DRIVE and PowerClerk Interface Tool to Expedite DER Interconnection Screening Process

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Agenda

- Motivation
- PowerClerk – Clean Power Research
- DRIVE – EPRI
- Hosting Capacity
- Example Process

- The number of interconnection applications continues to rise
- Fast-track screening methods (15% rule) can be conservative or inaccurate
- Detailed impact studies require valuable time and resources

**Project Task:** Develop a platform to interface CPR’s PowerClerk and EPRI’s DRIVE tools to expedite the DER Interconnection screening process.

**DOE RFP Objective:** Reduce processing time to less than 1 week and cost to less than $1000 per application
Interconnection Application Management

- Homegrown or Commercial Product
- Public facing (web based/accessable)
- Inform developers
- Accommodate DER portfolios
- Integrate planning and billing tools
- Automate screening practices
- Access application data
Automating energy programs covering a broad range of DERs

- Over 40 electric utilities managing DER interconnection and incentives
- Enterprise-grade platform providing:
  - Flexible end-to-end form-driven workflow
  - Data accessibility
  - Integration across existing systems

EPRI partnered with Clean Power Research for the DOE SHINES project, but the process is applicable to any Interconnection Application Management system.
Primary Functionality of DRIVE

- Calculating hosting capacity

Hosting Capacity is the amount of DER that can be accommodated without adversely impacting power quality or reliability under current configurations and without requiring infrastructure upgrades.
Applications of DRIVE

Hosting Capacity:
- Enable DER planning
- Inform developers
- Assist interconnection screening
- Assist operational dispatch
Bridging the Gap in Distribution Planning

- **Detailed Analysis** – use of power system analysis software to understand DG and solar impacts based on stochastic analysis (extensive model-based analysis)

- **Interconnection Screens** – such as in FERC SGIP fast-track screening or in CA rule 21 screening procedures (limited model-based analysis)
Automated Interconnection Screening with DRIVE

Manage Interconnection Applications

Automate Analysis

Leverage Existing Methods and Data

Decrease Time and Cost of Processing

Utility Database

Web Service

PowerClerk®

Driven by SunShot
U.S. Department of Energy

(Public Release)
Automated Interconnection Screening with DRIVE

- Manage Interconnection Applications
- Automate Analysis
- Leverage Existing Methods and Data
- Decrease Time and Cost of Processing
Automated Interconnection Screening DRIVE

*UTILITY must be able to identify electrical location from physical location

This project does not address best practices for screening

DRIVE Web Service calls PowerClerk to get a list of projects on that circuit

DRIVE Web Service calls PowerClerk again to get data for all projects in that list

DRIVE Web Service incorporates project data into input file and calls DRIVE to run

DRIVE Web Service sends results to PowerClerk

Engineer's Final Review

Permission to Construct

- Third party
- UTILITY
- PowerClerk
- DRIVE

Permission to Construct
Example Application Screening

Two 13.2 kV distribution feeders

5.0 MW Peak Load

3.7 MW Peak Load
Example with 13.2 kV Test Circuits
Step 1: An interconnection application is filed

Must be able to map physical location or account number to a circuit and node
Example with 13.2 kV Test Circuits
A utility administrator flags the project for review with DRIVE
Example with 13.2 kV Test Circuits
DRIVE Web Service finds the project in the Analysis Queue

<table>
<thead>
<tr>
<th>Queue Position</th>
<th>Project #</th>
<th>Developer</th>
<th>Current Status</th>
<th>Current Status Timestamp</th>
<th>Account Number</th>
<th>Host Customer First</th>
<th>Host Customer Last</th>
<th>Customer/Facility Line 1</th>
<th>Host Customer Zip Code</th>
<th>Total Generator Nameplate Capacity (AC-kW)</th>
<th>Assigned</th>
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<tbody>
<tr>
<td>1</td>
<td>EPRI-00004</td>
<td>DRIVE</td>
<td>Analysis Requested</td>
<td>01/29/2018</td>
<td></td>
<td></td>
<td></td>
<td>123 Test Ave</td>
<td>37914</td>
<td>60</td>
<td>[No Assignee]</td>
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Example with 13.2 kV Test Circuits
Web Service requests the project data with PowerClerk API method

<table>
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<tr>
<td>Project ID</td>
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<tr>
<td>Customer ID</td>
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<tr>
<td>Status ID</td>
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<tr>
<td>Transformer</td>
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<tr>
<td>Circuit</td>
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<tr>
<td>Segment</td>
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<td>Annual kWh usage</td>
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<td>DG Energy Source (biogas, CHP, fuel cells, hydro, solar, or other)</td>
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<td>Generator Type (Inverter, induction, synchronous)</td>
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<tr>
<td>Total Generator Nameplate (kW-AC)</td>
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<td>PV System, if energy source is solar</td>
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<td>Generator connection (Delta, Wye, or wye grounded)</td>
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<td>Phase (Single-phase or three-phase)</td>
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<td>New or addition</td>
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Example with 13.2 kV Test Circuits
Web Service requests other same-circuit projects and data

Same-circuit projects can have a variety of statuses, including: under review, permission to construct, permission to operate, etc. with time stamp prior to current project.

Web Service incorporates pertinent project data into DRIVE input files.
Example with 13.2 kV Test Circuits
Web Service executes hosting capacity analysis for project under review

The project under review and all other same-circuit projects are incorporated into DRIVE input files and considered ‘Existing DERs’ in the analysis.
Example with 13.2 kV Test Circuits
Web Service interprets hosting capacity summary results

Impacts Considered

- **Voltage**
  - Primary overvoltage
  - Primary voltage change
  - LTC/Regulator tapping

- **Thermal**
  - Feeder Level
  - Substation Level

- **Protection**
  - Element fault current
  - Breaker relay reduction of reach
  - Sympathetic breaker relay tripping
  - Reverse power flow
  - Unintentional islanding
  - 3V0
  - Operational Flexibility

Pass/Fail is determined by the remaining hosting capacity of the circuit.
The utility can define Hosting Capacity by the impacts considered.
Example with 13.2 kV Test Circuits
Web Service submits DRIVE results with PowerClerk API method

Submitting results updates the project status

Automated analysis ≠ automated approval
## Next Steps

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- **Software Development**: Starts in May 2018
- **Testing and Use Cases**: Continues from July to October 2018 with a focus in September (✨)
- **Reporting**: Begins in July 2018 and continues through October 2018 (✨)
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