2012 Smart Grid Program Peer Review Meeting

Enhanced Distribution and Demand Management Regional Demonstration

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Project Title

Objective

To advance the deployment of the smart grid through:

- Demonstration of effective technology
- Advancement of cyber security
- Advancement of interoperabity

Life-cycle Funding ($K)

$68 million with match

Hardware: $43 million
Research: $11.6
Co-op Labor: $13.4

Technical Scope

- 23 Co-ops, Distributed Nationally
- 275,000 components deployed
  - Meters & DR
  - Distribution Automation
  - Infrastructure

- In home displays and web portals
- Demand response over AMI
- Prepaid metering
- Interactive thermal storage
- Electrical storage (20x10kWh, 1MWh 0.5MWh)
- Renewable energy
- Smart feeder switching
- Conservation voltage reduction
- Advanced metering infrastructure
- Meter data management
- Communications infrastructure
- SCADA

Needs and Project Targets

PRINCIPAL BARRIERS TO SMART GRID ADOPTION

- Customer Acceptance
- Volume of Data and Computational Complexity
- Communications
- Interoperability
- Cyber Security
- Uncertain Return on Investment

Needs and Project Targets

Participants	Demand Response				Distribution Automation (DA)				Enabling Technologies			
	IHD/Web Portal Pilots	DR over AMI	Prepaid Metering	Interactive Thermal Storage	Renew-ables	Smart Feeder Switching	Advanced Volt/Var Control	CVR	AMI	MDM	Comm	SCADA
Cooperative												
Adams Electric Co-op, IL	45	46				67				?	7	24
Adams-Columbia Electric Co-op, WI						38	69	70				8
Blue Ridge Electric, NC										100		
Clarke Electric Co-op, Inc., IA	47	48				71		72	25		19	26
Corn Belt Power Co-op, IA											13	
Calhoun Co. ECA		51							14			
Humboldt Co. REC		52							15			
Iowa Lakes EC	42a	42										
Prairie Energy Co-op		53							16			
Delaware County Electric Co-op, NY	54	55							1		27	
Delta Montrose EA, CO	91		94							99		
Energy United			96									
Flint EMC, GA	39								2			
Kaua'i Island Utility Co-op, HI	56	35							3	20		
Kotzebue Electric Assn., AK	90		93		105	103	102		87	98		106
Menard Electric Co-op, IL	58a	58					29					
Minnesota Valley EC, MN	89			104a	104			101		97		88
Great River Energy, MN										107		
Lake Region Electric Co-op., MN	109									108	85	
Owen Electric Co-op, Inc., KY	43a	43				36	76				30	11
Salt River Electric Co-op Corp., KY						17					17a	
Snapping Shoals EMC, GA	32a	32				78				82	18	5
United REMC, IN	44	66				41	79	80		37	6	
Washington-St. Tammany EC, LA						81					12	23

Interactions & Collaborations (1 slide)

Adams Electric Co-op, IL
Adams-Columbia Electric Co-op, WI
Blue Ridge Electric, NC
Clarke Electric Co-op, Inc., IA
Corn Belt Power Co-op, IA
Calhoun Co. ECA, IA
Humboldt Co. REC, IA
Iowa Lakes EC, IA
Prairie Energy Co-op, IA
Delaware County Electric Co-op, NY
Delta Montrose EA, CO
Energy United Flint EMC, GA
Kaua'i Island Utility Co-op, HI
Kotzebue Electric Assn., AK
Menard Electric Co-op, IL
Minnesota Valley EC, MN
Great River Energy, MN
Lake Region Electric Co-op., MN
Owen Electric Co-op, Inc., KY
Salt River Electric Co-op Corp., KY
Snapping Shoals EMC, GA
Washington-St. Tammany EC, LA .

Cigital – Cyber Security
ICF -- Study
SAIC – Data Systems
Cornice Engineering – Interoperability
Energy and Resource Economics
Advisory Panels
- Industry
- Members (Co-ops)
NYSERDA

Technical Approach

- Customer Acceptance
  - Focus groups
  - Case studies
- Volume of Data and Computational Complexity
  - SaS MDM investigation
  - Distributed control vs. central control
- Communications
  - Dynamic decision guidance
- Interoperability
  - MultiSpeak Extensions, Release 4.1
- Cyber Security
  - Guidance materials and templates
  - MultiSpeak cyber security extensions
- ROI
  - Automated data collection, including interval data
  - Co-op specific case studies
  - Multiple technology cross-cutting studies

Technical Accomplishments (1 of 2)

Cyber Security -- Work to Date

Guidance Document
Template
Special Templates
    Policy
    Authentication
    Perimeter and malware protection
Master Classes
Videos
    Introducing the tools
    Cyber Security is Important
    Regional meeting video
Participation in Multiple Forums
    -- Most recently NESCO
Cyber security plans for 23 co-ops

Cyber Security -- Upcoming

Lessons Learned
Updated Guidance Document –
    incorporating ESCRMMI
Updated Templates
    Plan
    Policy
    Authentication
    Perimeter and malware protection
Updated Master Classes
Continued participation in security forums

