S&C POWER ELECTRONICS PORTFOLIO, ISSUES AND OPPORTUNITIES IN THE DISTRIBUTION SYSTEM

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DISTRIBUTION AUTOMATION DEVICES

• Reactive current control
  – **DSTATCOM**: in modules of 1.25 MVar

• Storage Management Technology
  – **SMS** (Storage Management System)
    • Utility/Substation: **1 MW** – 20 MW
    • Commercial/Industrial: **250 kW** – 500 kW
  – **CES** (Community Energy Storage)
    • Grid-edge: **25 kW** single-phase
DSTATCOM
100-MW ONTARIO SOLAR FARM
SANTA RITA JAIL LAYOUT
SANTA RITA JAIL – DUBLIN, CA – 2MW SMS IN 27FT CONTAINER

• Energy storage provides system backbone:
  – Remains in Voltage Source mode for instant islanding
  – Controls via patented frequency droop and voltage droop algorithm
SMS – AMEREN MICROGRID
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Ameren Microgrid

- Substation
- RC
- 1MVV Customers
- 50kW Research
- Microgrid
- Switchgear
- INV
- Solar
- Wind
- Battery
- INV
- CB
- Gen

RC: Redloser
INV: Inverter
CB: Circuit Breaker
SMS – AMEREN MICROGRID
SMS – AMEREN MICROGRID
AMEREN MICROGRID - ISSUES

- Protection/Coordination
- System Integration
- Logic
  - Transitions
  - Black start
Si BASED POWER ELECTRONICS

CHALLENGES

1. Heat
   • Low Switching frequency ≈ 3-5kHz
   • Efficiency (>90%)

2. Size
   • Filters
   • Transformer (Vdc link ≈ 800 V)

3. Speed (UPS applications)