Using AMI Data for Planning and Operations

Joni Batson and Steve Rupp

Burbank Master Plan Project Approach

ESTABLISH GUIDELINES
- Planning Criteria
- Load Forecast
- Economic Factors

SYSTEM ANALYSIS
- System Configuration
- System Deficiencies
- Base Case/Alternatives

EVALUATE ALTERNATIVES
- Cost
- Losses
- Reliability

CIP

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Planning for Growth –How Much? Where? When? Load Forecast Methodology

Assume IRP System Peaks

Weather adjust

Correlate econometrics

Determine diversity

Allocate to subs/feeders

Add known customers/spot loads

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Traditional Modeling Methodology

Historical Peak Data
Feeder or Substation

End Use Customer Data
Energy(kWh), Xfmr kVA, Demand (kW) etc.

Engineering Assumptions
Power Factor by class, Load Factor, Coincident Factor etc.

→

Allocate Demand in Engineering Model - WindMil Synergi Cymdist

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AMI Modeling Methodology

Historical Peak Data
Feeder or Substation

End Use Customer Data
AMI kW, kVAR, Voltage

Engineering Assumptions
~~Power Factor by class, Load Factor, Coincident Factor etc~~.

→ **Ratio Demand in Engineering Model - WindMil Synergi Cymdist**

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Issues with AMI Modeling Methodology

- Not all AMI meters recorded kVAR
- Not all AMI meters were recorded for the same interval
  - 15 Minute data
  - 5 Minute data
- Each AMI record needs to be associated to a engineering model element
- Collecting AMI meter data for the same time stamp as the peak
- Model configuration not matching feeder peak load
  - AMI loads not summing up to match feeder or substation peak loads
- Bad meter reads
- Voltage readings in the detailed engineering model not aligning with actual readings
- Data processing and entry into the engineering model

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Using AMI Data for Planning

Pros	Cons
Increased model accuracy	Increased data requirements
AMI data integrity check	Increased data storage/retrieval

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Using AMI Data for Planning - Next Steps

- Determine data needed for planning
- Organize big data to store/retrieve as needed
- Synchronize timestamps with SCADA
- Track annual/seasonal peak load and system configuration
  - Customer
  - Circuit
  - Substation

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Working With AMI Data to Improve System Operations

- Reliability Analysis
- System Visualization
- Voltage Management
- Transformer Load Management
- Cost of Service and Rate Analytics

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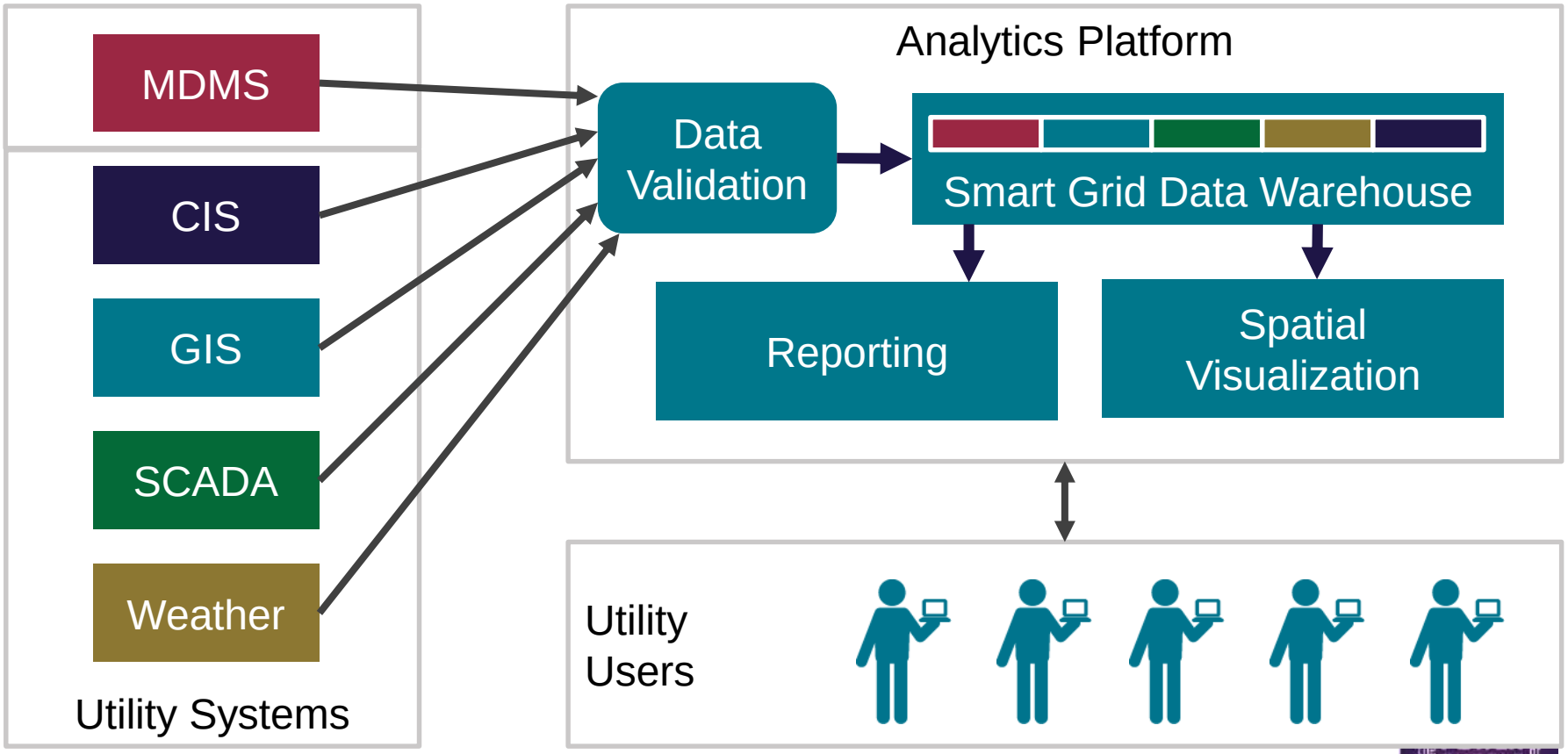
Putting AMI Data to Work



