

# SDG&E- Beach Cities MicroGrid Project



Symposium on Microgrids  
September 17-18, 2009

# Agenda

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1. Project Overview
  - Objectives/Benefits
  - Project Participants
  - Equipment Deployment
  - Project Schedule
  
2. Update of activities completed to date
  - Successes
  - Challenges
  - Next Steps
  
3. Questions

# MicroGrid Project Overview: Project Objectives

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## **Objective:**

Conduct a pilot scale “proof-of-concept” test in San Diego, CA of how information-based technologies and DER may increase utility asset utilization and reliability.

## **Goals:**

1. Achieve > 15% reduction in feeder peak load through the integration of multiple, integrated DER— generation (DG), energy storage and price-driven load management
2. Demonstrate capability of Volt-Amps-Reactive (VAr) management -
3. Develop a strategy and demonstration of:
  - Information integration focused on security and system architecture.
  - Integration of advanced metering infrastructure (AMI)
  - ‘Self-healing’ networks through the integration of Feeder Automation System Technologies (FAST)
  - Integration of Outage/Distribution Management Systems (OMS/DMS)
  - Automated distribution control to intentionally “Island” customers

# MicroGrid Project Overview: Goals & Scope

SDG&E's Microgrid project integrates a DOE component, focused on feeder applications and a CEC component, focused on customer-side applications

## MicroGrid Project

### DOE Portion

- \$7.2M in DOE funds contribution towards \$12M total project cost over 3 years
- Goal to achieve >15% reduction in feeder peak load and improve system reliability
- Perform cost/benefit analysis for full scale deployment
- Involves Integration of 5 technologies:

1. *Distrib. Energy Res. (DER) and VAR Technologies (FAST)*
2. *Feeder Automation System*
3. *Advanced Energy Storage (AES)*
4. *OMS/DMS system*
5. *Price Driven Load Mgmt (PDLM)*

### CEC Portion

- Entirely CEC Funded (\$2.8M)
- Sustainable Communities MicroGrid focused on interoperability, AMI and customer DER
- Schedule to mesh with larger DOE proj.
- Involves Integration of customer based technologies:

1. *Remote Controlled Demand Response Devices (e.g. Thermostats)*
2. *Solar panels*
3. *Battery storage*
4. *Plug-in Hybrid Electric Vehicles (PHEV's)*
5. *Grid-friendly appliances*

# MicroGrid Project : Roles and Responsibilities

## SDG&E – Prime Contractor

- Prime contractor for the agreement with DOE and CEC
- Accountable for the success of the project
- Responsible for reporting to DOE and CEC
- Provides substation and feeders
- Provides access to customers (proprietary)
- Responsible for asset deployment

DOE & CEC

## IBM - PMO

- Provide Project Management Support
- Development of project standards
- Status reporting
- Cross-project dependency management
- Vendor Management

DOE & CEC

## Horizon Energy Group (HEG)– Solution Architect

- Functional Architecture/Business Process
- Technical Architecture/Engineering Support
- System Integration/Interfaces
- Operational Testing

DOE & CEC

## Motorola

- Network Communications
- Security

DOE

## Pacific Northwest National Labs (PNNL)

- DER Design

DOE

## Oracle

- OSM/DMS Functions

DOE

## Advanced Energy Storage (AES) Vendor

- Utility Storage

DOE

## University of San Diego

- Regulatory Design

DOE

## Lockheed Martin

- SOA
- DOE Systems Arch

DOE

## Gridpoint

- Demand Response
- HAN

CEC

## Xanthus

- CEC System Integration

CEC

# MicroGrid Project Overview: Timeline

2009				2010				2011				2012			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

## Program Initiation

Jan-May'09

- Site Selection
- PMO Set-up

## Phase I - Baseline & Key Developments

Jun'09 - July'10

- Project Prep
- AES Vendor Selection
- Pilot Network Analysis & Baselining
- Key Developments (Est Func Specs 7 Test programs)

