EPRI Technical Support for Integration of DG in NY

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Update on NYSERDA Projects

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Ongoing Technical Support for Integration

1. Harmonizing CESIR Processes in NY

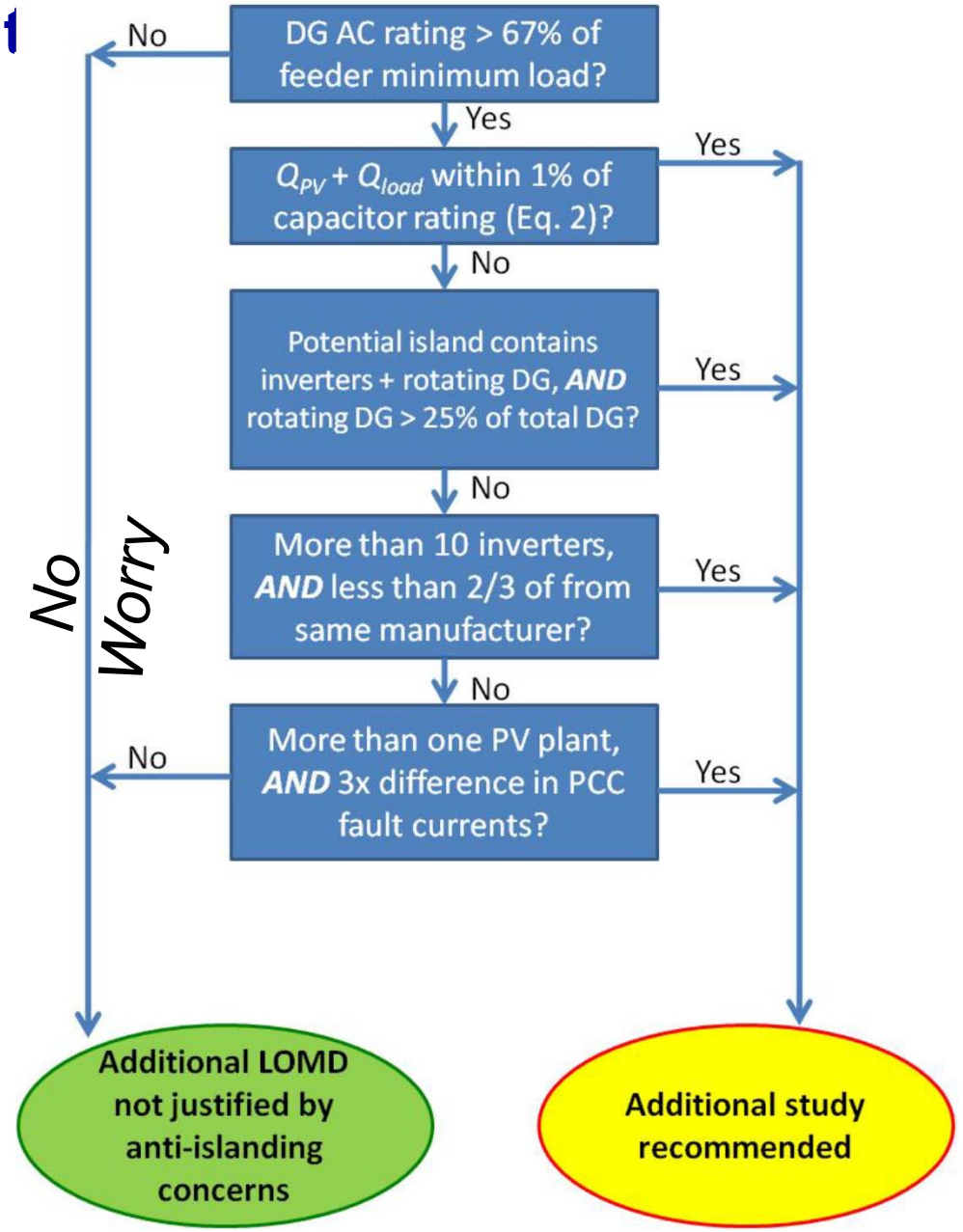
- Team/Scope: EPRI, NYSERDA, DPS and NY utilities, with input from outside NY, are identifying best practices for conducting technical reviews, applying new SIR screenings and conducting CESIR studies/reporting.
- Objective: Address consistency and alignment in light of evolving screening criteria, differences in distribution types, changing standards (1547), and progress on issues such as islanding, 3Vo and grounding.
- Results: by 12/31/2016

