PJM SynchroPhasor Grant Update

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TOA-AC
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## PROJECT: PJM Synchophasor Technology Deployment

**TOTAL PROJECT COST:** $27.8m  
**AWARD AMOUNT:** $13.7m

### Technical Approach

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Planning and Project Tasks</th>
<th>Interoperability</th>
<th>Cyber Security Protection</th>
<th>Data Collection and Project Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STRENGTHS</strong></td>
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<tr>
<td>✔️ Number of PMUs to be installed (91)</td>
<td>✔️ Well qualified team and clear roles and responsibilities</td>
<td>✔️ Project appropriately addresses interoperability</td>
<td>✔️ Good plan</td>
<td>✔️ Excellent break down of metrics and benefits provided that are believable</td>
</tr>
<tr>
<td>✔️ Number of Transmission Owners participating (12)</td>
<td>✔️ Well defined tasks</td>
<td>✔️ Large number of providers supports interoperability and will add to better industry understanding</td>
<td>✔️ Plan follows IEEE, NIST, and will implement a cyber security framework to meet NERC CIP requirements</td>
<td></td>
</tr>
<tr>
<td>✔️ Number of states covered (10)</td>
<td>✔️ Realistic schedule</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>✔️ Will advance the state of the art and standards for the grid</td>
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### Weaknesses

<table>
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<tr>
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<tr>
<td><strong>WEAKNESSES</strong></td>
<td></td>
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<tr>
<td>✔️ Only one aspect of smart grid addressed (transmission reliability)</td>
<td>✔️ More detail on risks should have provided</td>
<td>✔️ Evolving standards could introduce new risks, though team engaged in discussions</td>
<td>✔️ Security issues related to the control of the monitored systems not addressed. OK for now</td>
<td>✔️ No baseline of reliability established</td>
</tr>
<tr>
<td>✔️ More technical details of risks could be provided</td>
<td>✔️ Letters of support from a sample template</td>
<td></td>
<td>✔️ How data collected will be made available to DOE not addressed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>✔️ Benefits discussion could have been more extensive</td>
<td></td>
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</table>
PJM SynchroPhasor Technology Deployment –
Project Timeline

**Negotiations**: 10/27/09 through Contract Signing (≈2/15/10)

**Definitization Phase** (up to 120 days)
*Project Plan; Cyber Security Plan; Metrics/Benefits Plan*

**Project Execution - Year 1**
*PMU/PDC/SPDC/Telecomm Installations*

**Project Execution - Year 2**
*PMU/PDC/Vis. App. Installations*

**Project Execution - Year 3** (end of 2012)
*PMU/PDC Installations, Telecomm Redundancy*

**Project Closeout** (beginning 2013)
*final project reports*

**Cumulative PMU Installation Schedule**

- 36
- 69
- 91
1. PJM receives agreement with TOs/Vendors on Flow Down Provisions
## DOE Terms and Conditions Overview

<table>
<thead>
<tr>
<th>Concern</th>
<th>1/12 DOE FAQ Update</th>
<th>Resolved?</th>
<th>Next Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Ownership</td>
<td>When fair market value of property &lt; $5000, DOE no longer has residual interest</td>
<td>No</td>
<td>PJM intends to seek clarification from the DOE on property and encumbrance issues pursuant to 10 CFR 600.321</td>
</tr>
<tr>
<td>Davis Bacon Act</td>
<td>Act not applicable to public utilities when they furnish their own materials to extend their own utility system</td>
<td>Almost</td>
<td>PJM intends to seek clarification from the DOE on installation of PMUs</td>
</tr>
<tr>
<td>Tax Implications</td>
<td>Tax implications fall under jurisdiction of IRS, no further guidance expected</td>
<td>Almost</td>
<td>PJM recommends all subawardees discuss tax implications with company tax experts</td>
</tr>
<tr>
<td>Intellectual Property Rights</td>
<td>Not addressed</td>
<td>No</td>
<td>PJM to request an exemption from having to provide source code and object code.</td>
</tr>
<tr>
<td>Schedule flexibility based on force majeure events</td>
<td>Not addressed</td>
<td>No</td>
<td>PJM to request an article in T&amp;Cs to allow TOs &amp; PJM to change schedules should uncontrollable events impact schedule</td>
</tr>
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</table>
PG&E Filing and the IRC’s Response

• **Issue**
  - PG&E designates substations where phasor measurement units (PMUs) and phasor data concentrators (PDCs) are located as critical assets (part of recent rate filing)
  - FERC agreed.
    • PMUs / PDCs that feed into operational decisions should also be identified as critical
    • NERC process for self-certification flawed and looking for external review process

• **Potential Impact**
  - All PMUs / PDCs and substations where these devices are located could be identified as critical assets.
  - Entities that don’t meet this classification may choose to not install

• **IRC Response**
  - Requesting clarification that the Order was not meant to be generally applicable outside the context of the facts and circumstance specific to PG&E’s Petition.
  - If not provided, request rehearing as it violates Administrative Procedures Act and Federal Power Act
Definitization Phase: Period of up to 120 days after DOE contract signing to fully define project scope, execute sub-recipient/vendor contracts, and validate ability to perform.

Required Deliverables:
- Cyber Security Plan (30 days)
- Project Execution Plan (30/60 days)
- Metrics & Benefits Reporting Plan (60 days)

Expenses Authorized for Reimbursement:
Only expenses related to the required deliverables (above) are eligible for reimbursement during this phase. All other expenses are “at risk” until DOE has accepted the deliverables and the Definitization Phase is completed.
Agenda Topics:
- Project Team Introductions
- TO Scope Presentations
- Overview of US and Global SynchroPhasor Initiatives (Quanta)
- Lessons Learned from SynchroPhasor Implementations (EPG)
- Status of SOWs/Terms & Conditions
- Definitization Phase and Deliverables
- Reporting Requirements and Collection Process
- PMU/PDC Requirements Development
- Coordination with North American SynchroPhasor Initiative (NASPI) and Other ISO/RTOs
- Review Project Timeline and Next Steps
Participants:
PJM Interconnection
Quanta Technology
Virginia Tech University
Transmission Owners

Draft: High Level Guidelines

PMU PDC Guideline Development at Quanta Technology, Raleigh NC
Draft: Detailed Guidelines

Publish: Draft Detailed Guidelines & Solicit Input

Feedback Received from Participants

Publish: Detailed Guidelines Version 1.0

01/19/2010
01/21/2010
01/29/2010
02/05/2010
02/10/2010
Monthly/Quarterly Billing and Reporting Process

TO

Invoices

Labor Stats

Project Status

Budget Status

Benefits/Metrics

PJM

Calculate Overall Project /Budget Status

FederalReporting.gov (ARRA)

DOE VIPERS

DOE Grant Reporting
Supporting Slides
Proposed Substations for Phasor Measurement Unit Installations
Functional Component View

**PJM**

- Displays
- Event & Alarm Processor
- Data Processing
- Super PDC
- Phasor Data Archive
- EMS/SCADA

**TO**

- PMU
- PDC
- PJM Displays
- Data Processing*

*TOs can optionally receive phasor data from PJM

Other Monitoring Entities (FERC/NERC, etc.)