

Special MIC Meeting – DER

Small DER Aggregation Example

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Presented by:

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A.F.Mensah, Inc.

Outline

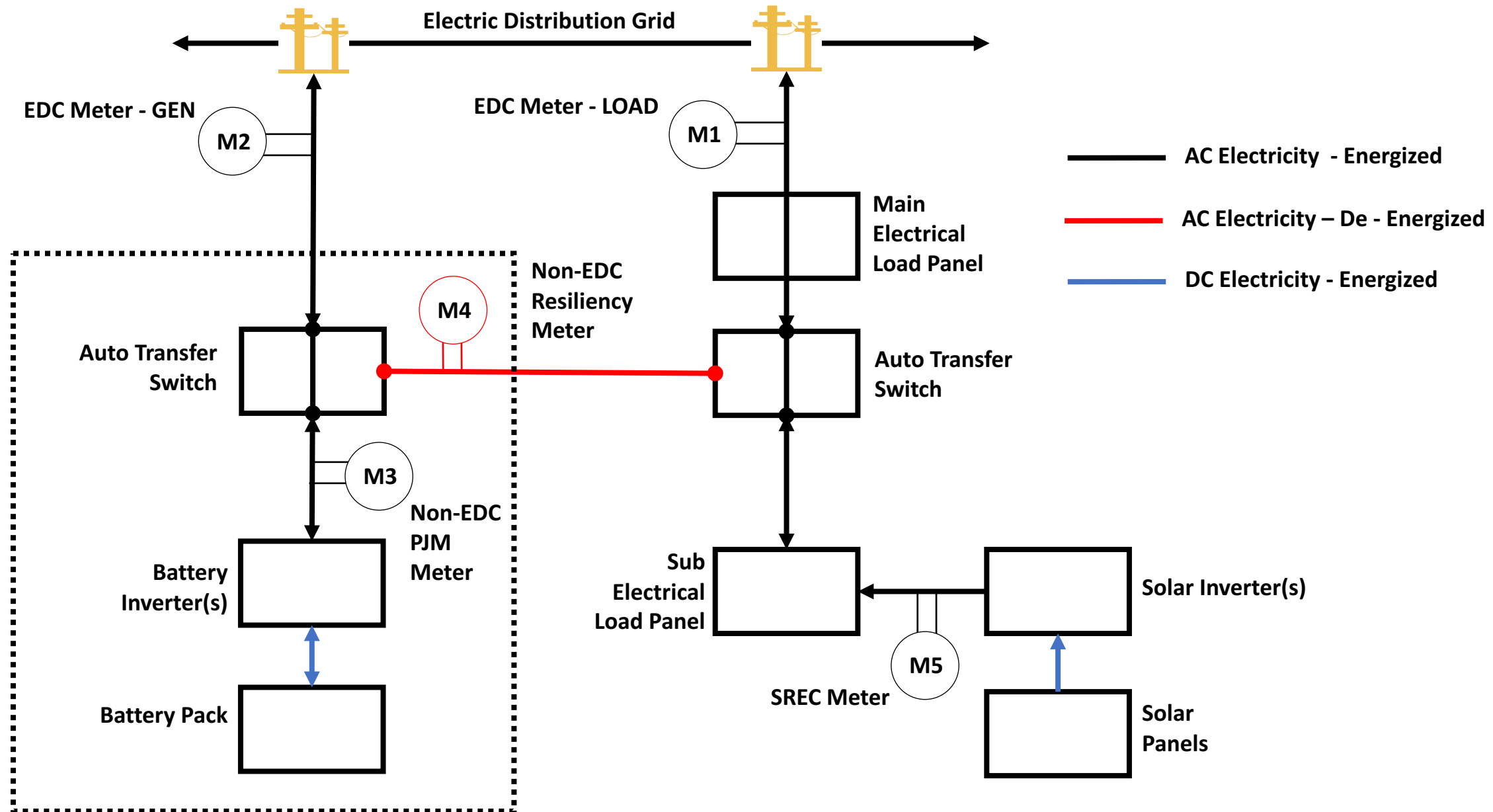
- Example Overview
- System Design
- Operations – Backup Power Mode
- Meter Description
- EDC Ownership Demarcation Line
- Interconnection Process Overview
- PJM Aggregation Considerations
- Future Considerations

EXAMPLE OVERVIEW

Example Overview	
Site Overview	<ul style="list-style-type: none">• Front of Meter Generator• Retail Load• Retail Solar PV – Net Energy Metering
FERC Jurisdiction Determination	<ul style="list-style-type: none">• Non-FERC Jurisdictional
ISA or WMPA?	<ul style="list-style-type: none">• WMPA
PJM Classification – Resource Type	<ul style="list-style-type: none">• Generation Resource – Energy Only
PJM Interconnection Application	<ul style="list-style-type: none">• Attachment BB
PJM Applications	<ul style="list-style-type: none">• Frequency Regulation Market• Energy Market
Other Applications	<ul style="list-style-type: none">• Backup Power (solar-storage)