## Phase II - Integration & Op Testing

Sept'09 - Aug '11

- Solution Outline
- DER Integration & Test
- FAST Integration & Test
- AES Integration & Test
- OMS/DMS Integration & Test
- PDLM Integration & Test

## Phase III - Data Collection & Analysis

Sept'11 - Mar'12

- Cost Benefit Analysis
- Final Report

## Phase 0 - Administrative

June'09 - May'11

## Phase I - Design

June'09-Feb'10

- Solution Outline
- High-Level Design
- Detail Design

## PHASE II - Demonstration

Feb'10 - May'11

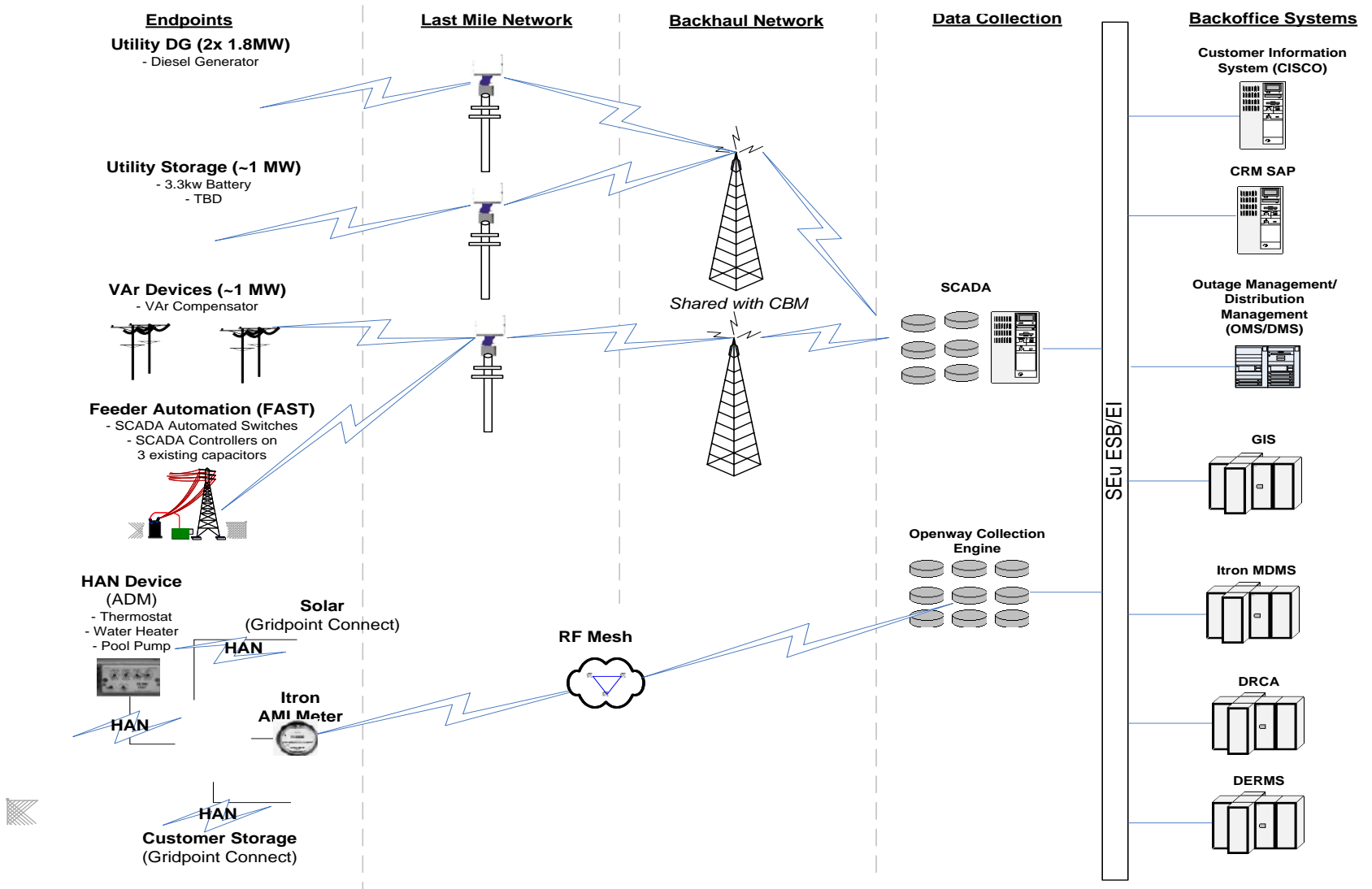
- Establish Baseline
- Integrate Resources
- Operational Testing
- Prepare Results