2. Updating Sandia Guide to Assess Islanding Risk (Sand2012-1365)

- Team/Scope: EPRI, NYDERDA, SNLA, NREL and industry will revise and update the March 2013 version of assessment guide and screens.
- Objective: Address questions about how the criteria was derived, methods to apply it and what needs changing with new 1547 and higher penetration.
- Results: by 3/31/2017

Current Sandia Assessment and Islanding Screen

- Scope and application
- Where islands form
- Cases to rule out
- Cases that need study
- Evaluation methodology and screen flow chart
- Mitigations tool box
- Smart inverters and anti-islanding methods
- Load characteristic effects
- Substation-level cases
- Future ADMS and coordination



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Next Steps and Schedule: Updating Sandia screening method (Sand2012-1365, of March 2013)

- Issues with existing method:
  - Needs more justification for using 2/3 min-load as first screen.
  - The 2/3 min-load conflicts with a number of current practices.
  - Screens that follow min-load require a lot of hard to get data.
  - Most utilities go from first screen to a risk of Islanding (ROI) study.
- Opportunities and role of an updated methods.
  - Clarify the assessment steps that reached a 2/3 min-load allowance
  - Address different power factor settings and trip limits
  - Address new voltage and frequency ride through requirement
  - Update on alternative methods for both on board and utility controlled anti islanding measures.
  - Describe how this industry practice may compliment utility specific

Harmonizing CESIR Processes in NY: Update

Done

- Connect existing SIR screens with study objectives and identified gaps.
- Reviewed sample CESIRs to understand current practices
  - Found very different criteria; approaches; and formatting of results

