Implementing Nanogrid into the Critical Facility- Improving Reliability, Efficiency, and Future Adaptability

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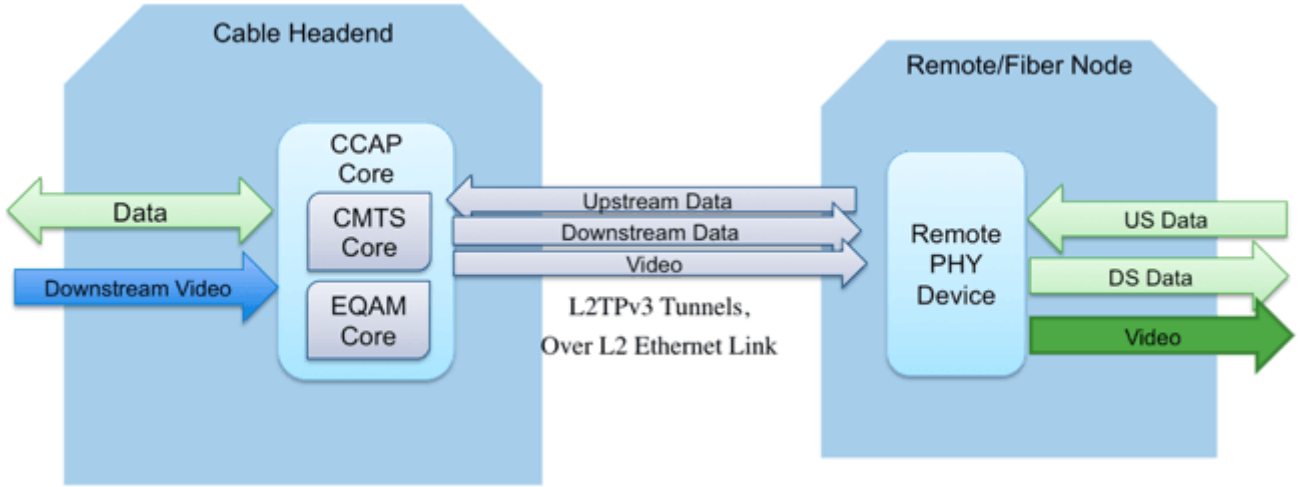
Evolving Critical Infrastructure Technologies

- As cable broadband networks evolve to meet capacity and performance expectations – pushing legacy functions outward toward the edge – critical facilities are challenged to:
  - Increase reliability
  - Meet sustainability and operational efficiency goals

- "**Modern equipment densities can overheat an environment in less than an hour without adequate cooling, making any additional installed capacity unusable**." – SCTE 184 (2022)



