

Special MIC Meeting – DER

Small DER Aggregation Example

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Presented by:

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Outline

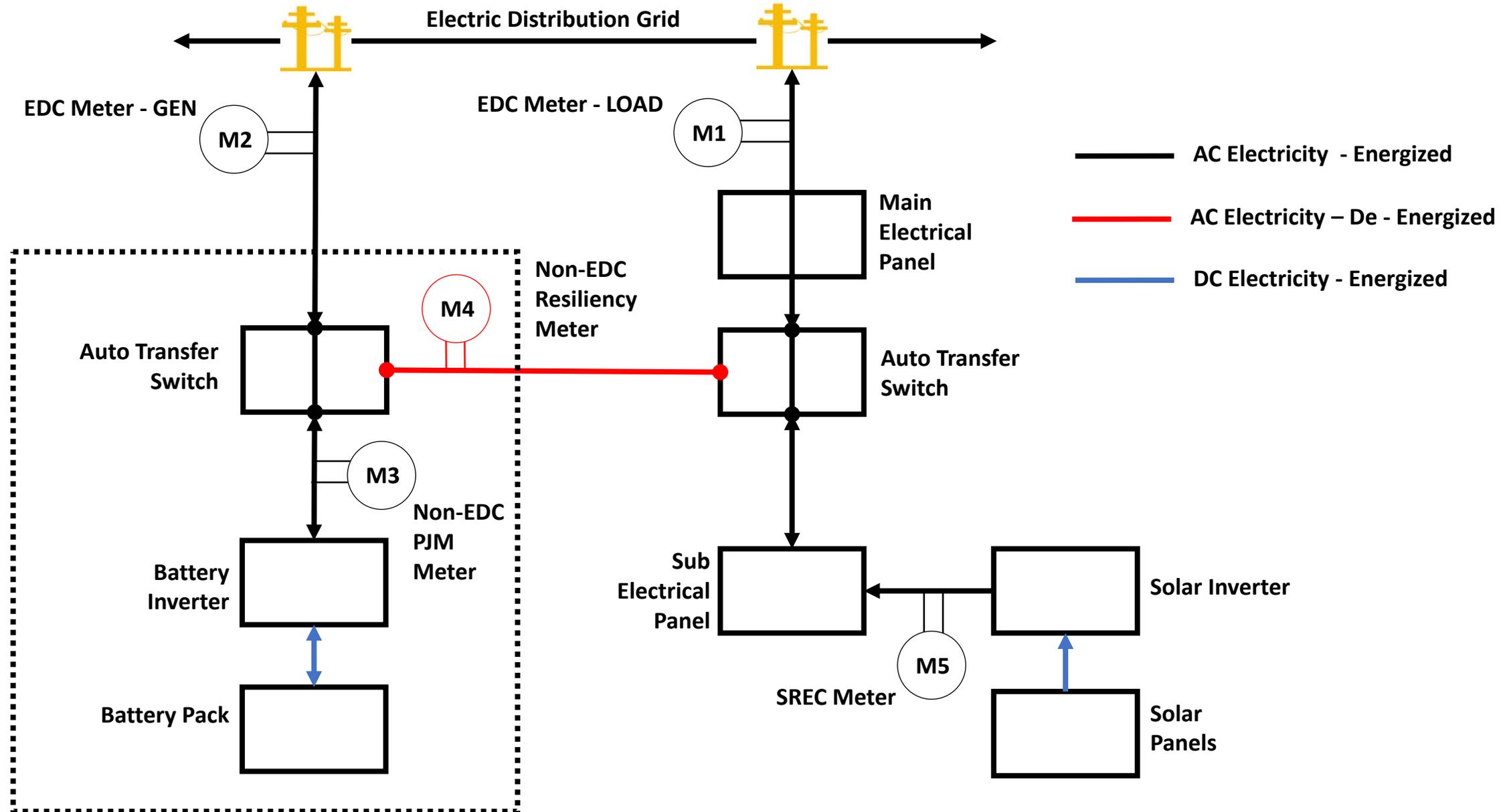
- Example Overview
- System Design
- Operations – Backup Power Mode
- Meter Description
- EDC Ownership Demarcation Line
- Interconnection Process Overview
- PJM Aggregation Considerations
- Future Considerations & Lessons Learned

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

A.F.Mensah



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

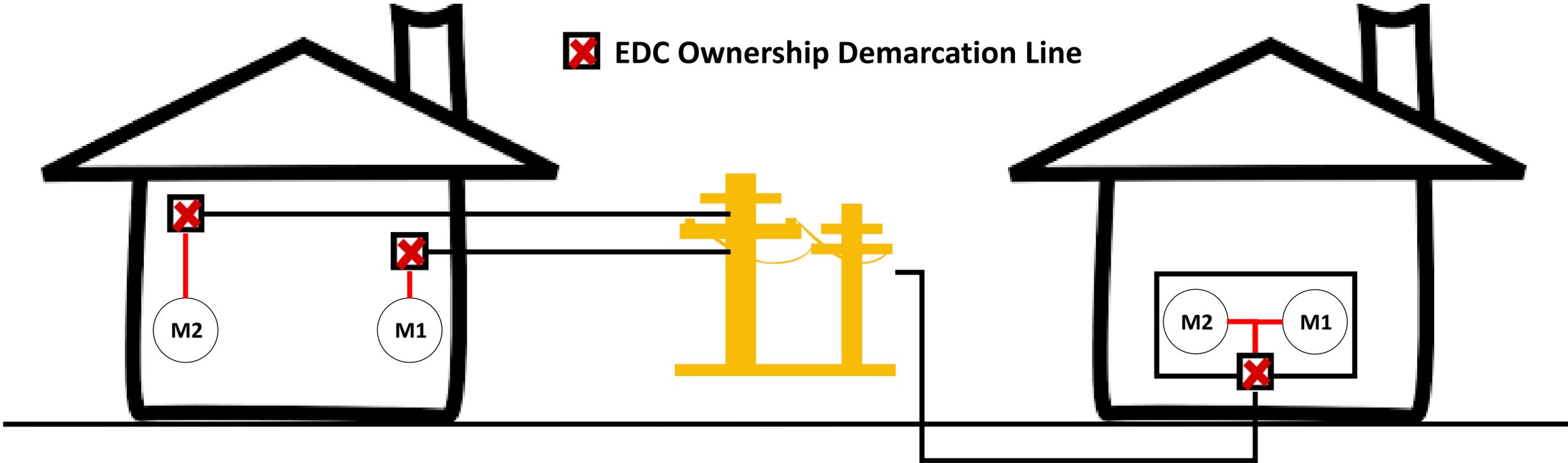
² Real time secure data link to PJM SCADA Network

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 |

FUTURE CONSIDERATIONS

- 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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