

Ex Parte Communication Report

Date:										
То:	Public Ex Parte Communication File									
	Docket No:									
	Case Name:									
From:	PUC Staff:									
RE:	Permissible Ex Parte Communications Pursuant to Minn. Rules, Part 7845.7400.									
1.	Type of communication: (Oral or Written)									
	If written, attach the document.									
	If oral, Date: Time:									
NOTE: In L	ooth instances, please notify the Maker the communication has been submitted for inclusion in the record.									
2.	Maker of the Communication:									
3.	Recipient of the Communication:									
4.	For communications involving the setting of interim rates or the review of compliance filings, the topic was:									
5.	For all other permissible communications that are prohibited for the Commissioners under Minn. Rules, part 7845.7200, the substance of the communication was:									
6.	For oral permissible ex parte communications, has a copy of this memo been sent to									
	the assigned Administrative Law Judge? γ_{es} No N/A									

LoadSEER discussion and demonstration

February 13, 2024, 3:30pm - 4:40pm Virtual on Microsoft Teams

<u>Commission Staff in Attenda</u>nce: Hanna Terwilliger, Christian Noyce, Yunpei Zhang <u>Xcel Staff in Attendance</u>: Amber Hedlund, Patti Leaf, Madeline Lydon, Brenda McDermott, Brian Monson, Meghan Tisdell, Paul Vaynshenk

The discussion was focused on a technical walkthrough of the LoadSEER tool and not on the resulting forecasts or content included in the Integrated Distribution System Plan.

Xcel used the attached presentation, during the discussion Staff asked clarification questions:

- 1. Does Xcel have a breakdown by feeder for each load forecast?
 - Easy to get peak load at the feeder and substation transformer levels, hard to get breakdown for each technology type by feeder - takes more data complication/adjustments
- 2. Clarification on Xcel's growth components in the budget vs base vs mid vs high plan
 - a. The budgets in the IDP are based only on the "Budget Plan" scenario which does not include any forecasted electrification or solar adoption beyond what is already in Xcel's interconnection queue. Xcel's IDP budget does not include any money to address any DER scenarios, except for the \$190 million placeholder for DER upgrades discussed in Appendix D to the IDP. The Base Case DER is what Xcel would expect to see over the planning horizon. The low, med, and high scenarios do include scenarios from LoadSEER that reflect forecasted electrification and DER adoption impacts.
- 3. What forecasting was conducted before LoadSEER for feeder growth to plan distribution system upgrades?
 - a. Prior to LoadSEER Xcel used distribution asset analysis (DDA in prior filings) this looked at historical peak loads, identified load transfers, new spot loads, capacity projects etc, and added load growth at a fixed percent per year (depending on the area, a different fixed percentage of load growth was assumed, typically 0.5% or 1%)
- 4. How is weather data being adjusted for changing weather patterns?
 - a. Currently looking at extremities of historical data, Xcel is talking with vendor about forward thinking for extreme weather and the ability to provide its own simulated future weather scenario this is also a concern for other utilities. There is also a variety of different percentiles that can be customized and adjusted in ScadaScrubber to reflect varying magnitudes of weather data (i.e. low, typical, extreme weather).
- 5. Is Xcel using the PUC's EV registration data and solar interconnection data as reported to the PUC in the annual DER reports?
 - a. Yes integrating salesforce interconnection data into the map, using EVs by Zip Code
- 6. Use load consumption data from solar production meters, TOU meters for EVs?
 - a. Yes using existing data this will get better with AMI data

After the presentation, Xcel staff provided a live demonstration of the following part of LoadSEER:

- How they use ScadaScrubber to derive load shapes for each node on Xcel's system.
- How the company can allocate potential load adjustments on a premise level basis for new technology additions like electric vehicles, batteries, rooftop solar, and other electrification.
- How the potential load additions are combined into different estimates for low, medium, and high service adoption.
- How LoadSEER enables the user to visualize the different stages of the forecasting process via heatmaps, charts, tables, and reporting mechanisms.



LOAD FORECASTING & LOADSEER

MN PUC & XCEL ENERGY FEB 13, 2024

AGENDA

Introductions

LoadSEER Concepts

Integrating Concepts Demo

Discussion



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Discussion



BRIAN MONSON

Manger of Distribution System Planning & Strategy



LoadSEER Introduction

What is LoadSEER?