Technical Accomplishments – (2 of 2)

Interoperability -- Work to Date
MultiSpeak® Interface (4 new interfaces)
MultiSpeak® Release 4.1
MultiSpeak Cyber Security Extensions

Interoperability – Upcoming
Integration of Cyber Security Testing into Interoperability Certification

Deployment -- Work to Date
80% purchased, 55% installed
Automated data collection system
Interviews with engineering teams
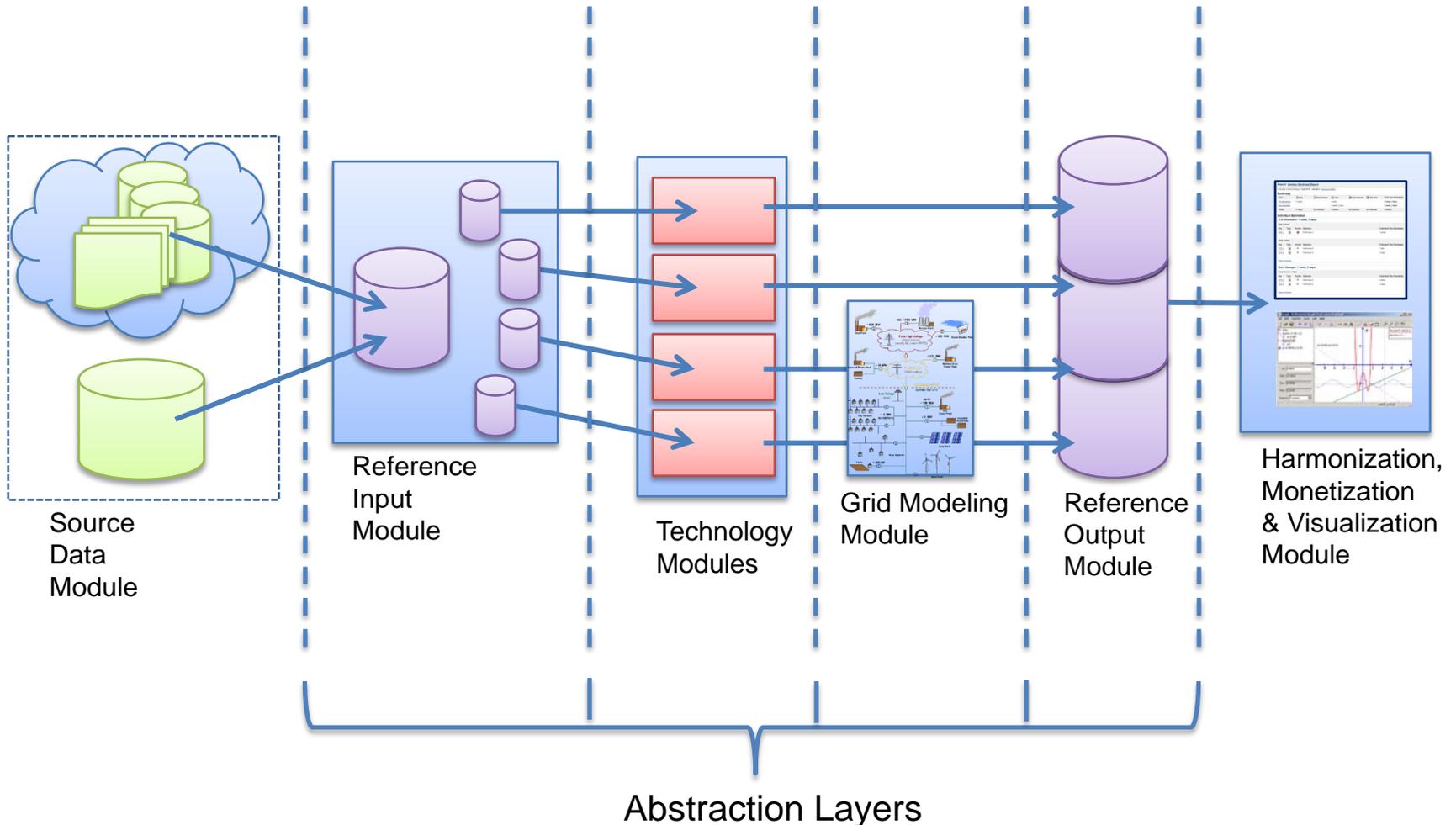Study Design
Design of a modeling systems, OMF

Deployment – Upcoming
- Advanced Communications Study
- Smart Feeder Switch Architecture
- Prepaid Metering
- Advanced Volt/VAR & CVR
- AMI over PLC
- Hosted MDM
- Multi-tenant MDM
- G&T Managed Demand Response
- In-home Electrical Storage
- Large Scale Battery Integration

Open Modeling Framework

Source
Data
Module

Reference
Input
Module

Technology
Modules

Grid Modeling
Module

Reference
Output
Module

Harmonization,
Monetization
& Visualization
Module

Abstraction Layers

Contact Information

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