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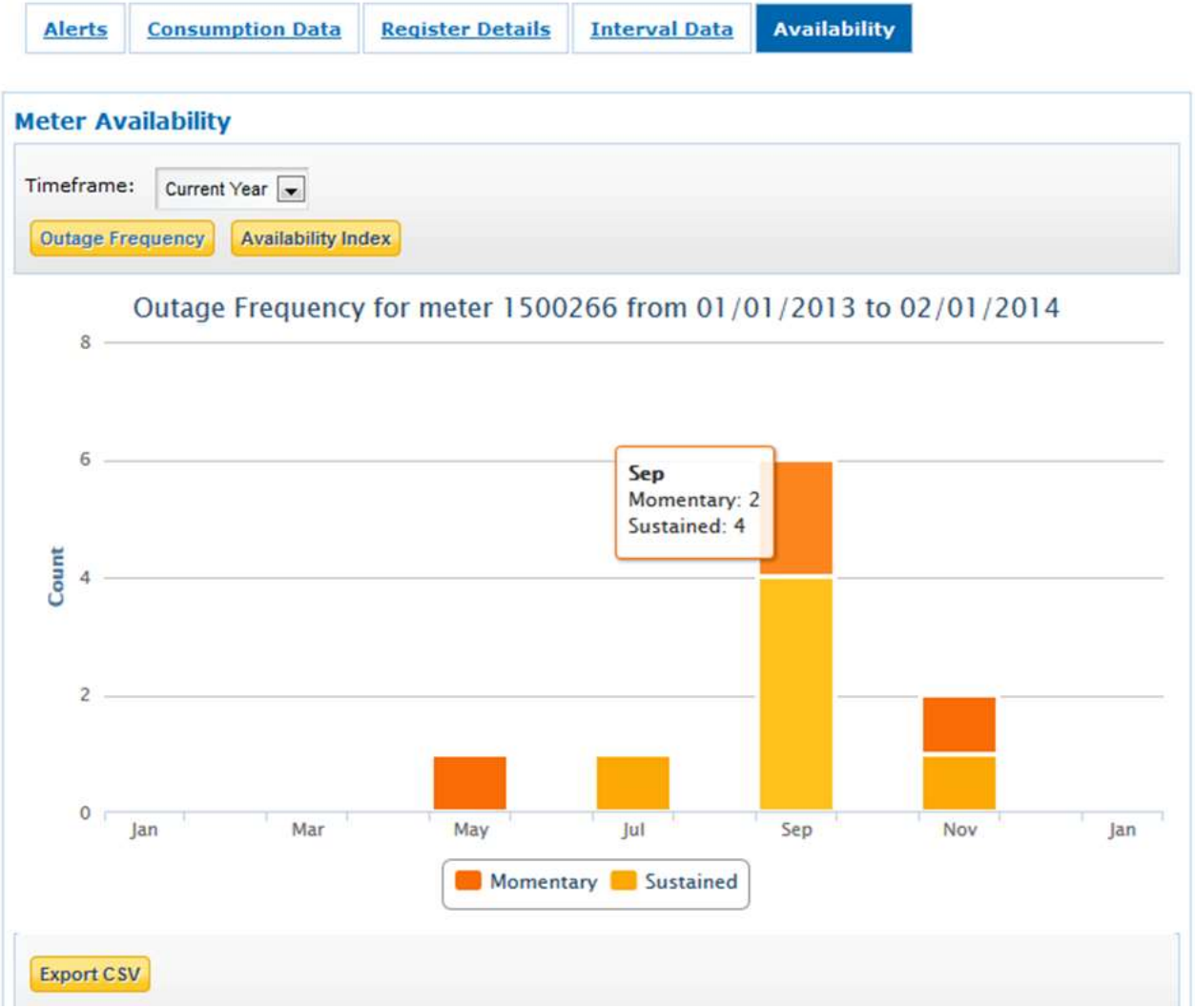
Reliability Analytics: Electric Service Availability



