

# 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

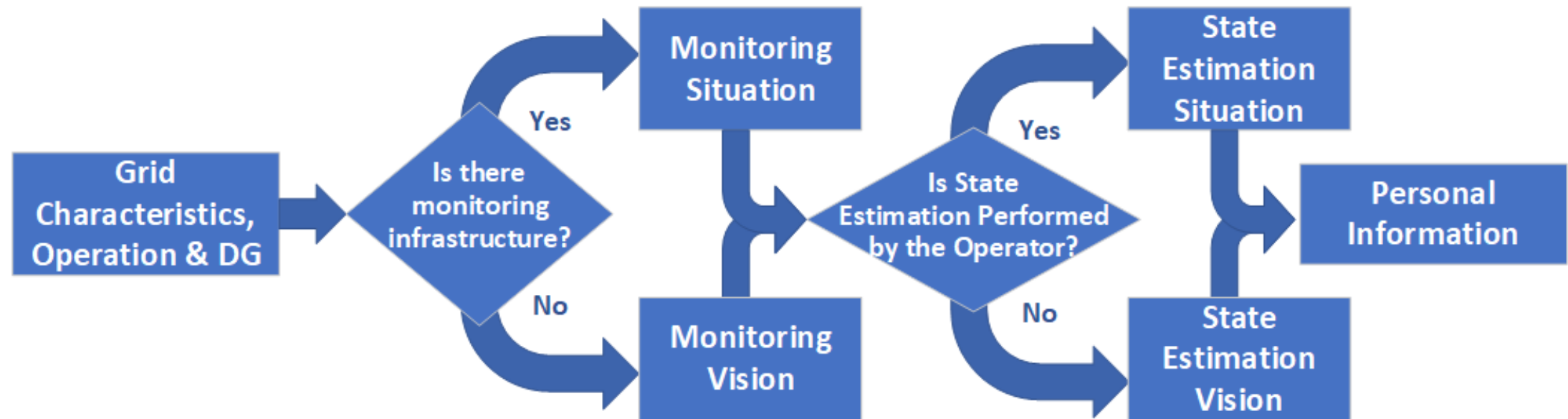
- The DEPsys (GEiMS) and NASPI questionnaires
- Structure of the GEiMS questionnaire to distribution system operators
  - Conclusions from the GEiMS questionnaire
- Structure of the NASPI questionnaires to distribution system operators
  - Conclusions from the NASPI questionnaire
- Path forward
- Appendix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



# 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?**

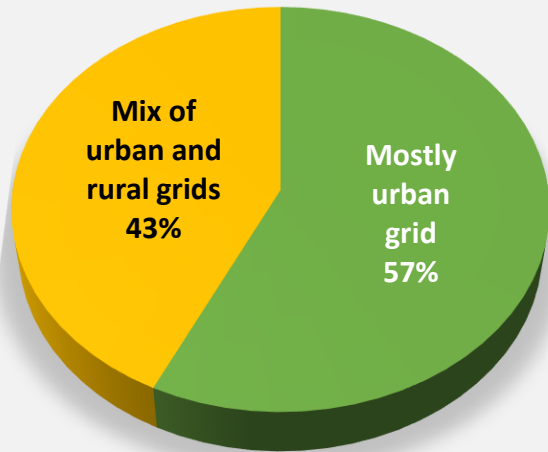
**Clarifications?**

**Comments?**

# Appendix

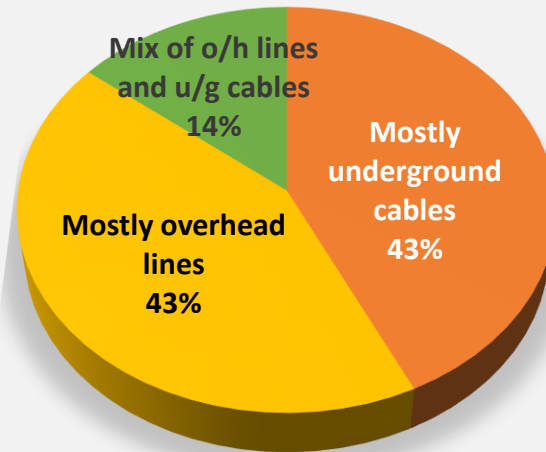
# Responses to GEiMS Qs – Grid & DG (1/4)

Which option describes better the distribution grid of the utility?