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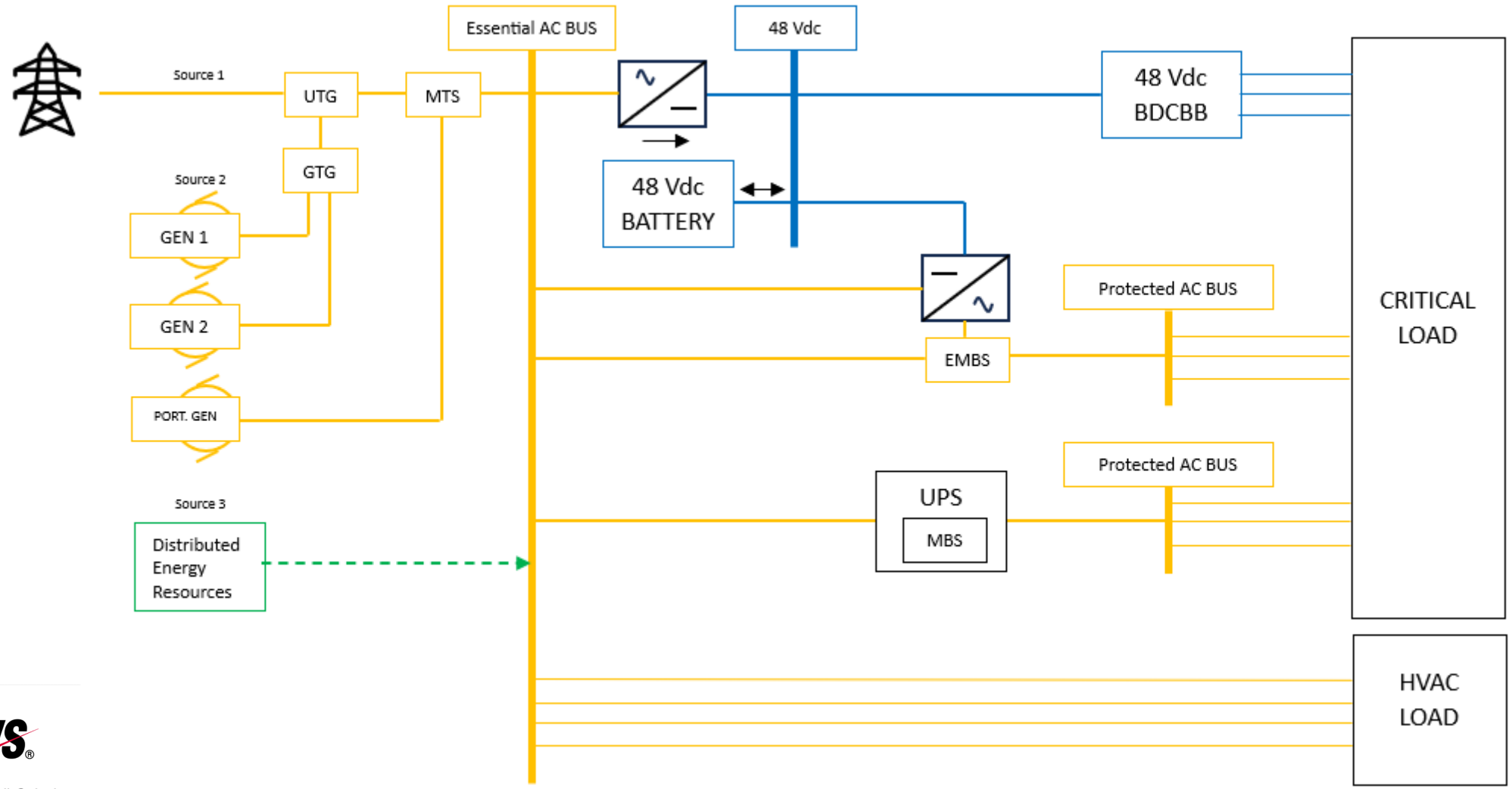
Typical Facility



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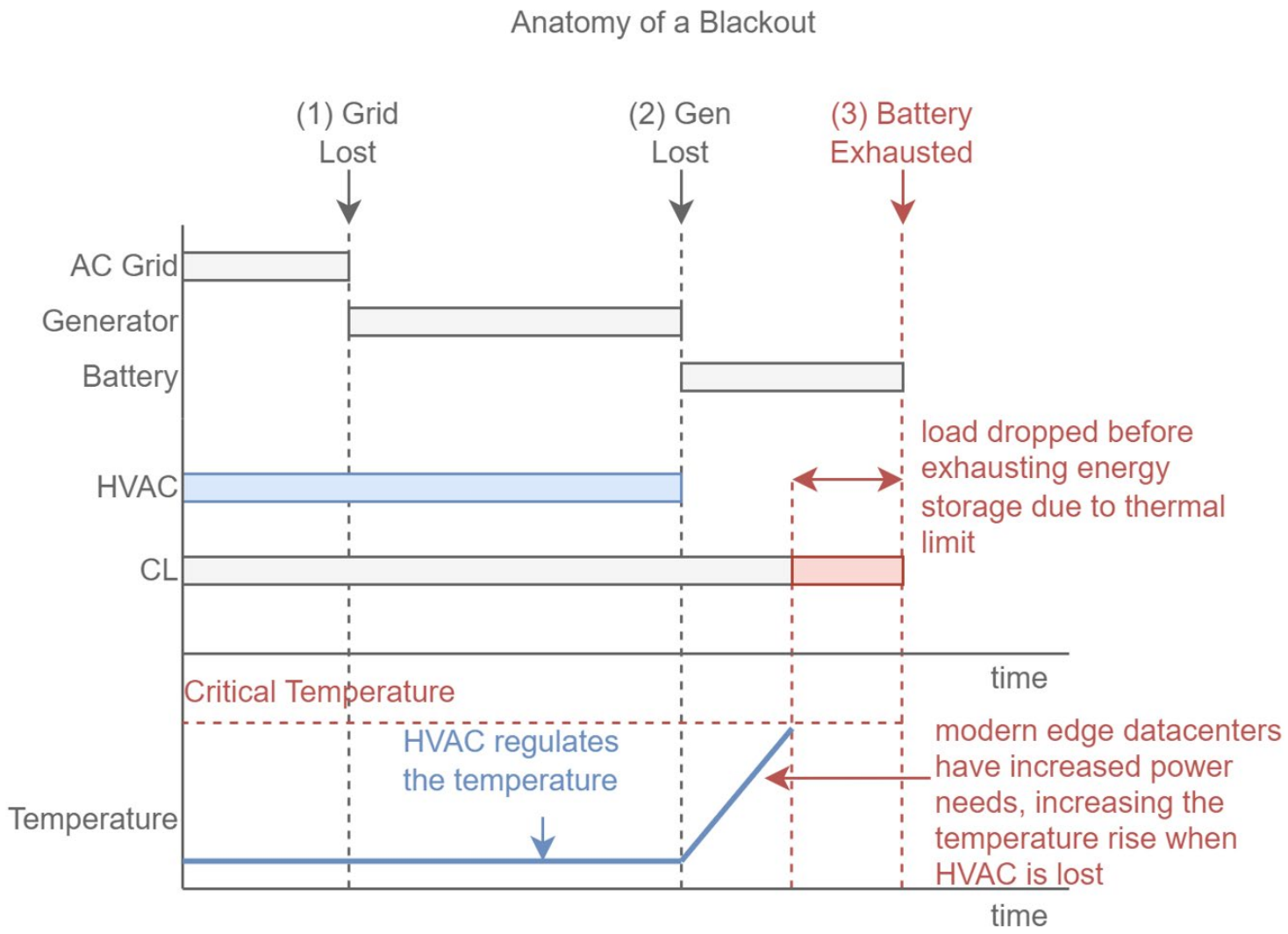
Anatomy of a Blackout