Please see file for more details →



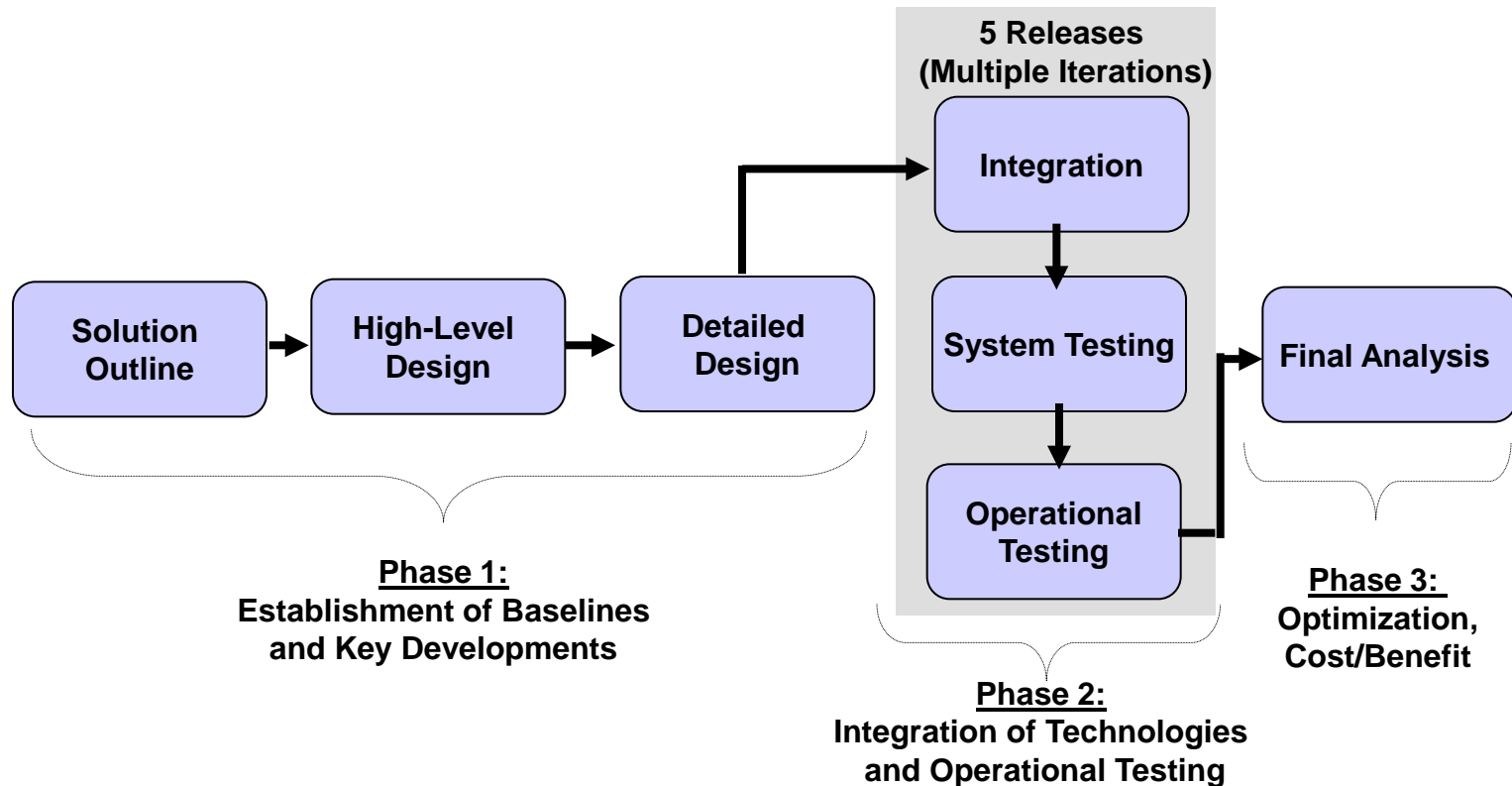
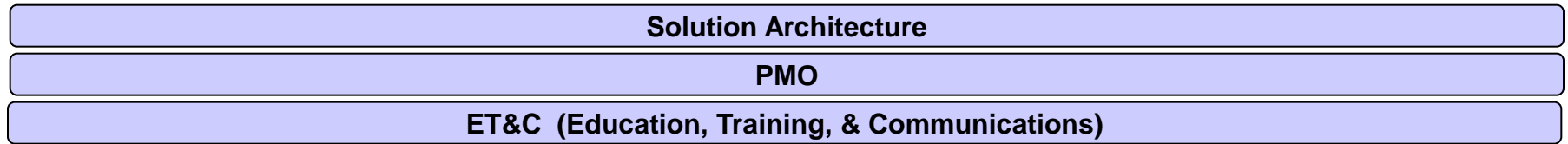
Microsoft Excel  
Worksheet