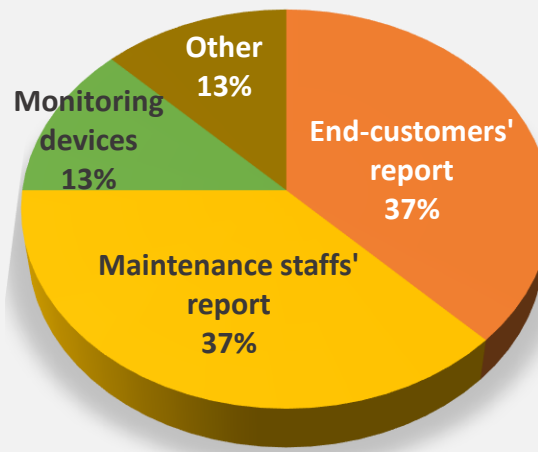
\* 6/13: N. A.

Which option characterizes better the utility's grid?



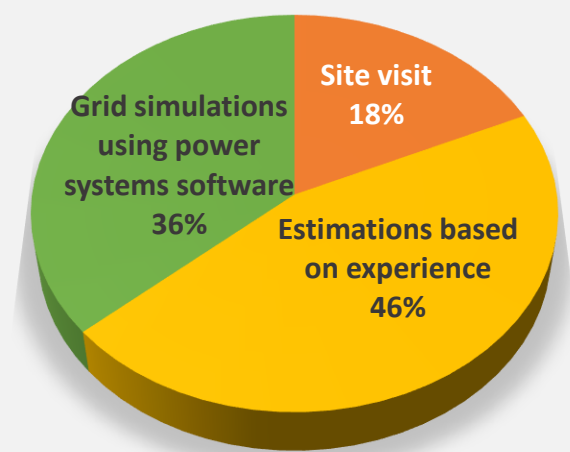
\* 6/13: N. A.

How has grid reliability been assessed?



\* 8/13: N. A.

How are grid reinforcement decisions taken?



\* 6/13: N. A.

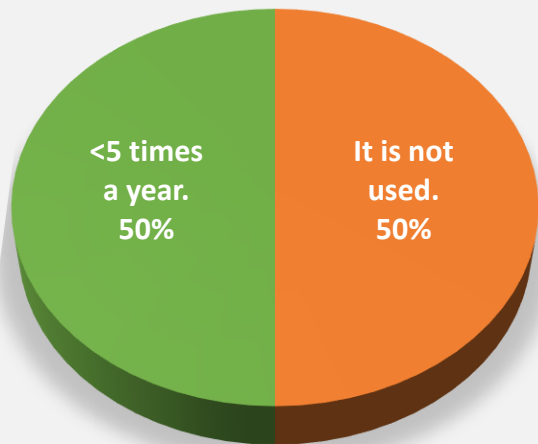
Low response



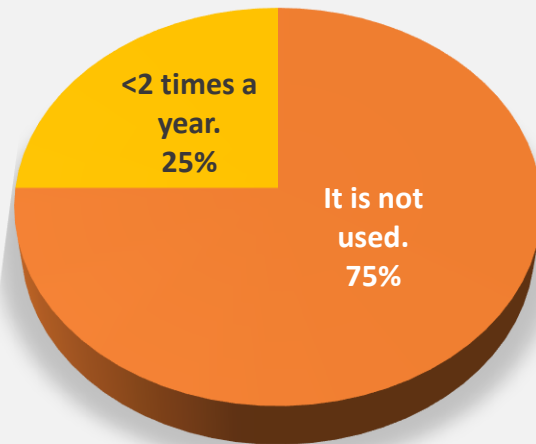
# Responses to GEiMS Qs – Grid & DG (2/4)

How frequently is system reconfiguration employed in average/year) for a...?