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Reliability Analytics: System Availability

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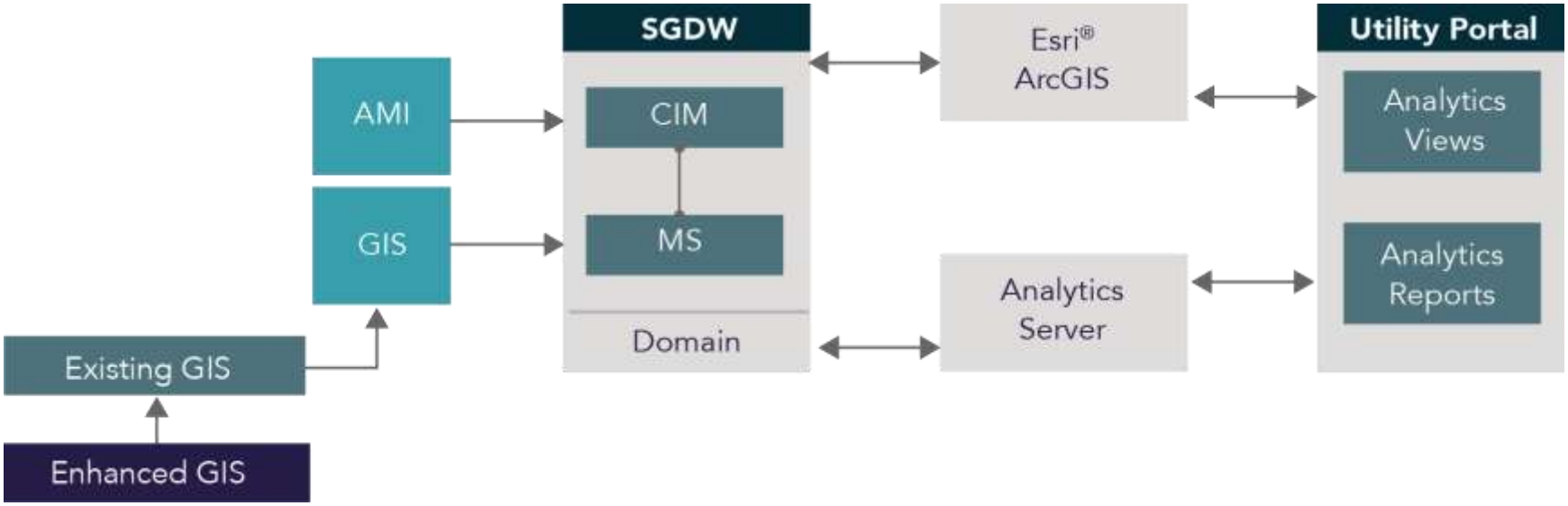
System Visualization – Combining AMI and GIS



GIS = Geographic Information System AMI = Advanced Metering Infrastructure SGDW = Smart Grid Data Warehouse
CIM = Common Information Model MS = MultiSpeak

