

# **U.S. DOE-Industry Workshop on The Role of Residential AC in Contributing to Fault-Induced Delayed Voltage Recovery**

Workshop Wrap-up Summary and  
Closing Discussion Comments

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# Panel Session #1

- FIDVR - a new acronym!
- Situation dependent: high system loads, large contribution by induction motors (AC) AND a fault
- System solutions expensive, inevitable, and can only limit spread
- Under-voltage load shedding represents a safety net for the system (some customers will still lose power)
- Uncontrolled cascading voltage collapse must be avoided
- Customer ultimately pays for (un)reliability

# Panel Session #2

- Dynamic phenomena, not appropriate to study with steady-state models
- Current state-of-knowledge adequate to justify utility actions/investments
- There remain important gaps in our understanding that are being addressed by significant on-going research activities – focus on data (motor properties; load composition) more so than models, themselves
- Can't stop stalling completely with supply-side actions; can only accelerate recovery – longer recovery = greater risk

# Panel Session #3

- Measurements confirm stalling voltage increases as function of temperature; even higher stalling voltage for overcharged units -> 2x increase in real power; 7x increase in reactive power
- Retrofit devices expensive: capital cost \$80-100 + \$120 installation cost – currently available models may not be fully effective in addressing issue
- Currently, protection based on thermal criteria (3-15 sec); overcharge or loss of coolant add time to trip – but cannot trip faster on thermal criteria
- Electronics-based solutions, which can trip faster, are currently used in larger machines
- Higher current during restart is a secondary consideration – can be addressed with existing solutions
- Short-cycle controls can trip rapidly, but are “insulated” from line voltages

# Issues

- System- vs. component-level solutions
- System topology – location/amount  
static/dynamic Vars
- Component: Retrofit vs. new units –  
timing/cost
- Interaction with energy efficiency stds.
- National vs. regional approaches

# Summary of Closing Workshop Discussions

- Avoid unintended consequences
  - We also need to manage over-voltage after AC units trip
  - And there could be transient stability concerns following large load drops
  - Still, there is adequate time to study and address these issues
- National solutions are preferable
  - Standards should focus on specifying “what”; let manufacturers determine “how”
  - Goal is to minimize total societal cost of all solutions (supply-side + demand-side), taken together – again, customer pays, ultimately, one way or the other
  - Energy-efficiency standards, per se, cannot be blamed for causing the problem; some designs, in fact, lower risks to the system
- Continue the dialog
  - Sharing models, information, points of view is essential for moving forward