**MV feeder**



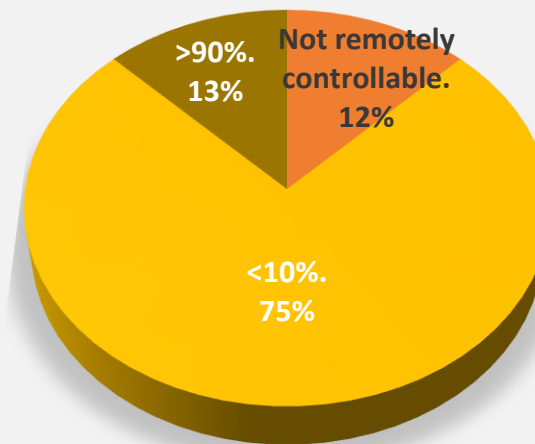
**LV feeder**



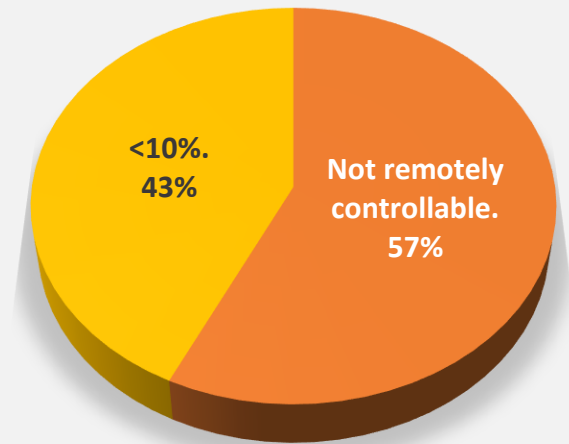
\* 9/13: N. A.

What percentage of... feeders are remotely controllable?

**MV feeder**



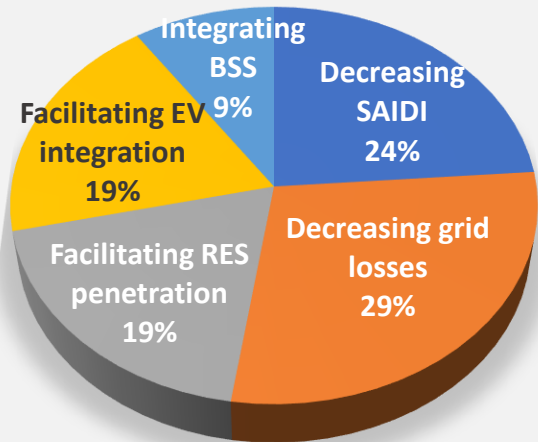
**LV feeder**



\* 6/13: N. A.

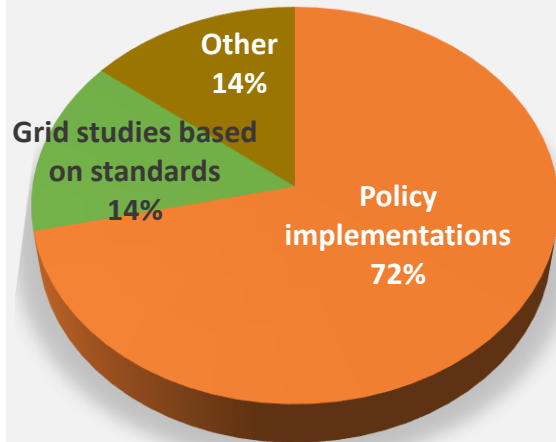
# Responses to GEiMS Qs – Grid & DG (3/4)

Which might be interesting for the utility in the future?



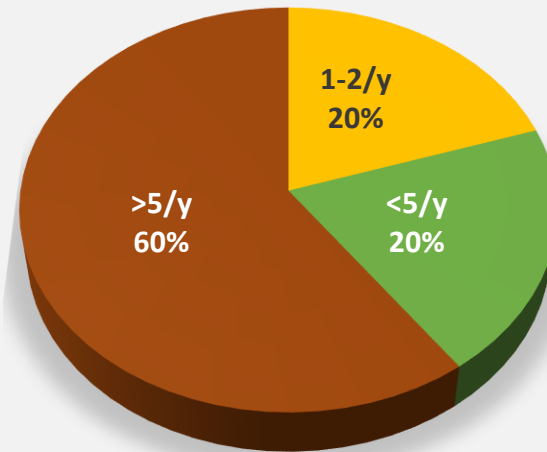
\* 6/14: N. A.

How is the maximum penetration of DG determined?