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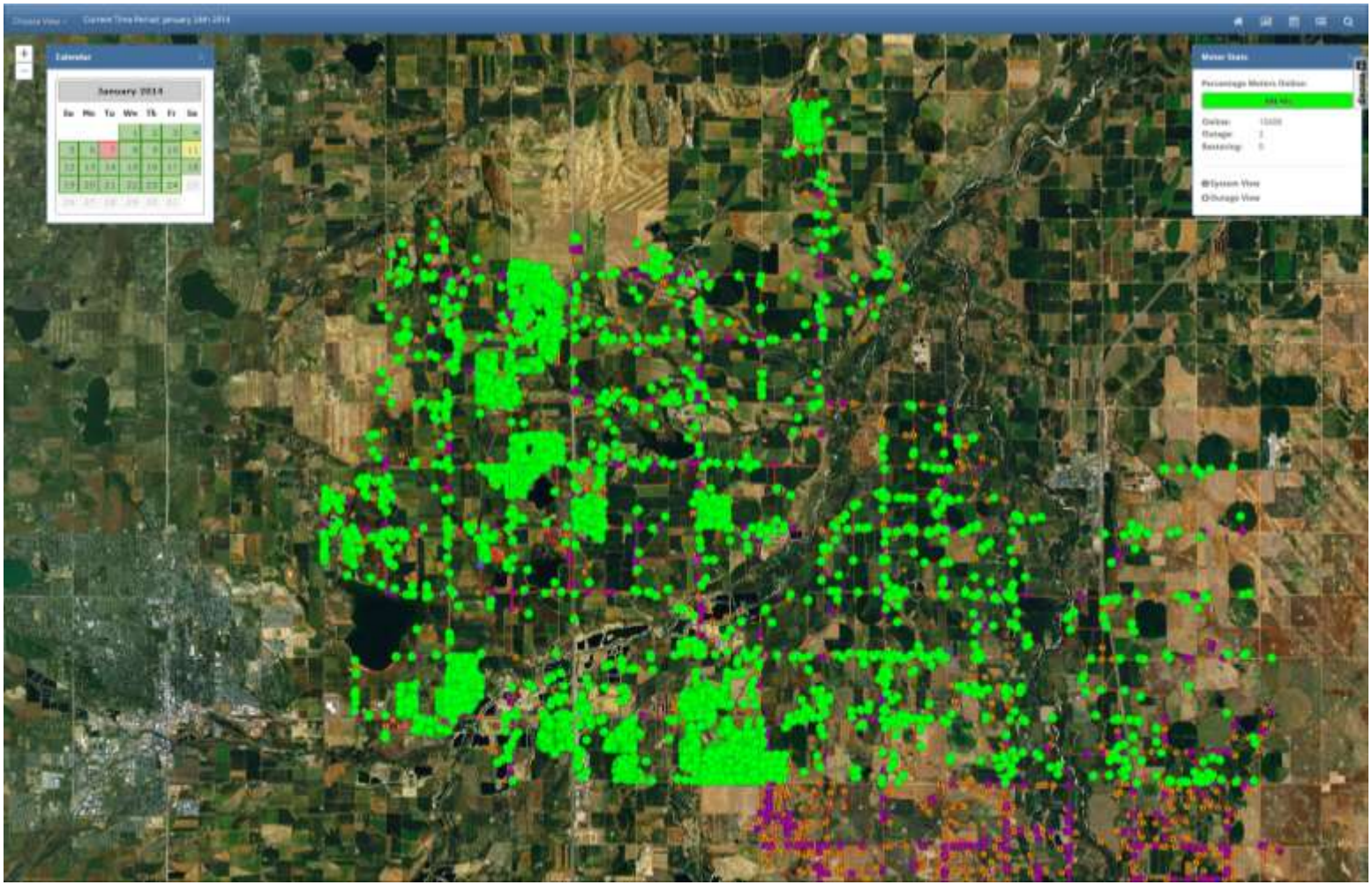
System Visualization Model: Outage Analysis View