# Project Architecture: Context Level Architecture



# Project Approach: Release-Based Project

The proposed approach is to run the MicroGrid project as a release-based project. The key components are common vision, centralized program management, single design and phased implementation.

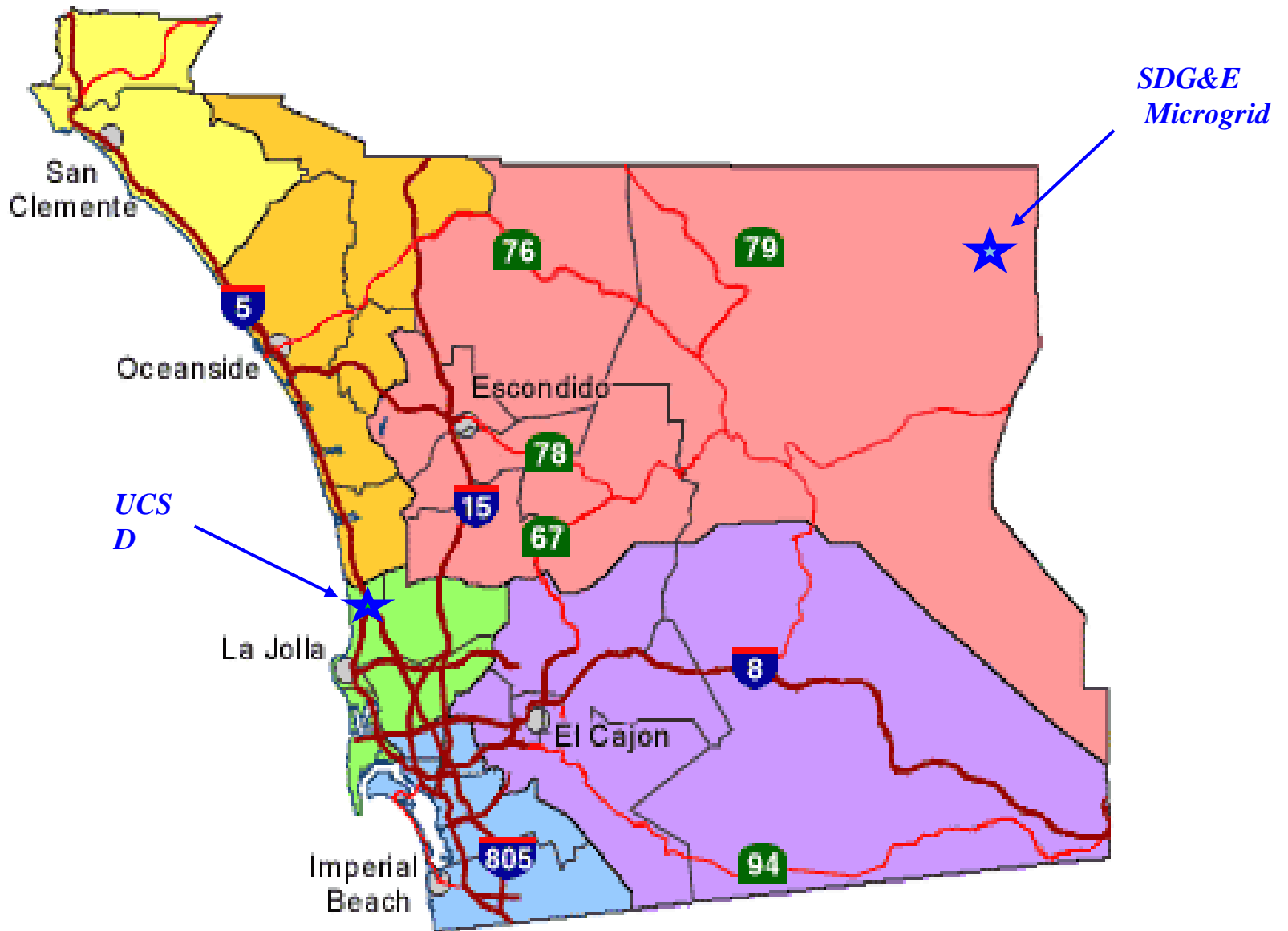




## Phase 1 Overview: Status of Activities

Task	Status	Comments
Task 1A –Develop a <b>Project Management Plan</b> (PMP):	Complete	The final SOPO and a project management plan have been updated
Task 1B – <b>Site Selection</b> : Select a demonstration site for the project	Complete	Site has been selected as Borrego
Task 1C – Analyze <b>Advanced Energy Storage (AES)</b> Solutions. Select appropriate types of AES devices to deploy for substation peak load shaving and support during transitions to/from islanded operation	Complete	The Use Cases for storage have been completed The RFP for storage device has been sent to the AES vendors
Task 1D – <b>Negotiate AES Pricing</b> and Obtain Cost: Quotes Analyze submitted price quotations, select vendor(s) and initiate purchase order(s)	Pending	The Pricing and Cost Quotes will be completed after the bids have been received.
Task 1E – Install Initial <b>Field Hardware</b> : Begin installing equipment to be used for subsequent phase of the project.	In Progress	Permits have been acquired. Civil & Electric engineering activities initiated Generator to be installed by September
<i>Task 2.1 -- Pilot <b>Network Analysis and Baselineing</b>:</i>	<i>Pending DOE approval</i>	DOE funds have not been fully released
<i>Task 2.2 -- <b>Key Developments</b>: Establish the functional specifications and test programs</i>	<i>Pending DOE approval</i>	DOE funds have not been fully released

# Microgrid- Project Location



# MicroGrid Selected Project Site: Borrego Substation

## Key Characteristics:

### Strengths:

- No residences nearby, plenty of land
- More Existing Solar Customers
- Large Reliability Improvements Possible
- Possibility of 'Islanding' Entire Community
- Great learning environment
- Extendable to service territory