LoadSEER is a spatial load forecasting tool that is used by electric distribution system planners to predict:

- 1. How much power must be delivered
- 2. Where on the grid the power is needed
- 3. When it must be supplied

It integrates the following to produce a forecasting and planning product for a utility:

- Geospatial Data
- System and Customer Level Data: SCADA/AMI/Customer Billing
- Historical and Forecasted Weather Patterns
- Distribution Load Flow Application

Top-Down Allocation



Use your corporate system-level forecast to accurately model down to the parcel level, with peak-load, regression-based, weather-adjusted geographic and macroeconomic inputs.

- Improves risk prediction and forecast confidence
- Accommodates load growth and distributed generation changes (new EV, PV, etc. regulatory teams)

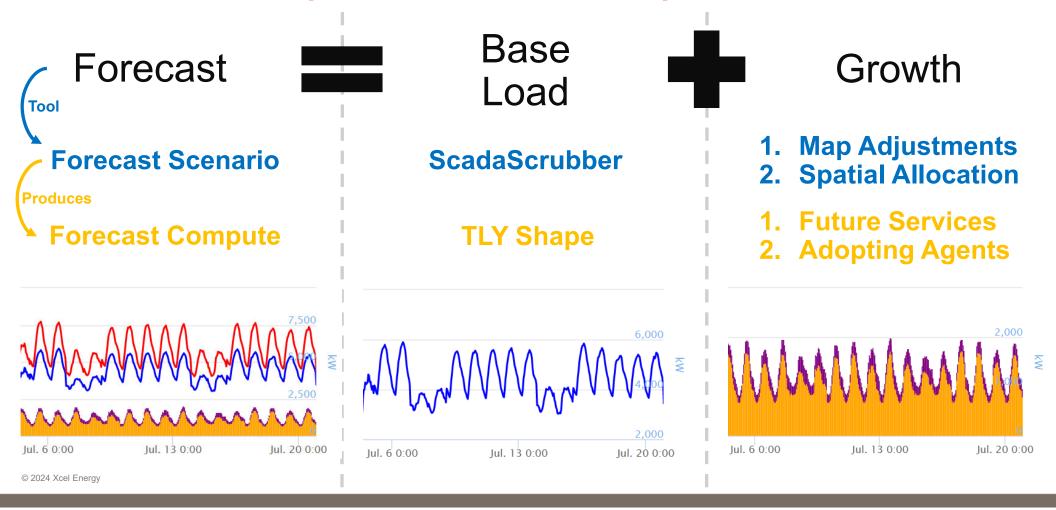
Bottom-Up Forecasting



Reconcile to your system-level forecast incorporating hourly load shapes, billing data, and AMI. The forecast is "snapped" to your core power flow planning application (CYME, Synergi, etc.) with batch processing.

- Aligns forecast to known data points for better integrity
- Enables time series and spatial analysis for off-peak planning

LoadSEER – Simplified Forecast Concept



LoadSEER – In-Depth Forecast Concept

This whole process end-to-end requires weekly attention by subject matter experts on a year-round basis to ensure that forecast results can be completed on time

Each input has to be translated into LoadSEER so it provides an accurate output

Each output requires quality assurance procedures to ensure high accuracy

Enhancements to the process are developed yearround

- Peak Load Growth
- Overloads
- Adoption Heatmap
- Weather Impacts
- 8760 Hourly Loads
- Substation & Feeder Geography

Outputs



LoadSEER

SCADA Scrubber

-IA

Interface

Inputs

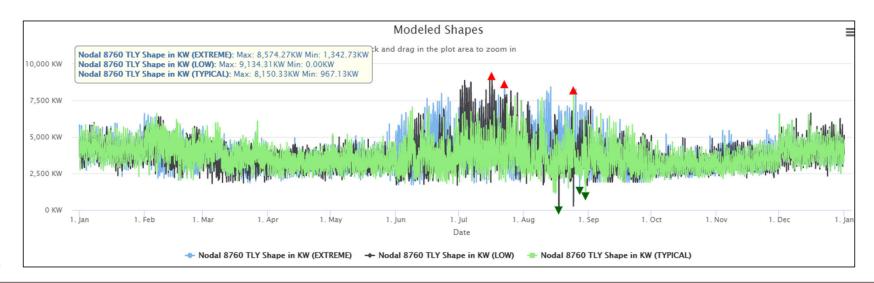
- Synergi Models
- GIS data
- Billing data
- Telemetry import & cleaning
- Spot loads
- Internal system-wide forecasts & their data inputs
- Load shapes
- Future adoption points
- Service territory maps

- Cleaned SCADA data
- Raw SCADA data
- DER data
- Historic peaks
- Asset hierarchy
- ATO contracts
- Load transfers
- Historical & Future Topology changes
- LoadSEER settings
- Weather Percentiles
- Import files

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Base Load - ScadaScrubber & Typical Load Year Shape