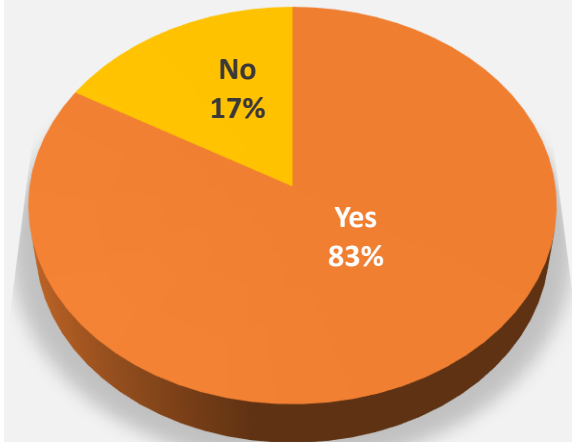
\* 7/14: N. A.

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%**

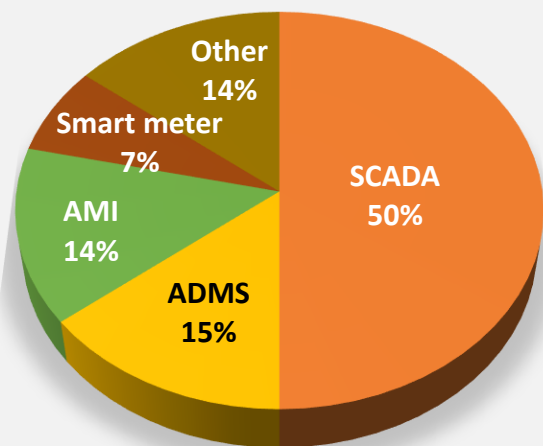
**Total installed capacity of DG?**

Average = **523±1215 MW**

Median = **26.5 MW**

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

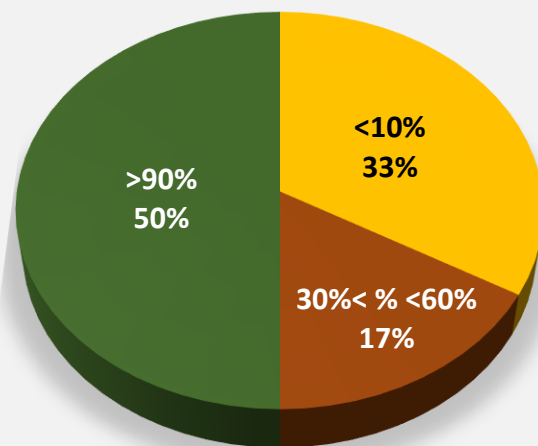
Which monitoring systems are used?



\* 4/13: N. A.

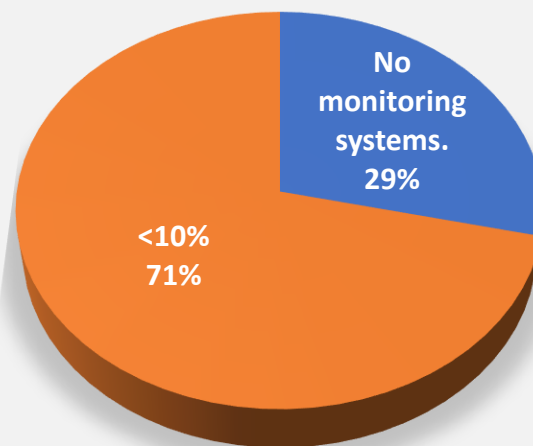
What percentage of ... are equipped with monitoring or smart meter systems?

**MV feeder**



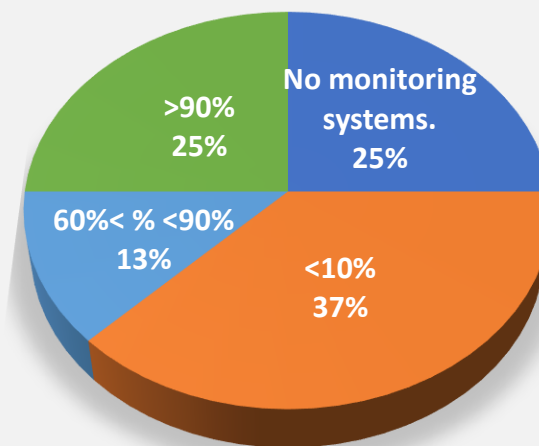
\* 7/13: N. A.