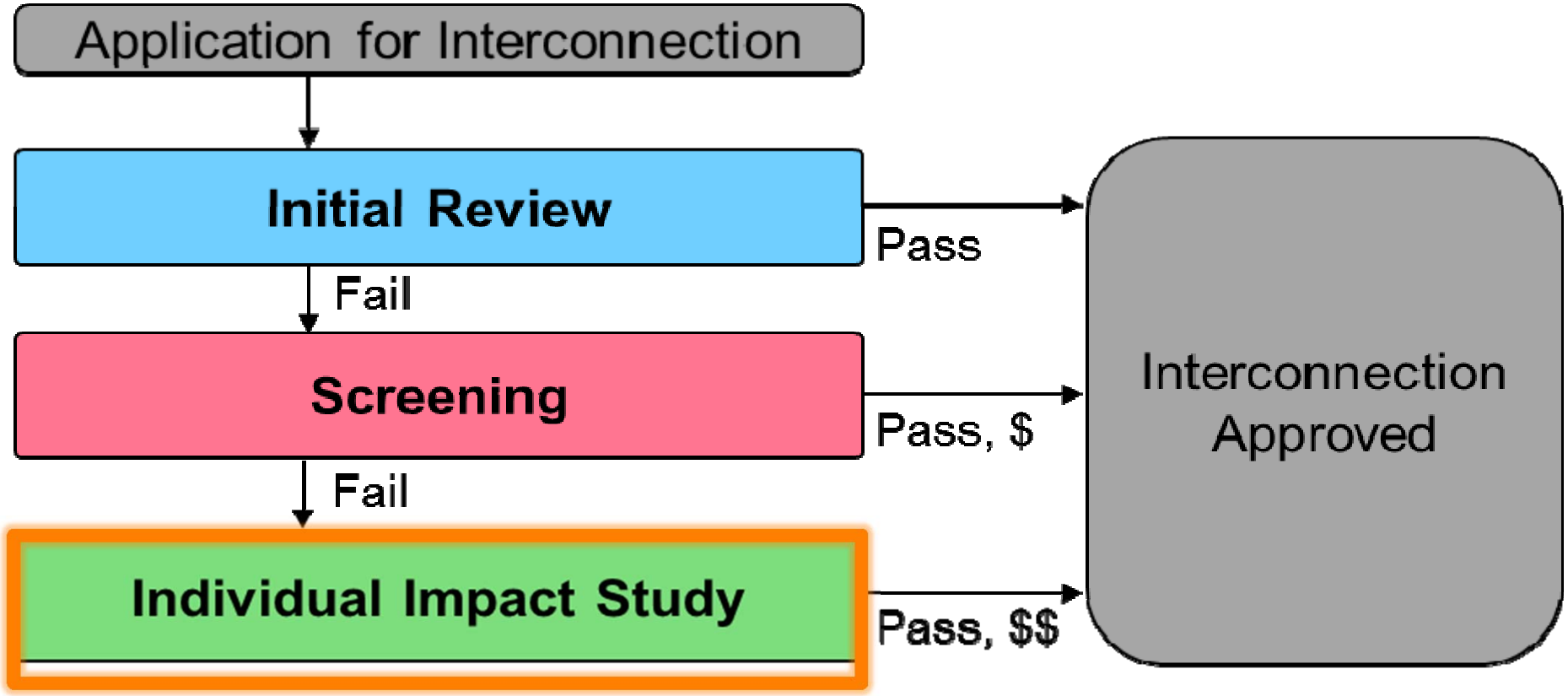
Doing

- Participating in the Interconnection Technical Working Group (ITWG)
- Providing related research, standards development and studies input
- Engaging NY utilities for input and coordination to development more consistent practices and guidelines for applying SIR

To Do

1. Work with utilities on current practices and to create consistent study approach for NY. Also consider practices outside NY. (finish Nov 15)
2. Draft guideline, provide for review and conduct a utility workshop on recommended technical review processes (late Nov, early Dec)
3. Include in future NYSERDA report addressing technical review in NY.

Expected flow of NY Interconnection Approval Process



Assumptions: Initial review is manual and utility unique, screening is based on NY SIR (March 2016), impact studies are CESIRs and may lead to Risk of Islanding (ROI) studies.

Harmonizing CESIR Processes in NY: Issues and Opportunities

- Issues with existing processes:
  - Wide range of study formats, narrative and length
  - New screening options in SIR not fully implemented
  - Queue challenges varies a lot.
- Opportunities for Harmonizing.
  - Draw best practices can be drawn from the current range of efforts in conducting and reporting on CESIRs.
  - Initiative by state and utility on issues such as the anti islanding requirements, 3Vo, network connections, grounding adds clarity.
  - More consistent application of SIR screens will come with use, plan to review and update based on emerging 1547, Sandia screening, etc.

Step in applying the SIR that lead to CESIR

Road to CESIR per SIR	Typical Implementation of NY Utility
Step 2 - Determine scope/nature, assign POC, offer pre-application report “like FERC” ($750)	Provide description of site-related limits and to identify if there are particular concerns with the specific site
Step 3 - Review of submittals, viability	Confirm if application complete per SIR appendix F
Step 3 - DG equipment verification	Check equipment per SIR appendixes B and C
Step 4 – SIR Screens A-F and verify Section II	Provide Table of Limits/Results
Step 4 – Letter report on A-F	Show results and estimated cost to continue
Step 4 – Offer supplemental screening H-J option	Confirm willingness to pay ($2,500) and provide report
Step 4 – Commit to CESIR Study scope and provide cost estimate?	Provided based on SIR, screening results and/or utility-feeder specific standards or other
Step 6 – Part I of CESIR	Review/disclose impacts expected to utility system and that need to be studied in this application case
Step 6 – Part II of CESIR (	Detailed review and explanation of proposed system compliance with criterion in the SIR

Can SIR screens help with a CESIR?

1. Determine if reverse power problems; for network, (currently in SIR, screen A) and for radial (screen E)
2. Test for possibility of islanding (screens B, E)
3. Check for thermal overloads, local service (C) and feeder (G)
4. Check for fault-related overvoltage potential
   - Coefficient of Grounding on low-side of xformer, (screen D)
   - GFO, 3Vo on high-side of xformer (not covered in SIR)
   - Transformer connection compatibility (not covered in SIR)
5. Check steady state voltage limit and step changes (screen F)
6. Confirm protection coordination, fault current compatibility, breaker reach, and device ratings (not covered in SIR)