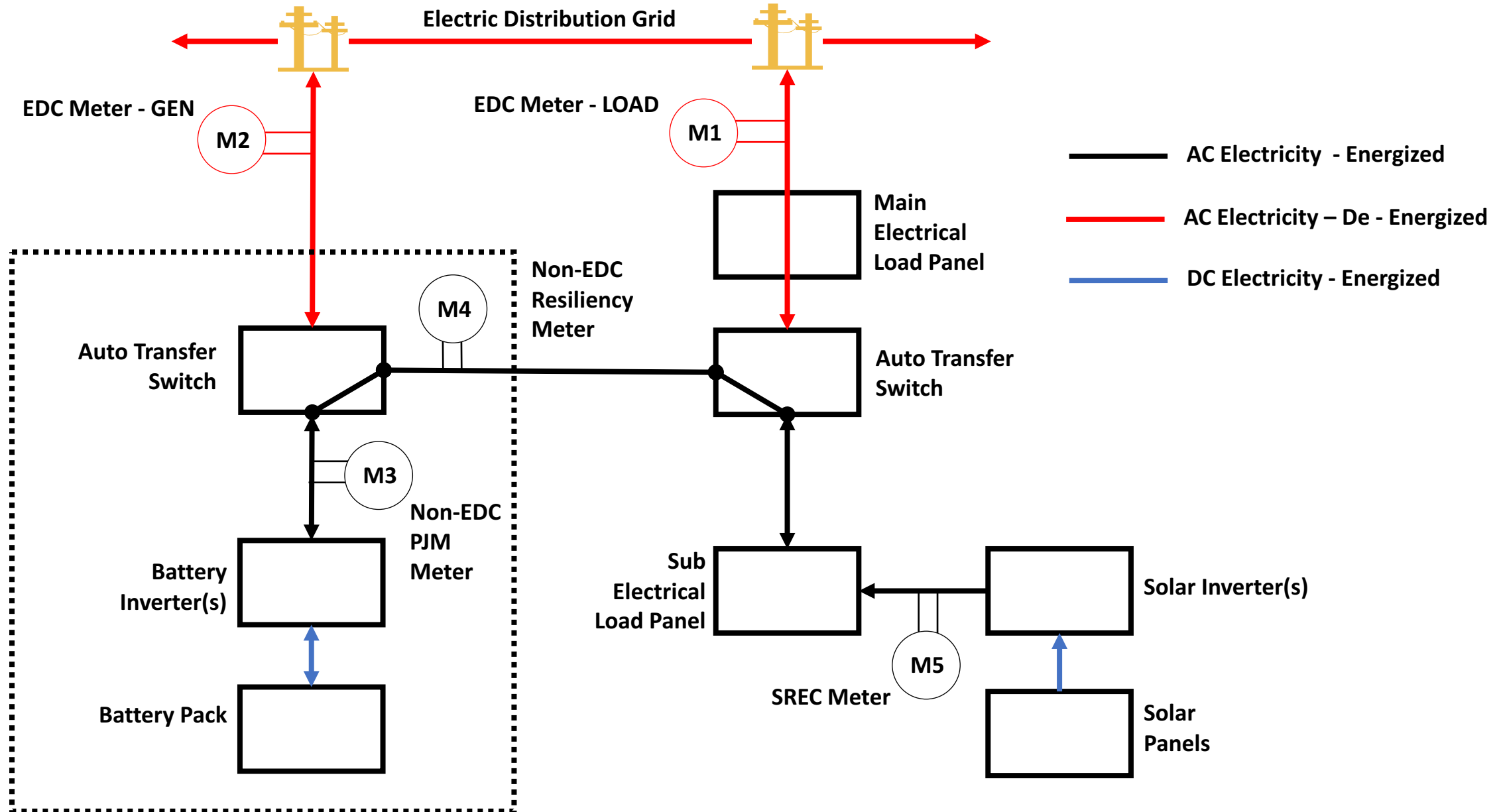
SYSTEM DESIGN - FRONT OF METER GENERATOR

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SYSTEM DESIGN – BACKUP POWER MODE

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METER DESCRIPTION

	Description	PJM Purpose	EDC Purpose	Owner	Cost	New or Existing	PJM Compliant	Comms Required
M1	EDC Retail Meter Load	N/A	Retail Settlement LOAD (NEM)	EDC	EDC	Existing	N	N
M2	EDC Retail Meter GEN Only	Hourly Energy Confirmation	Retail Settlement GEN	EDC	GEN Owner	New	Y ¹	Y
M3	Non-EDC Meter GEN Only	Real Time Data; Hourly Energy	N/A	GEN Owner	GEN Owner	New	Y ¹	Y ²
M4	Non-EDC Meter Resiliency Only	N/A	Retail Resiliency	GEN Owner	GEN Owner	New	N/A	TBD
M5	Sub Meter Solar (SREC)	N/A	N/A	GEN Owner	Solar Owner	Either	N/A	Y/N