**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...

...store the measurement data locally?

Yes, 33%

No, 67%

...transmit the measurement data?

Yes, 100%

...provide visualization interface?

Yes, 100%

...provide data analysis toolbox?

Yes, 33%

No, 67%

...format data in CIM or IEC61968?

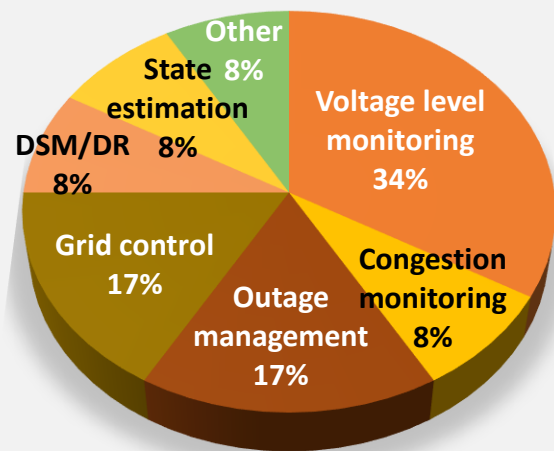
Yes, 50%

No, 50%

\* 10/14: N. A.

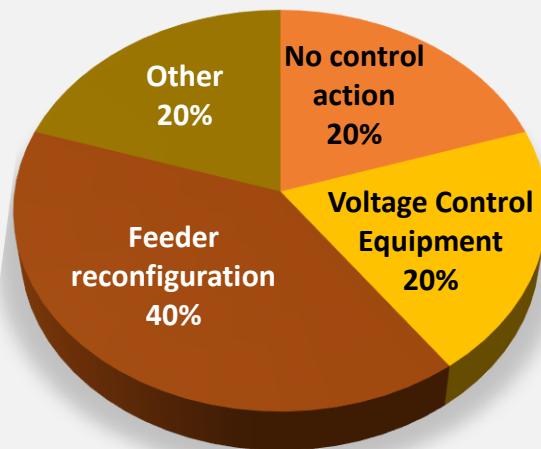
# Responses to GEiMS Qs – Monitoring Situation (3/3)

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 (...)

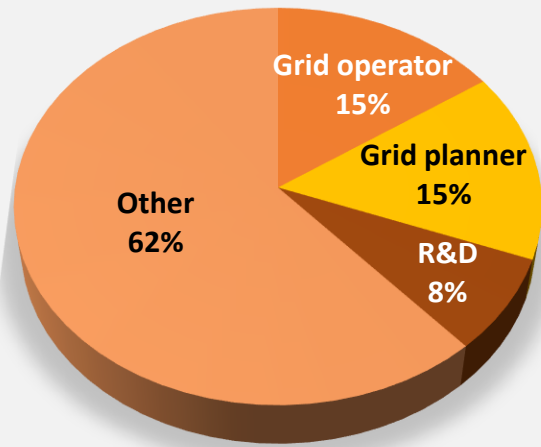
. . .

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

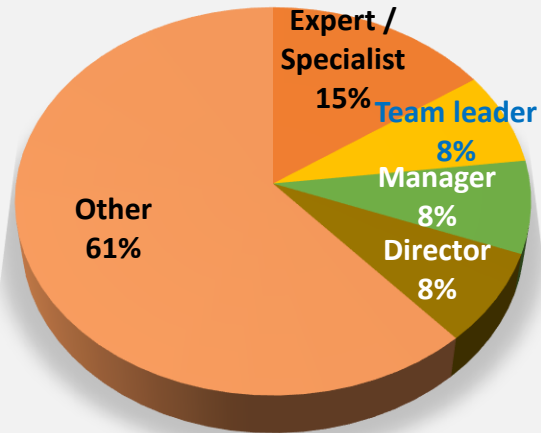


# Responses to GEiMS Qs – Survey ID

Which of the following best describes your role?



What is your seniority level?