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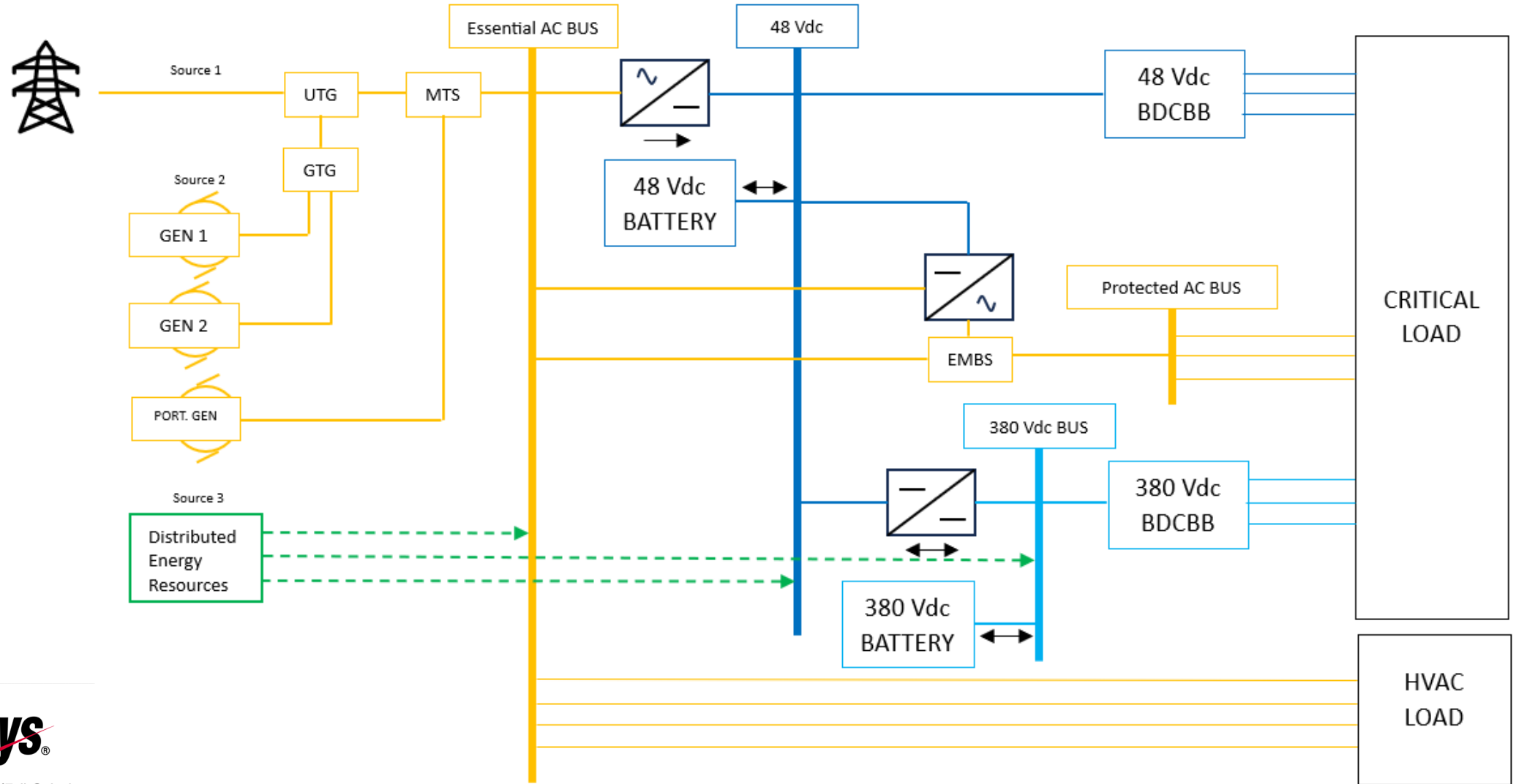
Adding 380 VDC Transition (Convert 48V to 380V)