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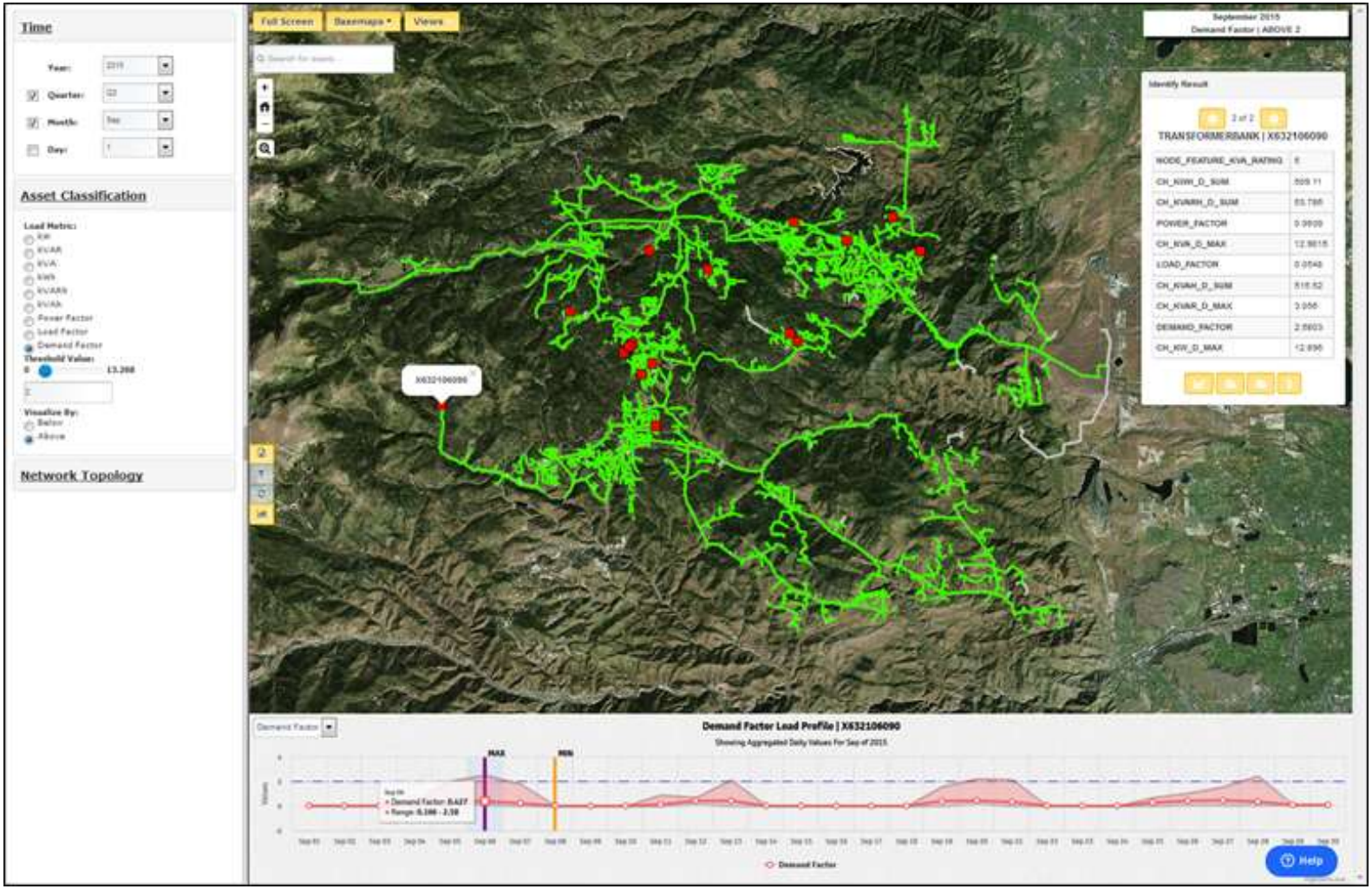
System Visualization: Customer Load Profile Analysis