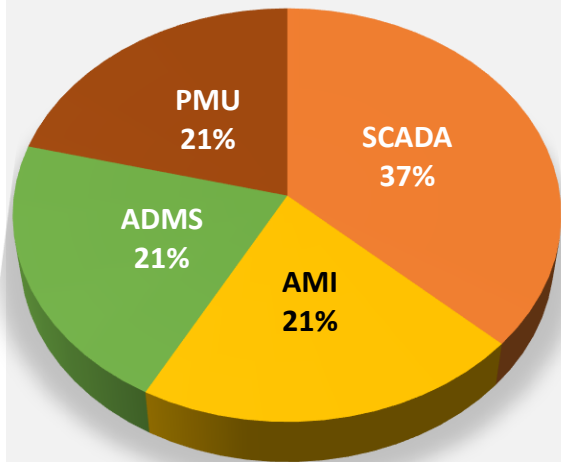


In which country is your organization active at?

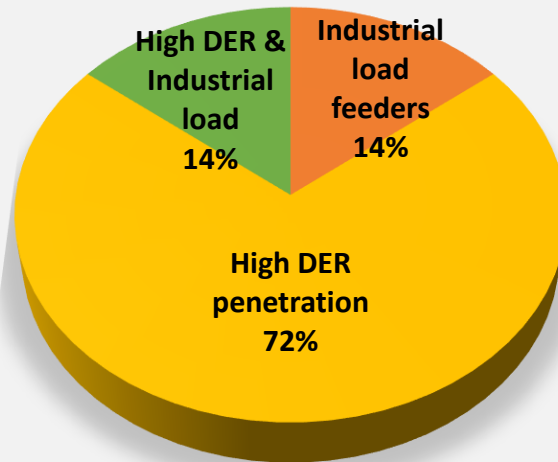
Answer: *Switzerland, Spain, Greece, Lithuania, Iran, Nigeria, Ecuador/Argentina, India*

# Responses to NASPI Qs (1/4)

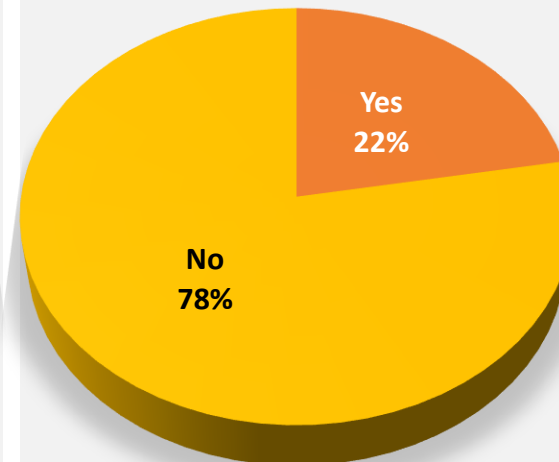
Which monitoring systems are used?



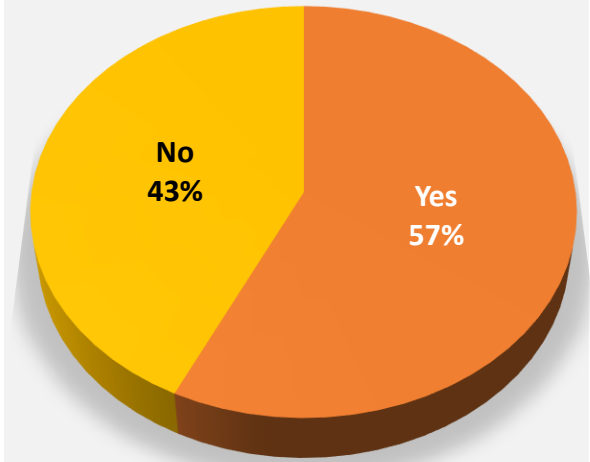
Which types of feeders are valuable to monitor?



Is State Estimation performed at the feeder?