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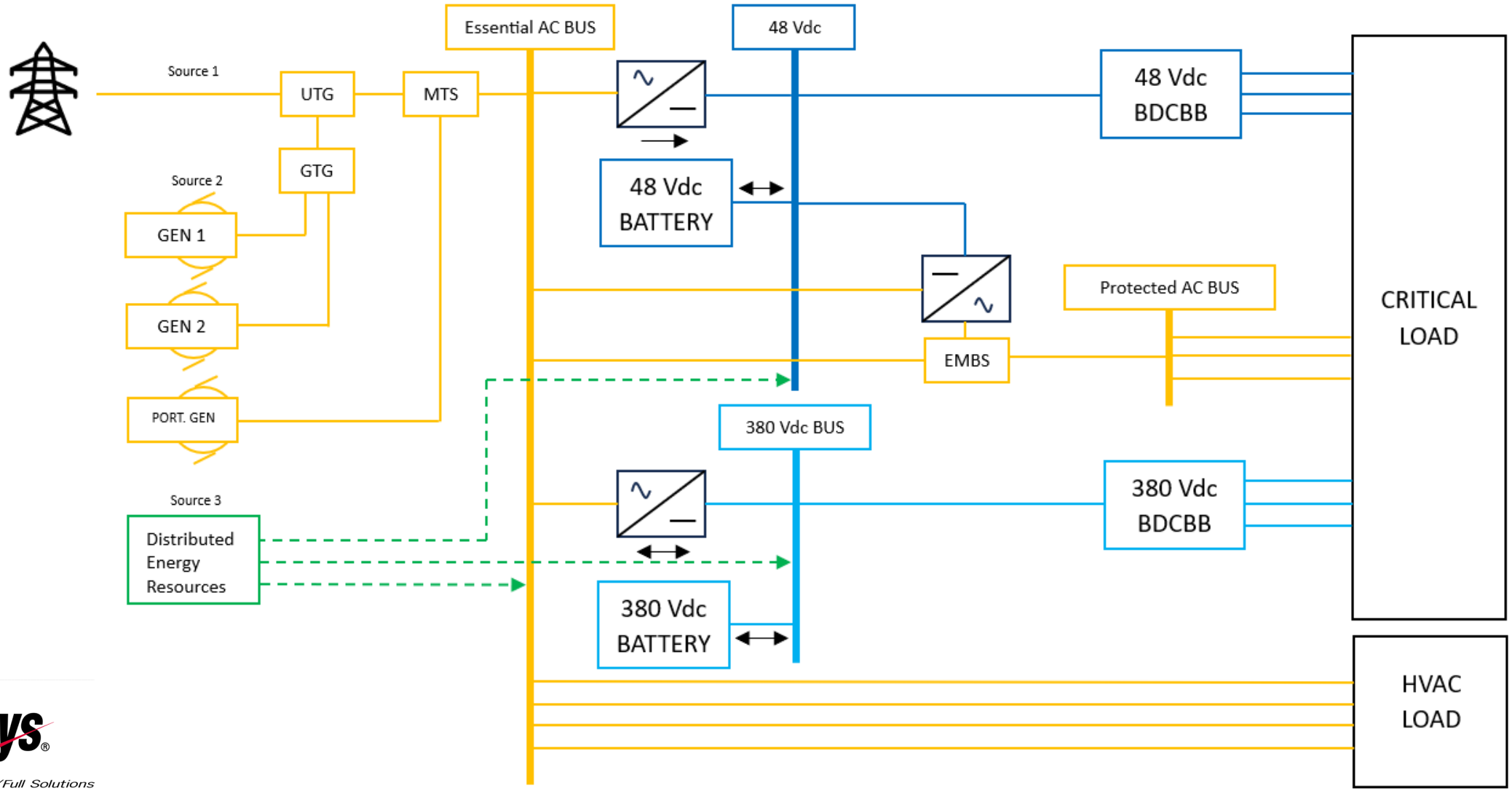
380 VDC Transition (Convert AC to 380Vdc)