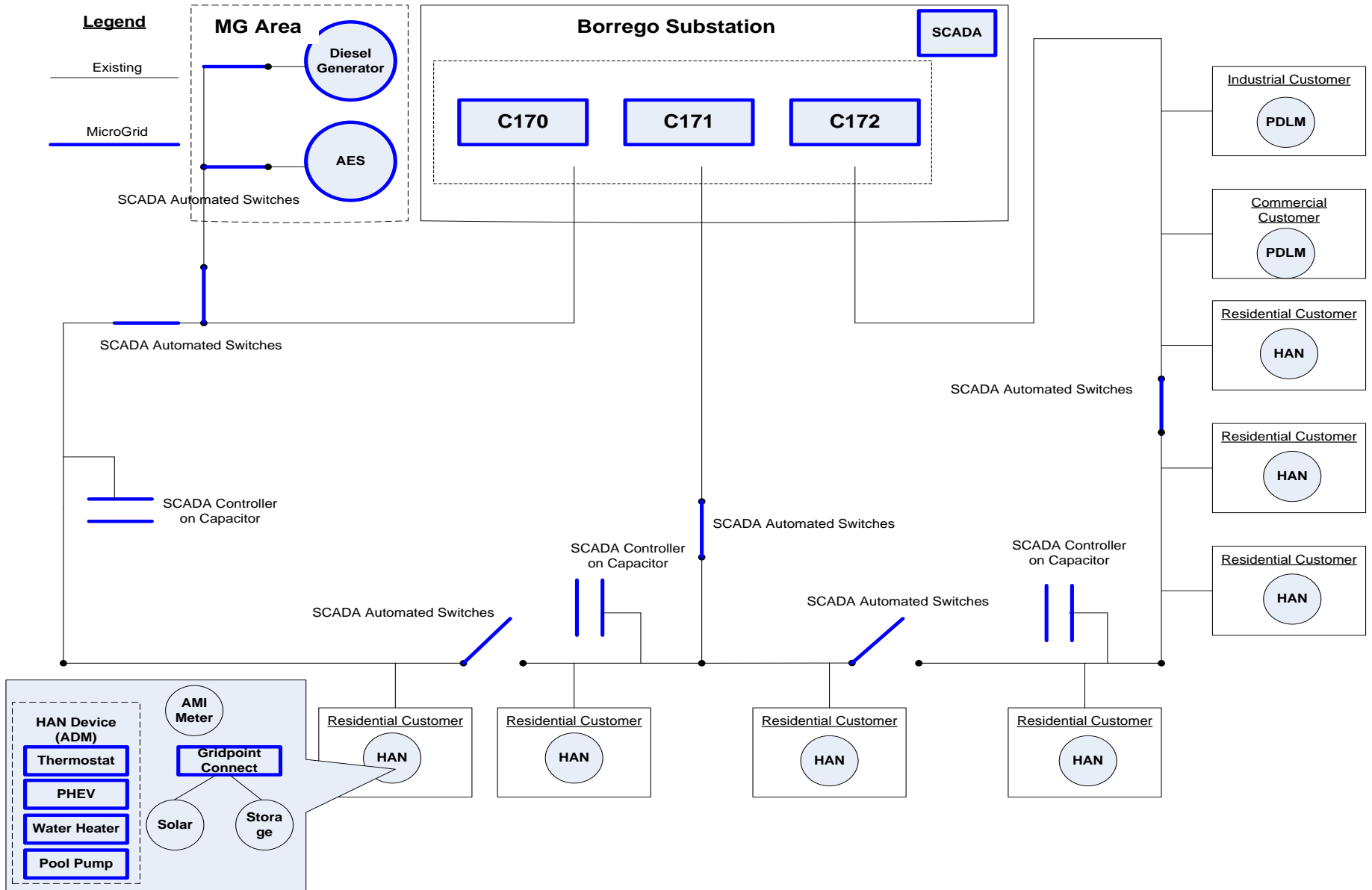
### Challenges:

- Remote Area
- Challenging Communications Environment
- New Fencing Required
- Requires Accelerating schedule for Condition Based Maintenance and AMI Deployment



*Borrego offers SDG&E an opportunity to be the leader in the Micro Grid area, with the possibility of being able to island an entire substation with peak load of over 10 MW.*