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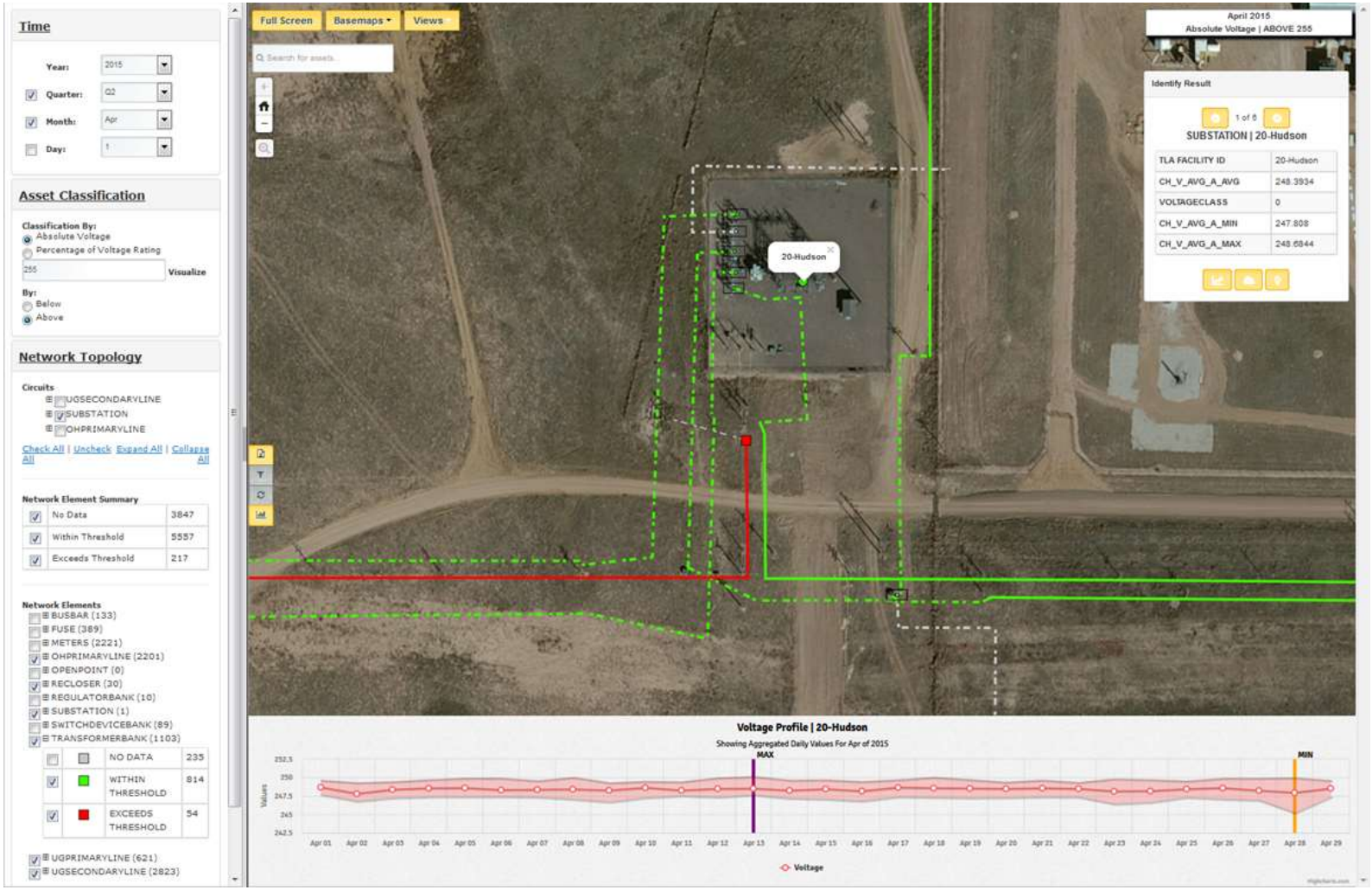
System Visualization: System Planning