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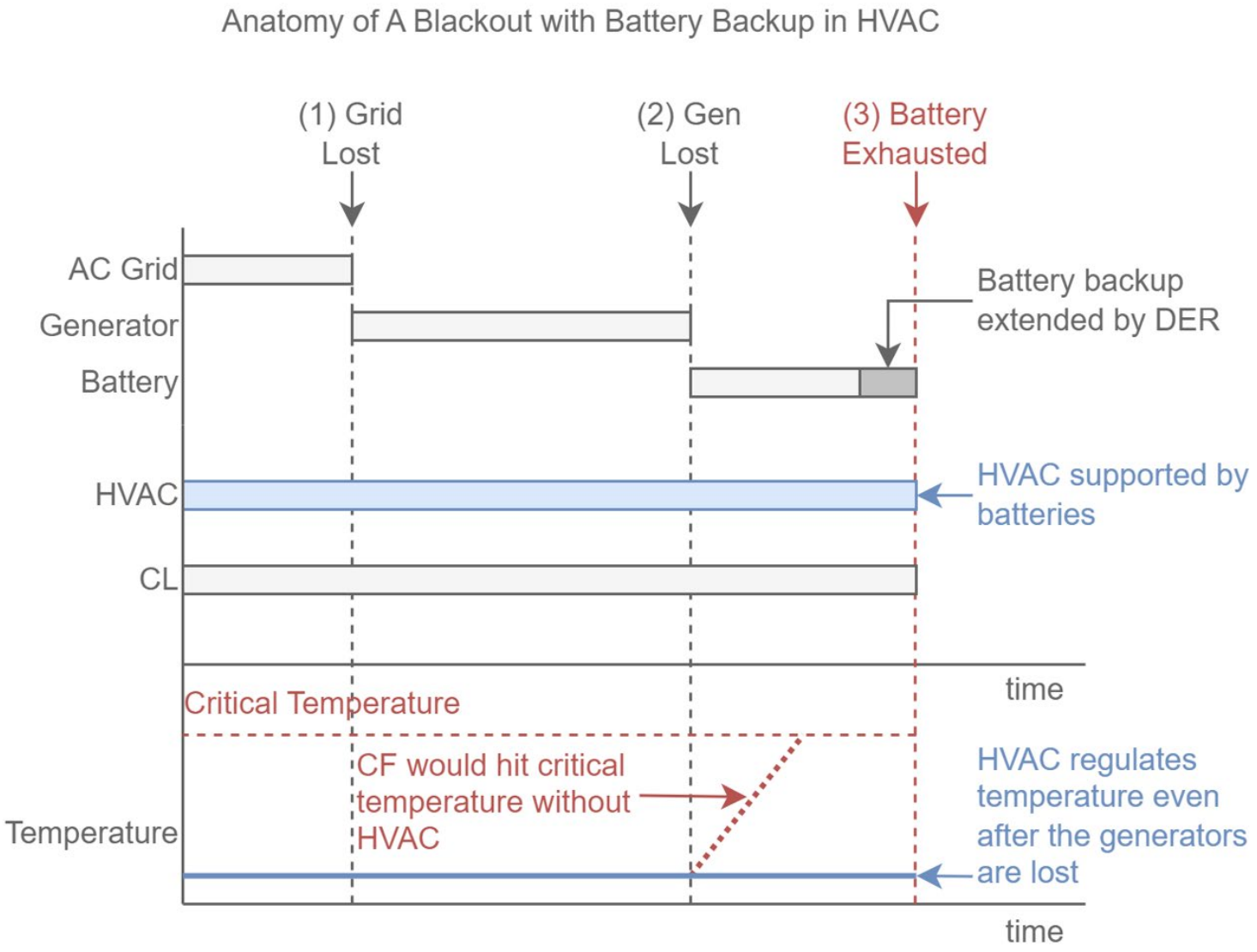
Anatomy of a Blackout with Battery Backup in HVAC