¹ Compliant with proper internet connection and if meets PJM accuracy requirements

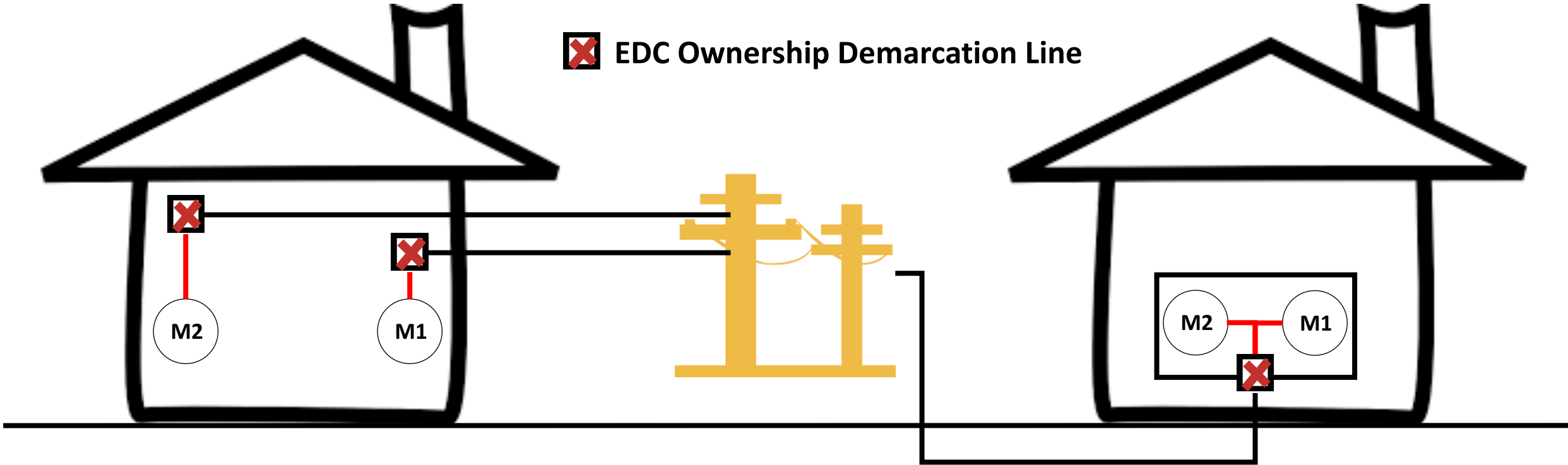
² Real time secure data link to PJM SCADA Network

EDC OWNERSHIP DEMARCATION LINE

OVERHEAD SERVICE

UNDERGROUND SERVICE

 EDC Ownership Demarcation Line



— EDC Owned Line

— Customer Owned Line

 M1 EDC Meter – LOAD (existing)

 M2 EDC Meter – GEN (new)

INTERCONNECTION PROCESS (State Jurisdictional)

PJM – Interconnection Application	
Attachment BB Application	Eligible Size: Up to 10 kW Application Fee: \$500 / Site Equivalent to \$50 / kW or \$50,000 / MW
FERC Jurisdiction Determination	Non-FERC Jurisdictional
Wholesale Market Participation Agreement (WMPA)	Individual WMPA per Site

EDC - Dedicated Service Line Request	
Dedicated Service Line Application	
Engineering Site Survey	~ PJM Combined Feasibility/Impact Study
Metering & Installation Site Survey	~ PJM Facilities Study
EDC Work Order Creation & Scheduling	~ PJM Construction Services Agreement
Cost Considerations	EDC Cost + Contractor Cost to Install

EDC - State Level Interconnection	
Level 1 or 3 Interconnection Application	Administrative Exercise w/ Study Completed Above



PJM AGGREGATION CONSIDERATIONS

Project Overview	
# of Generators	20 – Battery Storage Systems
Generator Size per Site	5 kW
Aggregated Size	100 kW (0.1 MW) (20 x 5 kW)
PJM Classification	Generation Resource – Energy Only

Interconnection Aggregation	
Attachment BB Application	20 – separate applications
WMPA	20– separate agreements
PJM Model Points	1 – single point as aggregate

Market Registration & Telemetry Aggregation	
PJM Telemetry Requirements	1 – Fleet (0.1 MW) 1 – Market Resource (0.1 MW)
Frequency Regulation Market	1 – Market Resource
Energy Market	1 – Market Resource (single pricing node)
Capacity Market	N/A