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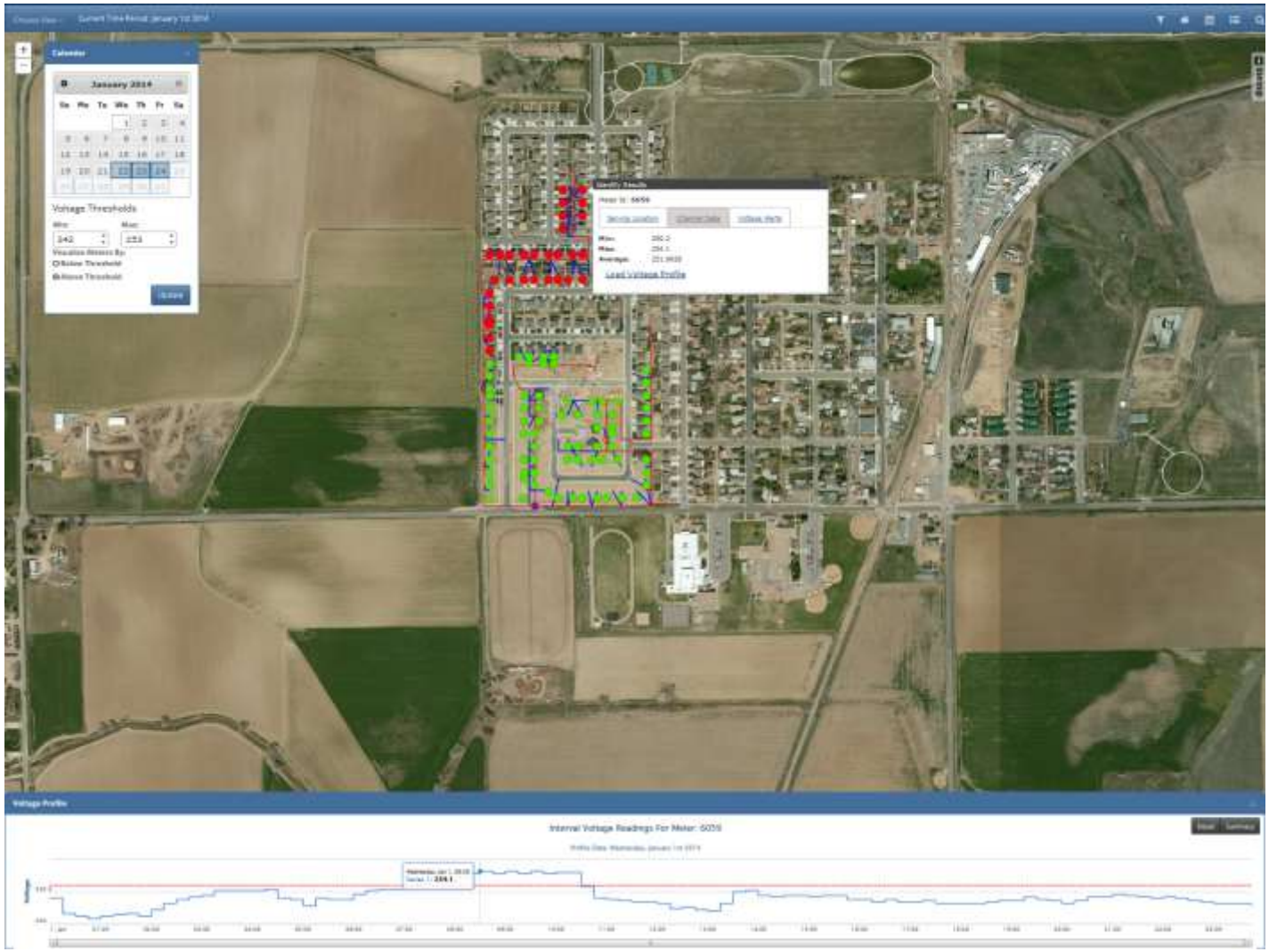
System Visualization Model: Voltage Optimization View



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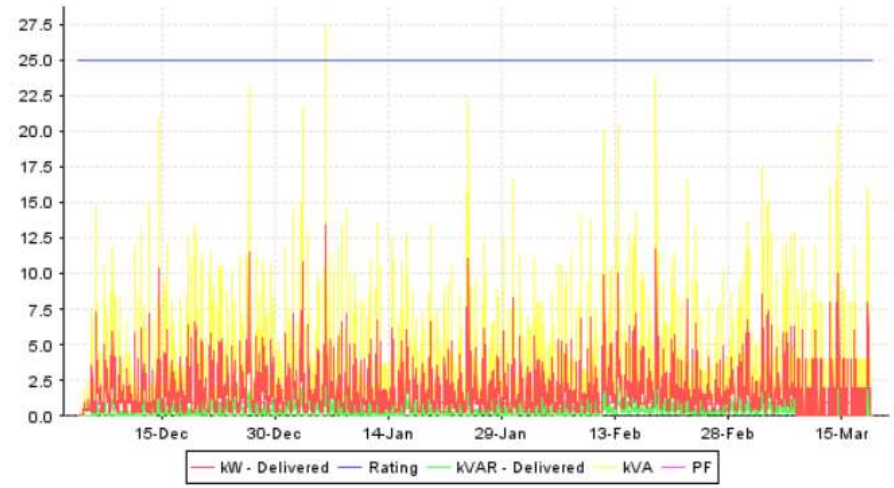
Advanced Analytics: Transformer Load Management