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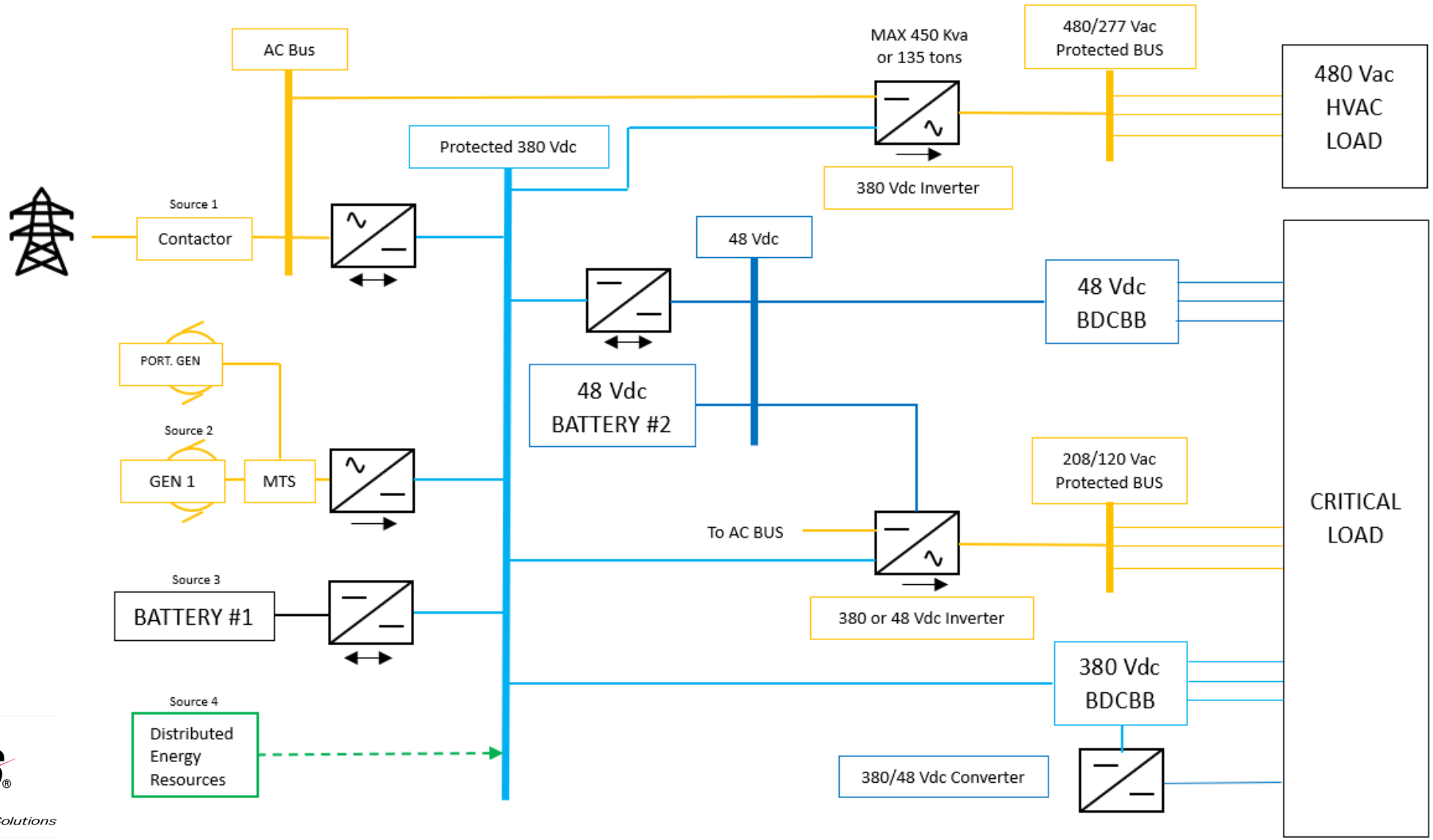