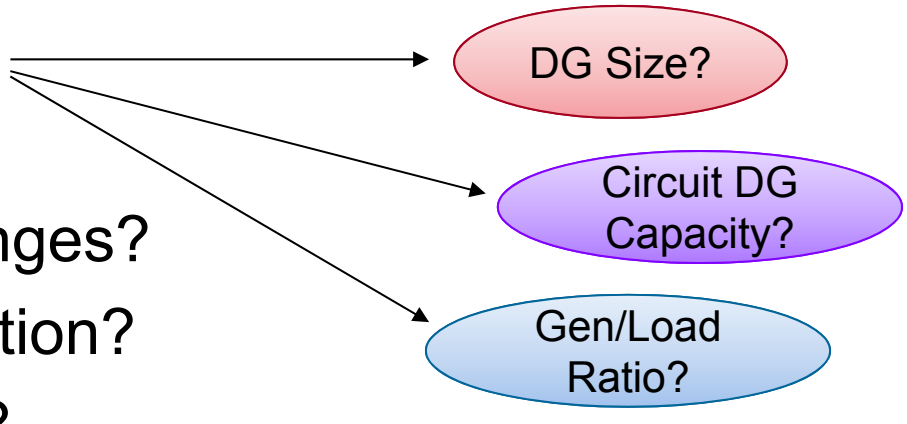
Notes: flicker and harmonics are site depend, usually not be pre-installation study objectives. A short circuit ratio may be considered as criterion.

CESIR Technical Analysis Method and Areas Included in Studies (with SIR screen references)

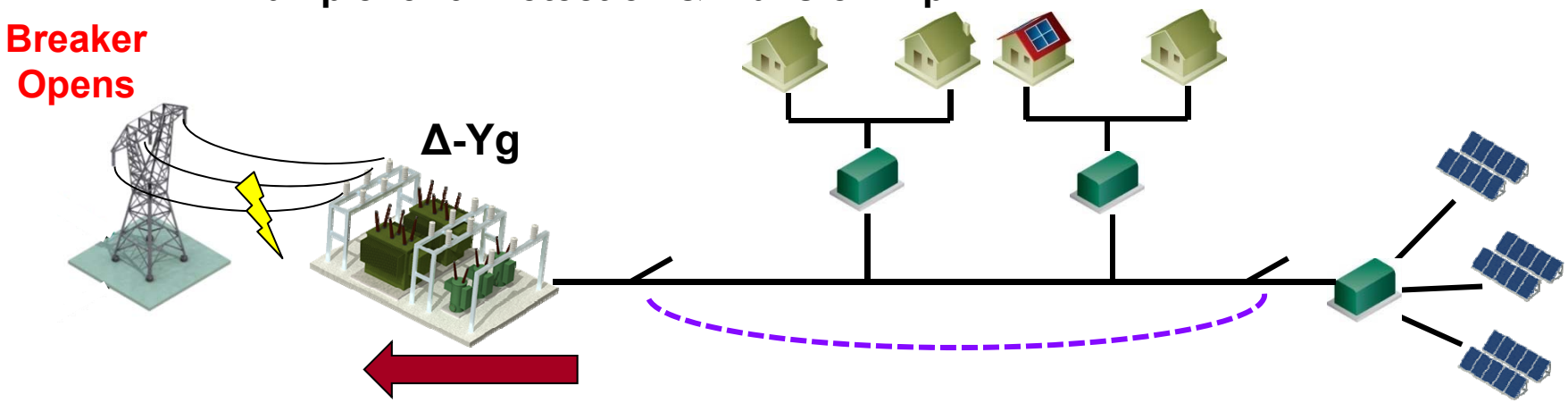
Identify Analytical Methods used	Ratios, shorthand calculations, distribution loadflow program
Voltage Analysis/Predictions (SIR Screens E, F, G)	Power related overvoltage
	Voltage step change
	Imbalance voltage
	Regulating Equpment Operations
Thermal (screen C)	Equipment Rating Exceeded
Thermal	Demand Masking
Protection (Screens E, then G, perhaps I, also Sandia method may be applied and sometimes ROI additional study)	Additional Fault Current
	Coordination
	Anti-Islanding (vs. load on feeder section)
	3V0/Substation
	Backfeed/Unidirectional Relaying
(Screen D)	GFO/Effective Grounding
Power Quality (Screen H)	Resonance Scan? (Harmonics)
	Flicker prediction or contingency
	Distortion contingency

Protection and Control Requirements

- Current Options:
  - In-line recloser?
  - LTC controller changes?
  - Transfer-trip protection?
  - 3Vo OV protection?