- Interconnection Process
 - Project Design & Market Rules to Accommodate Behind the Meter Resources
 - Aggregated PJM Interconnection Application for Small DERs
 - Mixed FERC and Non-FERC Projects As Aggregations
- Metering Requirement
 - Coordination Between PJM and EDC to Avoid Duplicate Metering
 - Data Sharing Between PJM, EDC, and GEN Owner
- Aggregation
 - Consistent Aggregation Rules Across All Markets
 - Mix of GEN, DR, DER?
 - Adding / Removing Resources to Existing Aggregation

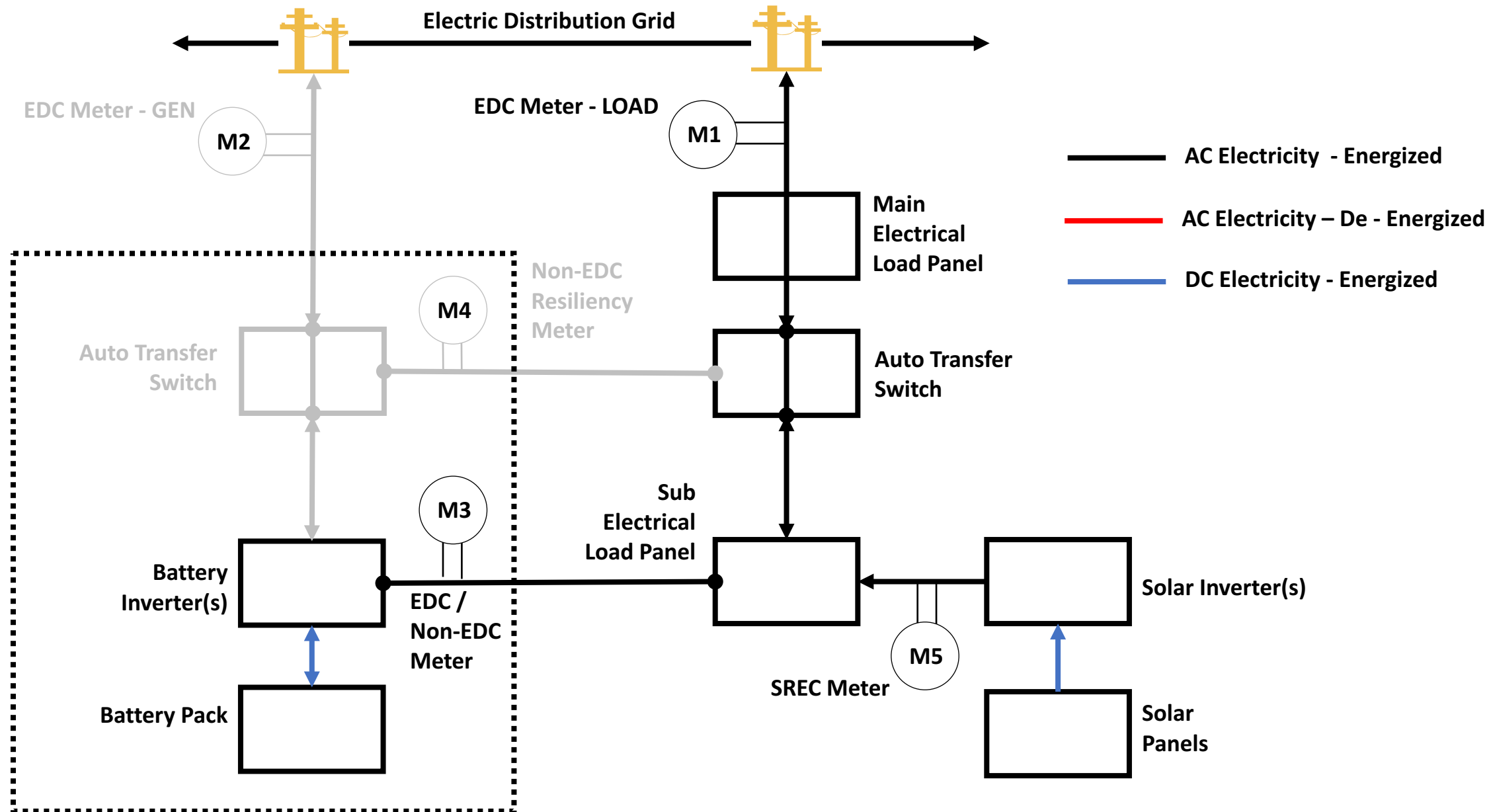
Thank You!

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SYSTEM DESIGN - BEHIND THE METER GENERATOR

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BEHIND THE METER GENERATOR – GRID OUTAGE

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