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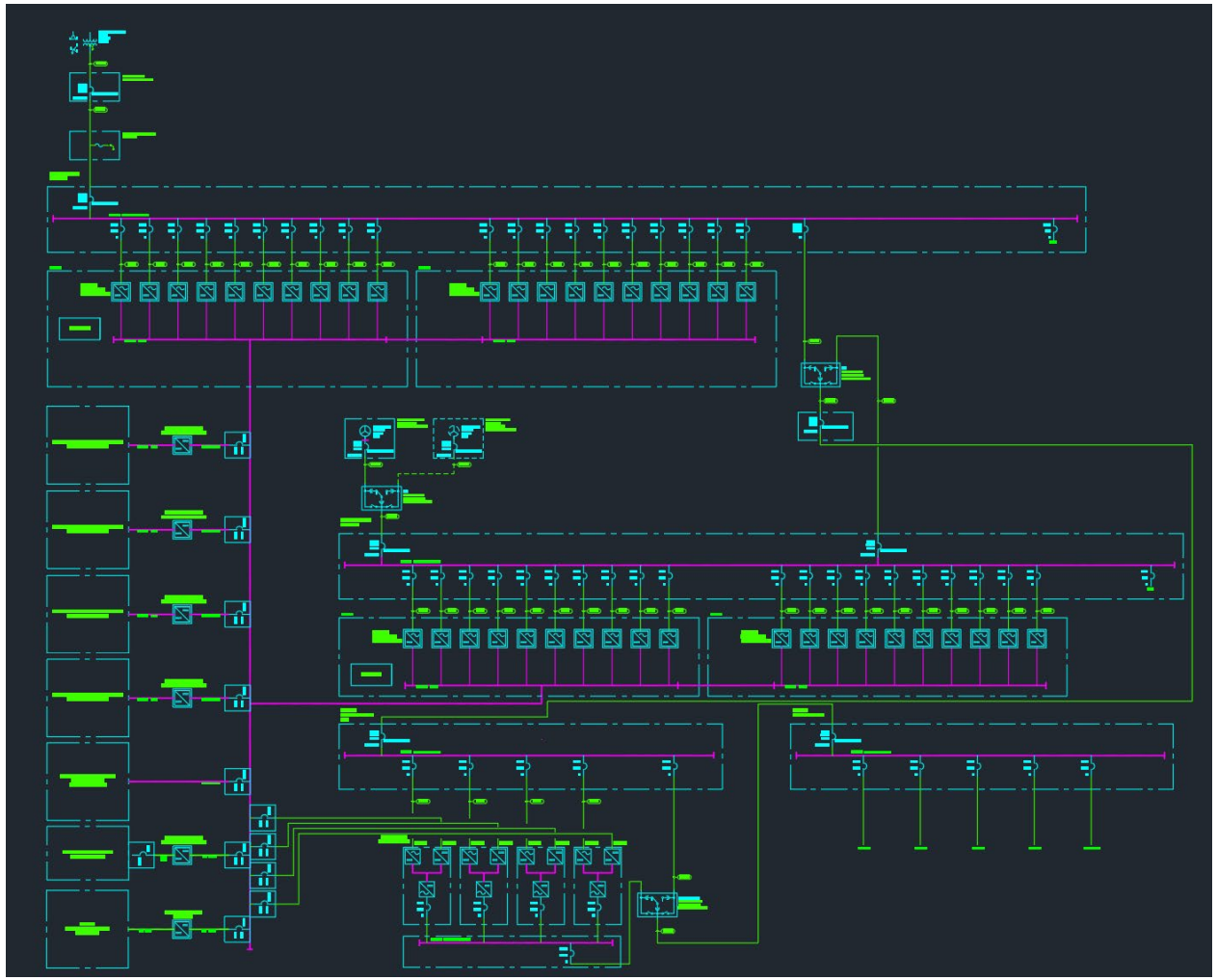

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Conclusions

1. The existing infrastructure reliability is at risk due to its existing and proposed increases in power and cooling requirements.

2. Increasing reliability requires a new facility nanogrid architecture which include:
    - Utilizing protected 380VDC vs standard AC infrastructure allows the HVAC and critical loads to be supported from multiple sources.
    - Bi-Directional energy converters allow for multiple energy distribution pathways
    - Enables multiple Battery Energy Storage Systems and Distributed Energy Resources to meet sustainability and efficiency goals.