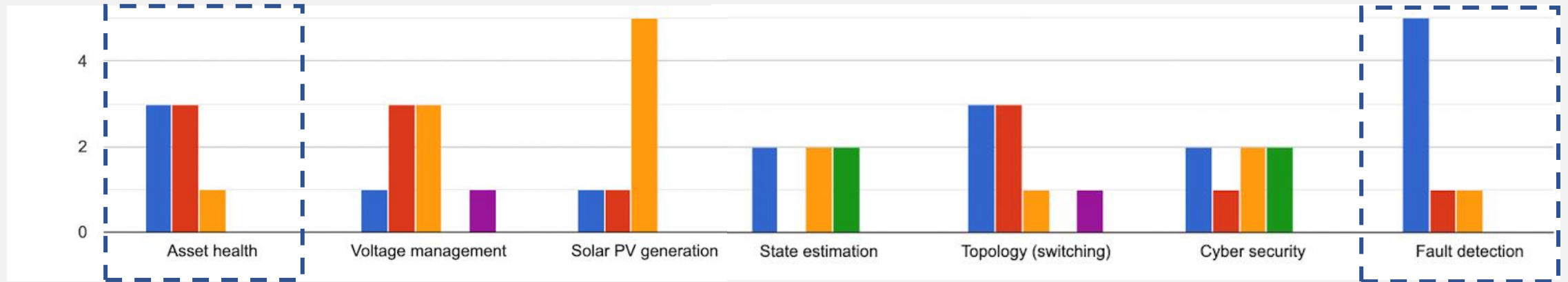
Are microgrid projects\* in the utility planning?



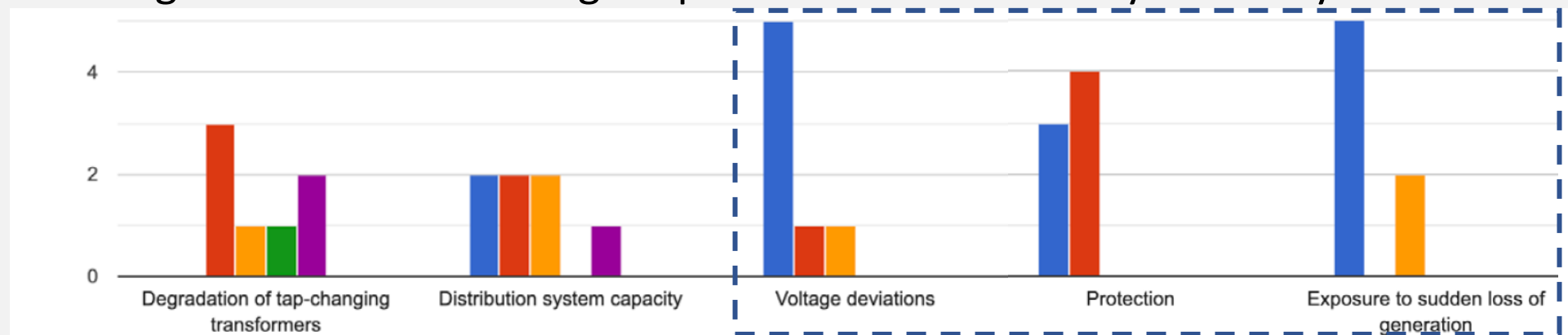
\* assuming use of PMUs

# Responses to NASPI Qs (2/4)

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

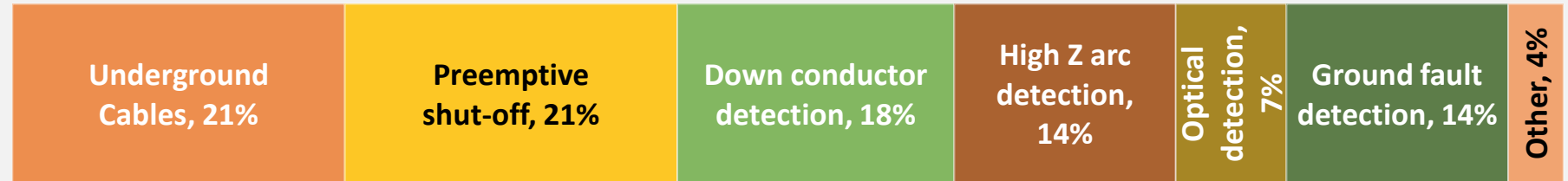


Rate the challenges associated with higher penetration of DER for your utility?