Example: 3V0 Protection & Transfer Trip

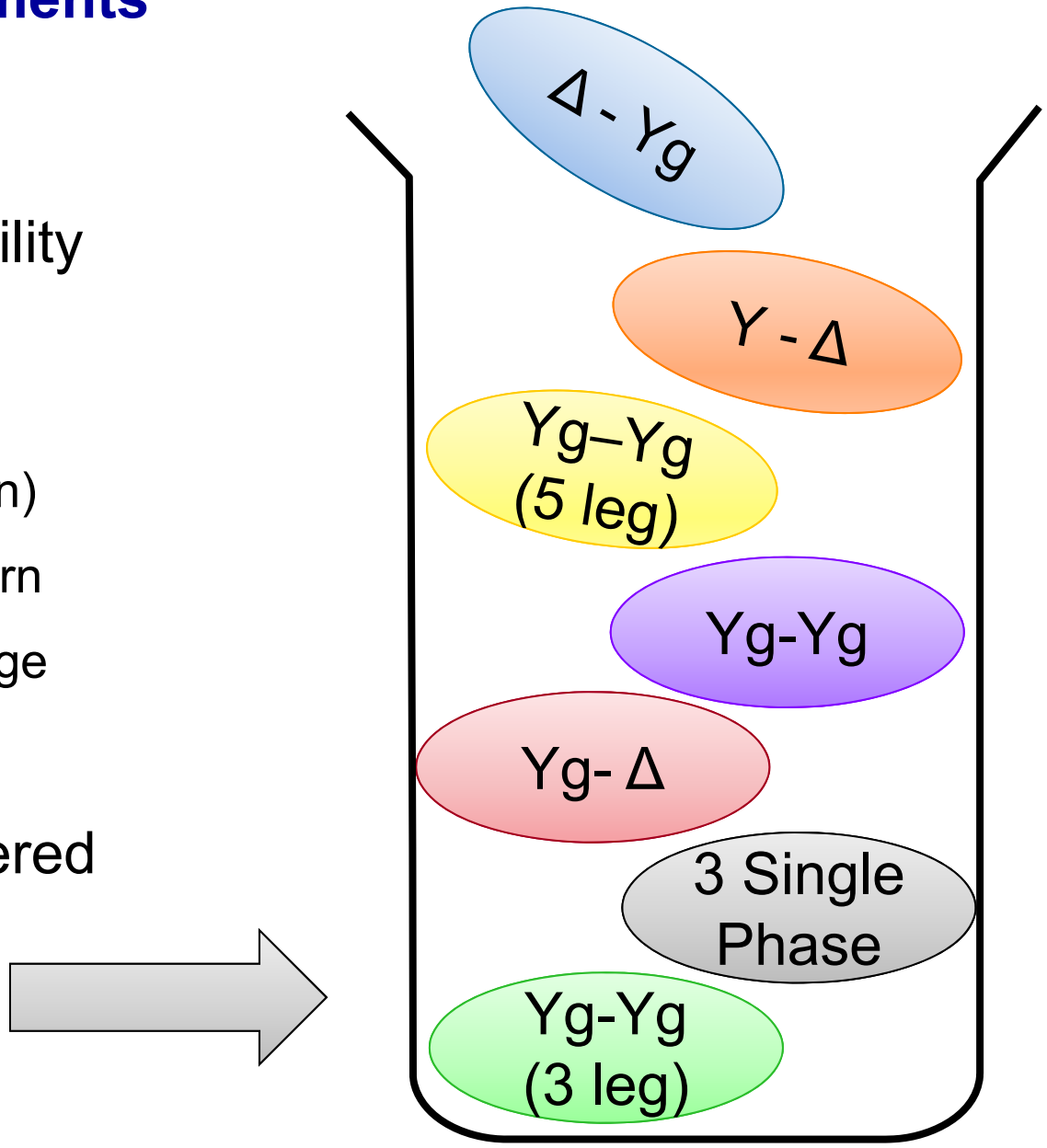


Transformer Requirements

- Typical Issues with transformer compatibility
  - Open phase detection
  - Additional fault current (protection coordination)
  - Ferroresonance concern
  - Ground-fault overvoltage

- Options to be considered

  with several different remedies, what is the best prescription?



Thanks for your input!

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