ASTRAPÉ CONSULTING
innovation in electric system planning

Evergy GADS Data Processing and Neighbor Database Setup

DRAFT

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PREPARED FOR

Evergy

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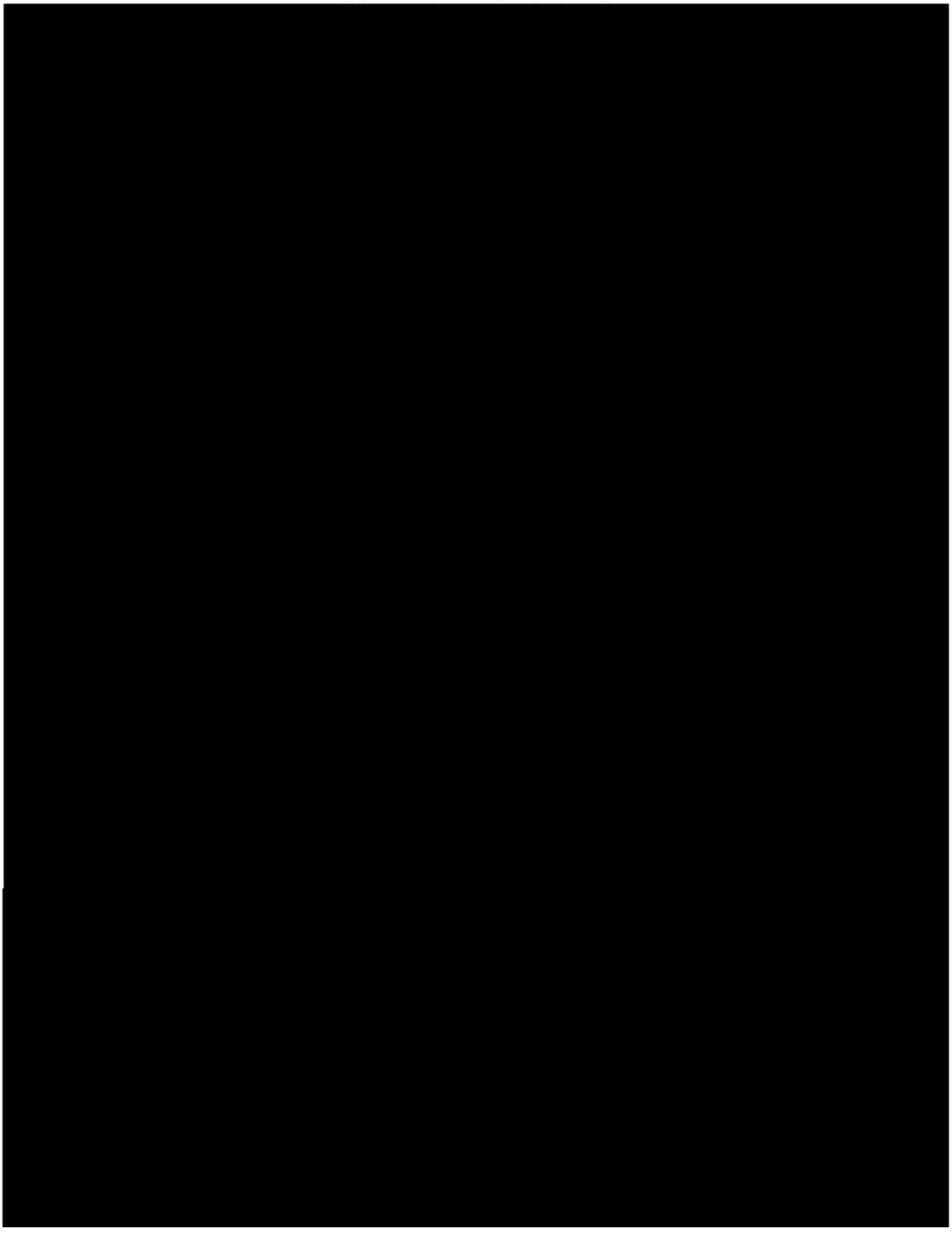
OUTAGE MODELING