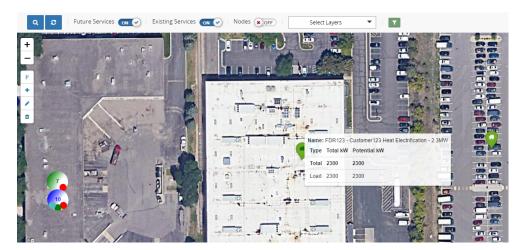
- Cleans historic SCADA Data
 - Correcting operational switching impacts and other data abnormalities
- Load and Weather Normalizes SCADA data to create Typical Load Year (TLY) 8760 Shape
 - Simulated against historical weather datasets
 - TLY had 3 weather scenarios: Low, Typical, Extreme
- TLY becomes base load shape in forecast, representing the load on the circuit today under different weather scenarios

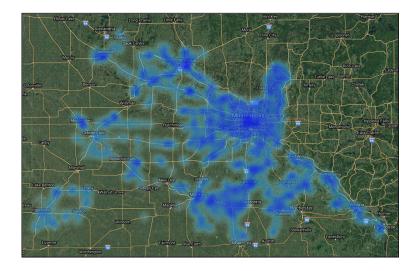


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Growth - Map Adjustments & Spatial Allocation

- **Map Adjustments:** Users can manually add future services to the map with information about load, inservice date, etc.
- Spatial Allocation: Simulates load growth
 - Takes forecast for high-level node, such as state or OpCo, and disaggregates to various customers on system
 - Probabilistic model for agent adoption determines likely innovators and imitators (clustering of adoption in neighborhoods)
 - Can deduct known adjustments to ensure alignment with forecast (guarantee)





LoadSEER – Spatial Allocation

Output

Integral Analytics

Xcel Energy

Spatial Allocation



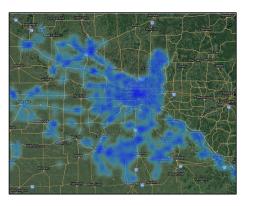
Future
Potential
Adoption
Points

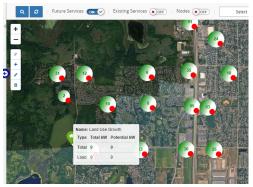


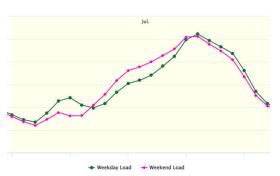
Shapes

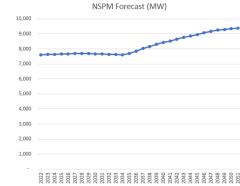


Forecasts



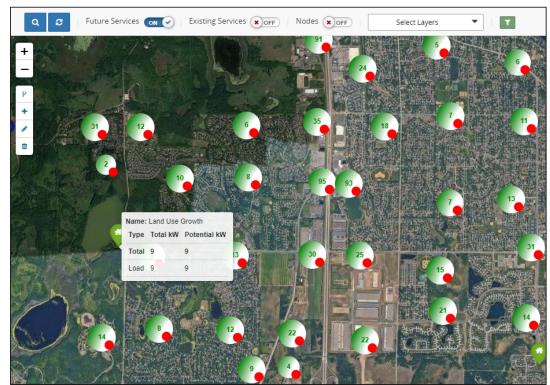






LoadSEER – Future Potential Adoption Points

- Future potential adoption points are imported by Integral Analytics (IA) using their data services
- Xcel guides IA in this process via:
 - Indicating which data services to target
 - Supply any relevant external data sets
 - Supply internal information regarding high adoption areas
- Xcel is still working to develop expertise and understanding on how to support this



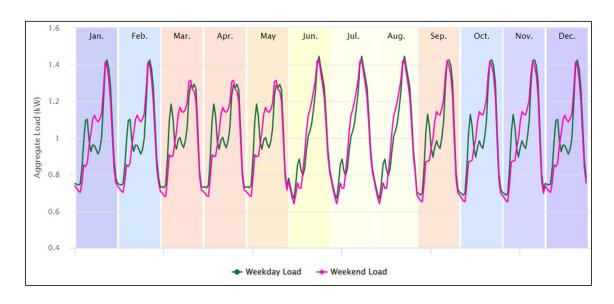
LoadSEER – Shapes

Shapes in LoadSEER:

- Provide estimation of customer loads and results in an improved 8760 forecast
- This is based on load research data and industry collaboration with NREL, EPRI, etc.
- We expect these shapes to improve with AMI data.

