



**MICROGRID
KNOWLEDGE**

CONFERENCE SERIES

Microgrid 2019
CONFERENCE



Electrical Feasibility Studies for Microgrids

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The logo for the Microgrid 2019 Conference. It consists of the text "Microgrid 2019" in a bold, white, sans-serif font, with "CONFERENCE" in a smaller, yellow, sans-serif font below it. The entire text is set against a dark red rectangular background.

Introduction

So, you want to create a microgrid...



Introduction

- Technical questions needed to determine feasibility
- Answers may uncover “show stoppers”, or
- Your plan is too ambitious, or
- Perhaps not ambitious enough!



Operational Requirements

- Is the ideal sequence of operations between grid-connected and island mode possible?
 - Bump-less transition needed?
 - Can an unintentional island condition be identified fast enough to:
 - Change generation control modes?
 - Initiate load shedding?



Operational Requirements



- If not bump-less, can the system black start?
 - Stored energy for system startup
 - Power to control systems to initiate startup and control

System Isolation Points

- Points of isolation required?
 - Circuit breakers and switches
 - Define and bound the extent of the microgrid
 - Isolate parts of the microgrid during startup
 - Load shedding
 - Partition the system into smaller protection zones

**ISOLATION
POINT**

Protection and Control Considerations

- How are protection and control systems affected?
 - Bi-directional power flow
 - Fault current distribution and sources (grid-connected and islanded)



Protection and Control Considerations

- Relative magnitude of fault currents
 - Arc flash hazard analysis
- Ground fault sources and location



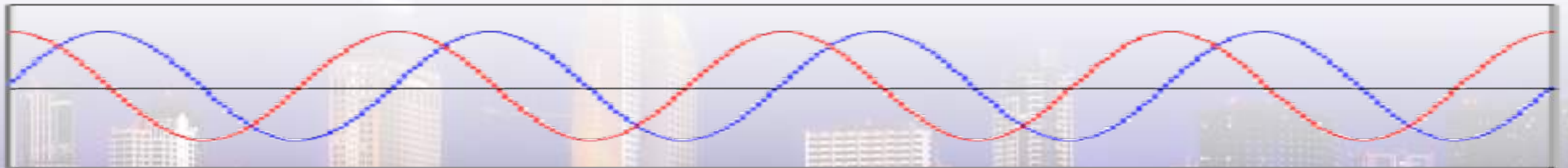
Power Quality

- Does islanded generation provide sufficient power quality?
 - Voltage sags and swells
 - Reactive power support
 - System reaction to deviations from nominal frequency



Power Quality

- Effects of power quality deviations on protection and control systems?
 - Do voltage or frequency-based protection elements need to be adjusted to be less stringent during islanded conditions?
- Does generation produce or exacerbate harmonics?



Load Energization

- Can transformers energize and motors start while islanded?
 - Power to start large motor loads and/or energize transformers in the system?
 - Additional equipment needed?

Ground Source Availability

- Available to all parts of the system during all modes of operation?
- Additional ground sources needed?
 - Where?
 - How does location affect system protection, operations, and safety?



Equipment Evaluations

- What is intrinsic about the design of the infrastructure that must be evaluated for performance in the system?
- Are existing equipment ratings sufficient for their new role in the microgrid?
 - Switches, circuit breakers, transformers, cables and conductors, switchgear ratings, etc.



Questions?



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