# MicroGrid Selected Project Site: Borrego Substation Circuit Diagram

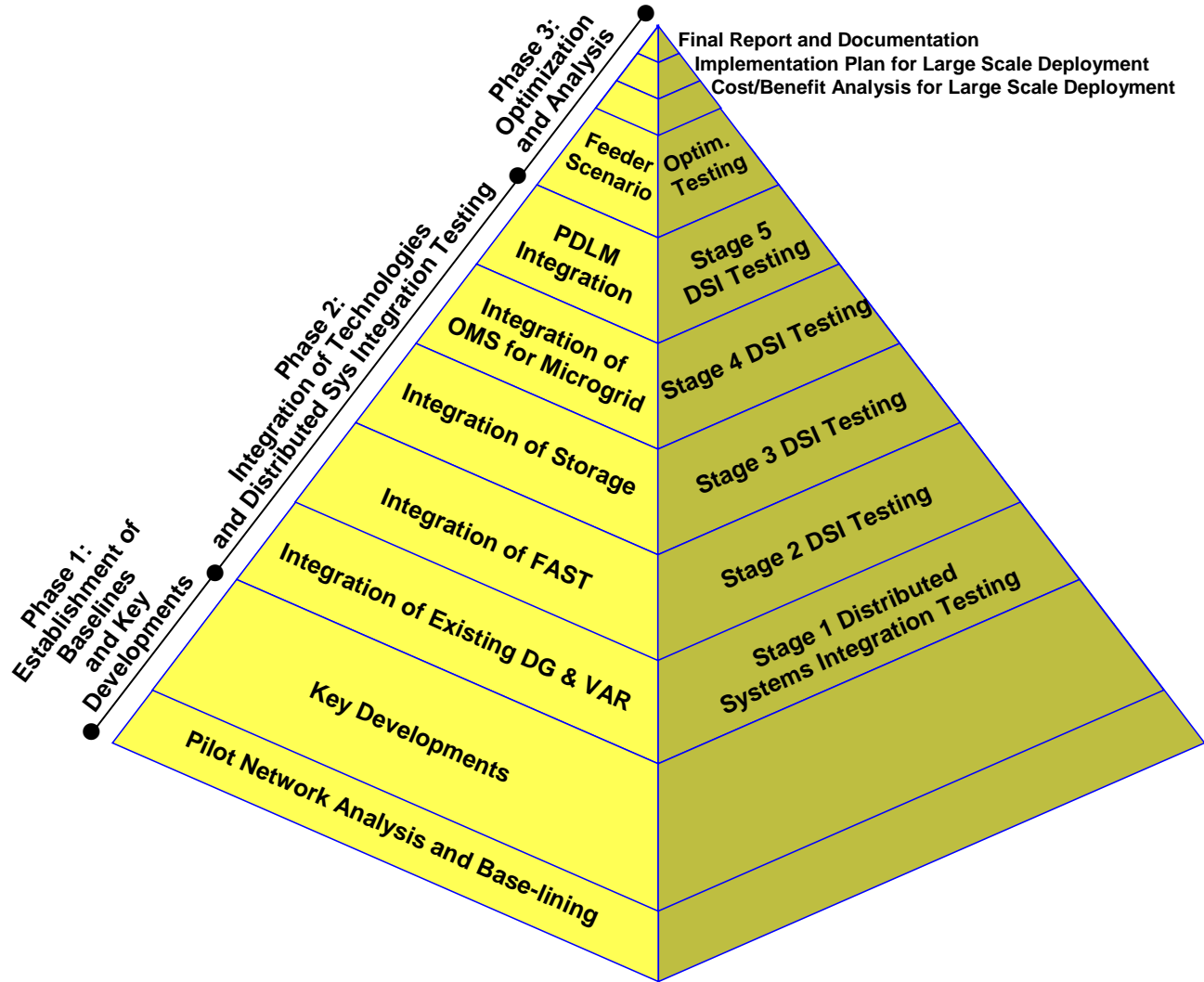


# Major Project Hurdles/Challenges

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- Establishing Secure Communications Network
- Development of Appropriate IT Architecture
- Customer Participation in DG and Demand Response Programs
- Coordination of Efforts Across Departments and with Subcontractors
- Regulatory and Tariff Impacts

# Microgrid Project Overview “Pyramid”



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# *Questions???*