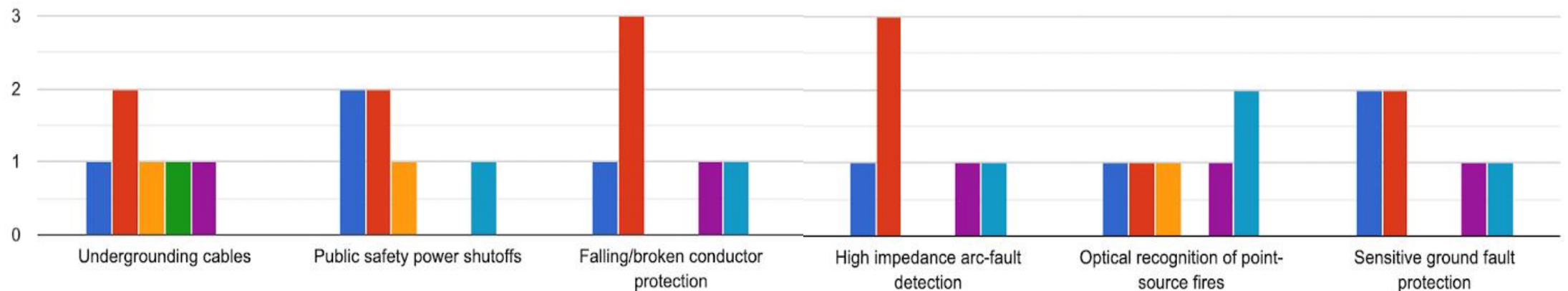


# Responses to NASPI Qs (3/4)

Which wildfire risk mitigation strategy does your utility use?

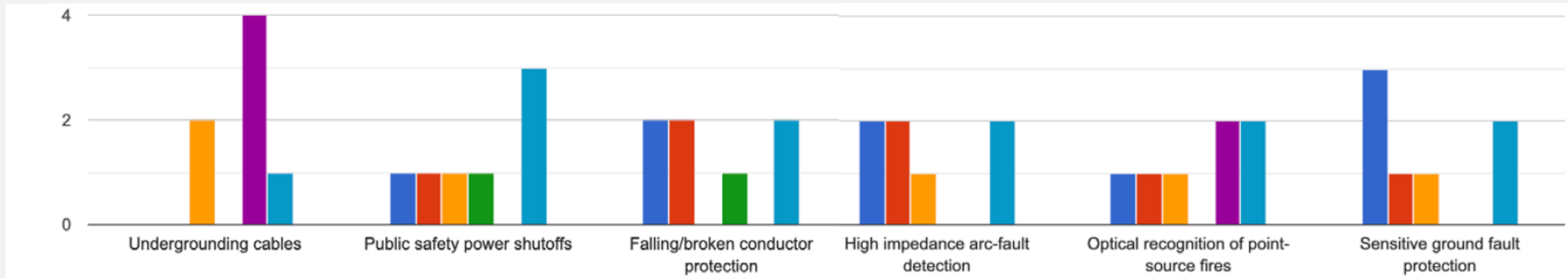


How important is each of the following wildfire mitigation strategies to your utility?

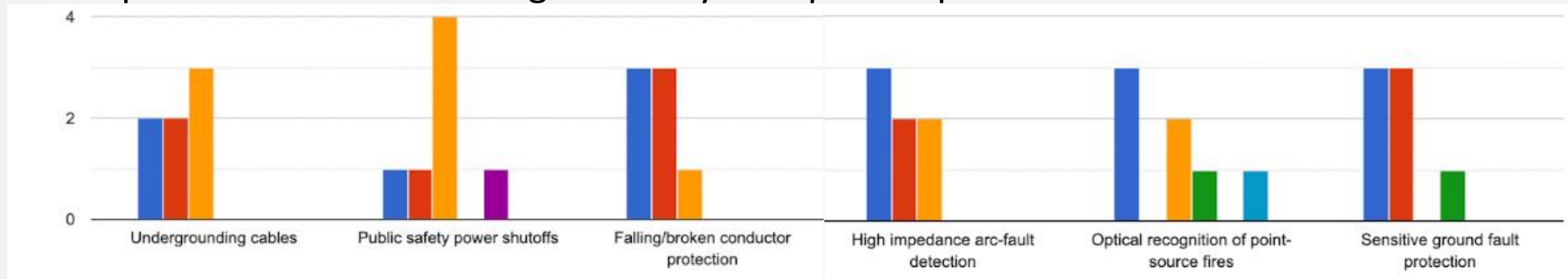


# Responses to NASPI Qs (4/4)

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

- Most operators manage at least some extent of urban grid
  - No monitoring for reliability or reinforcement; mostly reports/experience
  - Huge push for reducing SAIDIs
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