Quarterly Transformer MAX KVA and Demand Factor View

	Q4 2012		Q1 2013		Totals	
NAME	Summary Value (Highest)	Summary Value / RATING (Highest)	Summary Value (Highest)	Summary Value / RATING (Highest)	Summary Value (Highest)	Summary Value / RATING (Highest)
697	23.12	0.92	27.43	1.10	**27.43**	**1.10**
816	44.30	0.89	46.20	0.92	**46.20**	**0.92**
789	15.80	0.63				
804	23.24	0.46				
1898	1.16	0.02				
Totals	**44.30**	**0.92**				

Transformer Performance



- Meter groups and transformer monitoring
- Asset utilization and proactive trouble identification

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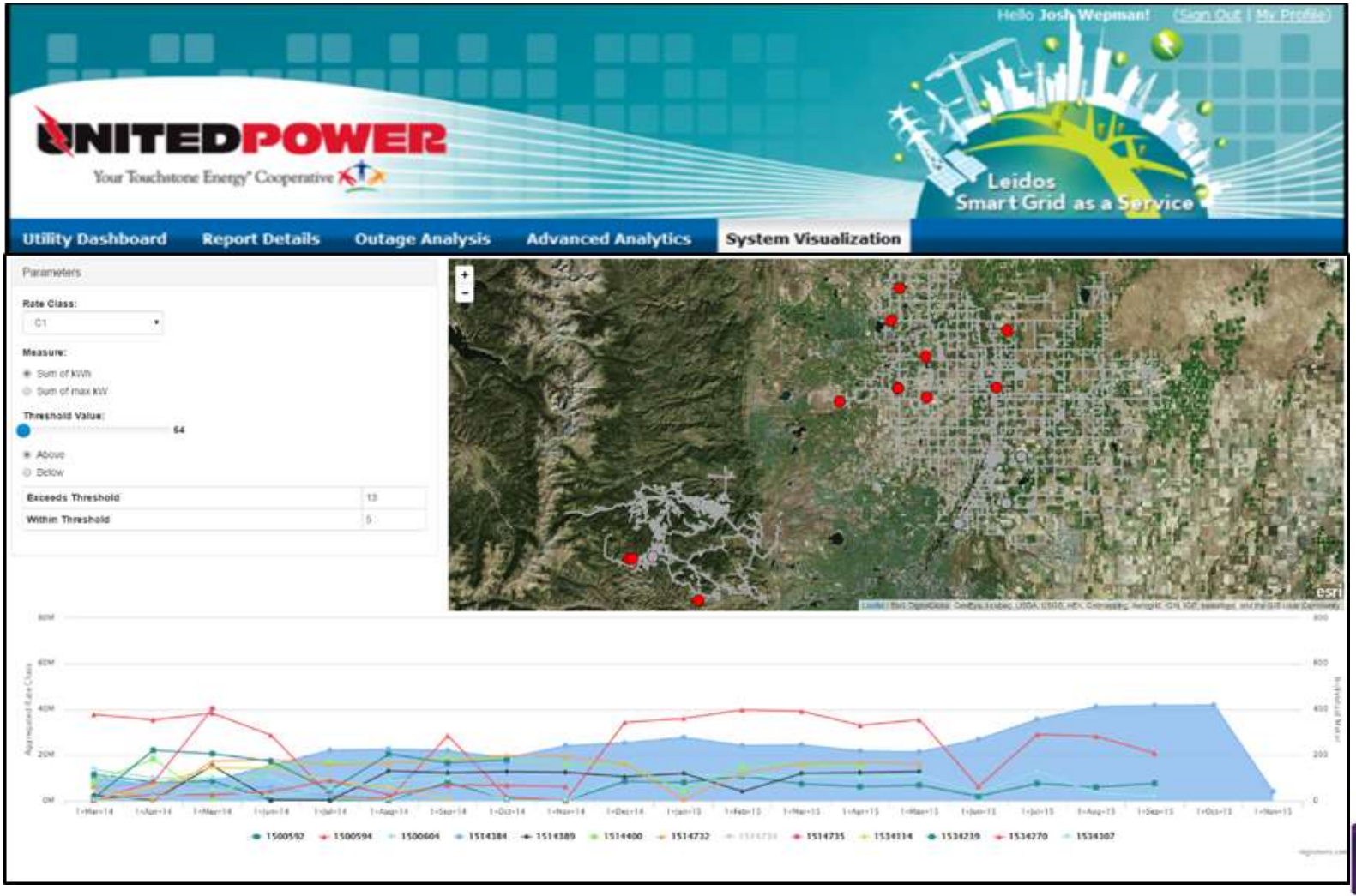
Advanced Analytics: Cost of Service and Rate Design



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