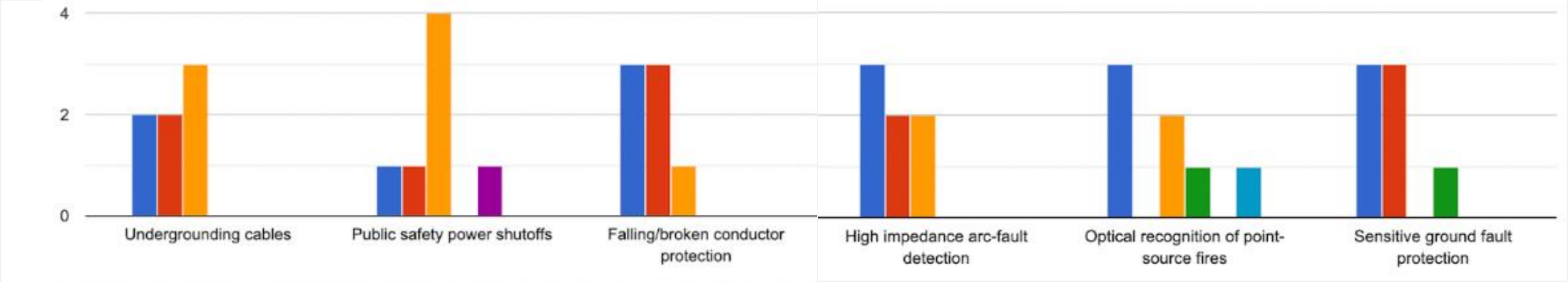


Responses to NASPI Qs (4/4)

Based on your estimation, assess the cost effectiveness of each fire mitigation solution?



Which practice for wildfire mitigation do you expect to perform better in the future?



All comments/remarks in one slide

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