Shapes are required for:

- Forecasts
- Customer Types
- Adjustment Types



LoadSEER – Forecast Types

- Types of forecasts run in spatial allocation include:
 - Corporate Forecast
 - EV Forecast (LDV, MDV, HDV)
 - Solar (Rooftop and Community Solar Gardens)
 - Demand Side Management
 - Beneficial Electrification
 - Battery (Behind the Meter)

LoadSEER – How It Comes Together

- Forecasting layers are merged as different scenarios
- Spatial allocation is run for each forecasting layer within each scenario
- Example scenario setup:

MN Base	MN Base DER	MN Base DER +10%	MN Base DER +25%
• TLY Shape	• TLY Shape	• TLY Shape	• TLY Shape
 Adjustments 	 Adjustments 	 Adjustments 	• Adjustments
Corporate Forecast	• Corporate Forecast (EE, DSM)	Corporate Forecast	Corporate Forecast
	• EV Forecast (LDV, MDV, HDV)	• EV Forecast +10%	• EV Forecast +25%
	Beneficial Electrification	• Beneficial Electrification +10%	• Beneficial Electrification +25%
	(Residential)	• Battery +10%	• Battery +25%
	• Battery (Behind the Meter)	• Solar +10%	• Solar +25%
	 Solar (CSG, Rooftop) 		

LoadSEER – How It Comes Together

- After the spatial allocation is run for each of the scenarios:
 - LoadSEER merges the load growth from all the adoption points identified during spatial allocation
 - LoadSEER then aggregates all the data to the feeder/substation transformer levels
- Example forecast:

Node Name	NodeID	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
		Peak													
		Load													
Substation 1	SUB1	40335	40335	40403	40560	40573	40573	40573	40573	40573	40573	40573	40694	40831	40903
SUB1_13.8 kV	SUB1_13.8 kV	40335	40335	40403	40560	40573	40573	40573	40573	40573	40573	40573	40694	40831	40903
Substation 1 115/13.8 kV TR1	SUB1_TR1	29536	29536	29549	29690	29697	29697	29697	29697	29697	29697	29697	29779	29848	29892
Substation 1 115/13.8 kV TR2	SUB1_TR2	15621	15621	15684	15697	15703	15703	15703	15703	15703	15703	15703	15745	15822	15853
Substation 1 115/13.8 kV FDR061	FDR061	8930	8930	8934	8977	8982	8982	8982	8982	8982	8982	8982	8994	9012	9018
Substation 1 115/13.8 kV FDR062	FDR062	11994	11994	12001	12007	12008	12008	12008	12008	12008	12008	12008	12053	12095	12106
Substation 1 115/13.8 kV FDR063	FDR063	11201	11201	11205	11328	11330	11330	11330	11330	11330	11330	11330	11363	11379	11412
Substation 1 115/13.8 kV FDR081	FDR081	5814	5814	5818	5820	5824	5824	5824	5824	5824	5824	5824	5852	5882	5886
Substation 1 115/13.8 kV FDR082	FDR082	7780	7780	7786	7789	7790	7790	7790	7790	7790	7790	7790	7794	7825	7841
Substation 1 115/13.8 kV FDR083	FDR083	5831	5831	5875	5880	5881	5881	5881	5881	5881	5881	5881	5887	5893	5897
Substation 1 115/13.8 kV FDR084	FDR084	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Substation 2	SUB2	36623	36623	36652	36669	36679	36679	36679	36679	36679	36679	36679	36752	36886	37030
SUB2_13.8 kV	SUB2_13.8 kV	36623	36623	36652	36669	36679	36679	36679	36679	36679	36679	36679	36752	36886	37030
Substation 2 115/13.8 kV TR1	SUB2_TR1	17211	17211	17224	17232	17235	17235	17235	17235	17235	17235	17235	17271	17351	17427
Substation 2 115/13.8 kV TR2	SUB2_TR2	22295	22295	22309	22319	22325	22325	22325	22325	22325	22325	22325	22361	22410	22475
Substation 2 115/13.8 kV FDR061	FDR061	7004	7004	7008	7010	7011	7011	7011	7011	7011	7011	7011	7020	7026	7031

LoadSEER Challenges & Roadmap

Roadmap items include:

- Improving data integrity
 - More accurate TLY creation
 - Higher granularity shapes and forecasting layers
- Planning process improvements
 - Including AMI data
 - Integrate automation/scripting enhancements
- Using 8760 data in the planning process
 - Non-Wires Alternative analysis
- LoadSEER enhancements collaboration with Integral Analytics
 - Refining identification of future potential points
 - Enhancing LoadSEER to retain historical scenarios

AGENDA

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Integrating Concepts Demo

Discussion



PAUL VAYNSHENKStaff Distribution Planning Engineer