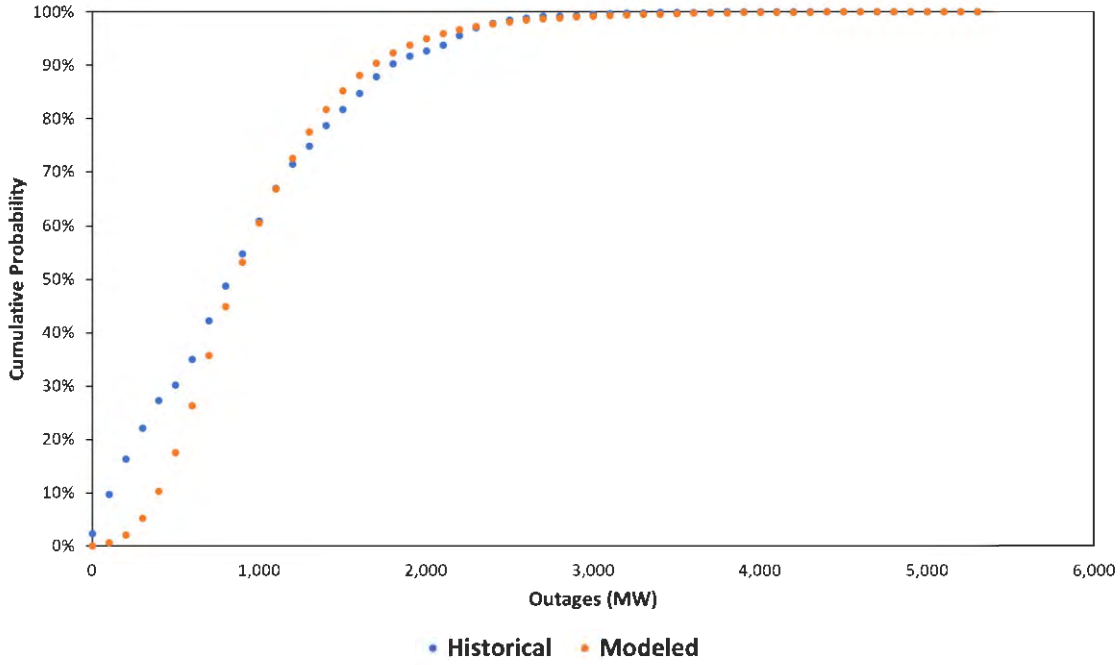
Astrapé was provided 5 years of historical GADs data by Evergy (2019-2023) which Astrapé then processed to create a set of SERVM inputs as well as to create the incremental cold weather outage adders to accurately reflect the incremental level of outages seen at colder temperatures. The resulting equivalent forced outage rates(EFORs) of the units are listed in the table below. Consistent with the work done for the 2021 Resource Adequacy Study, the CT's were capped at 30%. This GADS data was stored under the "2024 GADS" unit modifier while the existing GADs data was stored under the "Old GADS" unit modifier.

Table 1. Modeled EFORs(%)



To ensure the modeled outages were consistent with historical outages, a cumulative outage curve validation was performed. This step involved plotting the historical hourly outages and counting the number of hours with each level of outages and comparing it to the same curve modeled in SERVM. These curves are in Figure 1 below.

Figure 1. Cumulative Outage Curves



Modeling the incremental cold weather outages also involved plotting the hourly forced outages by unit type against an hourly temperature profile and then averaging the level of outages seen at each temperature. The outages were separated by their unit types into the following categories: combined cycle, combustion turbines, and coal/diesel units. As Figures 2 and 3 show below, the combined cycle (613 MW of nameplate capacity) and coal/diesel units (6,693 MW of nameplate capacity) did not show any incremental outages as temperatures decreased so there were no additional outages modeled for these unit types.

Figure 2. Combined Cycle Average Outages

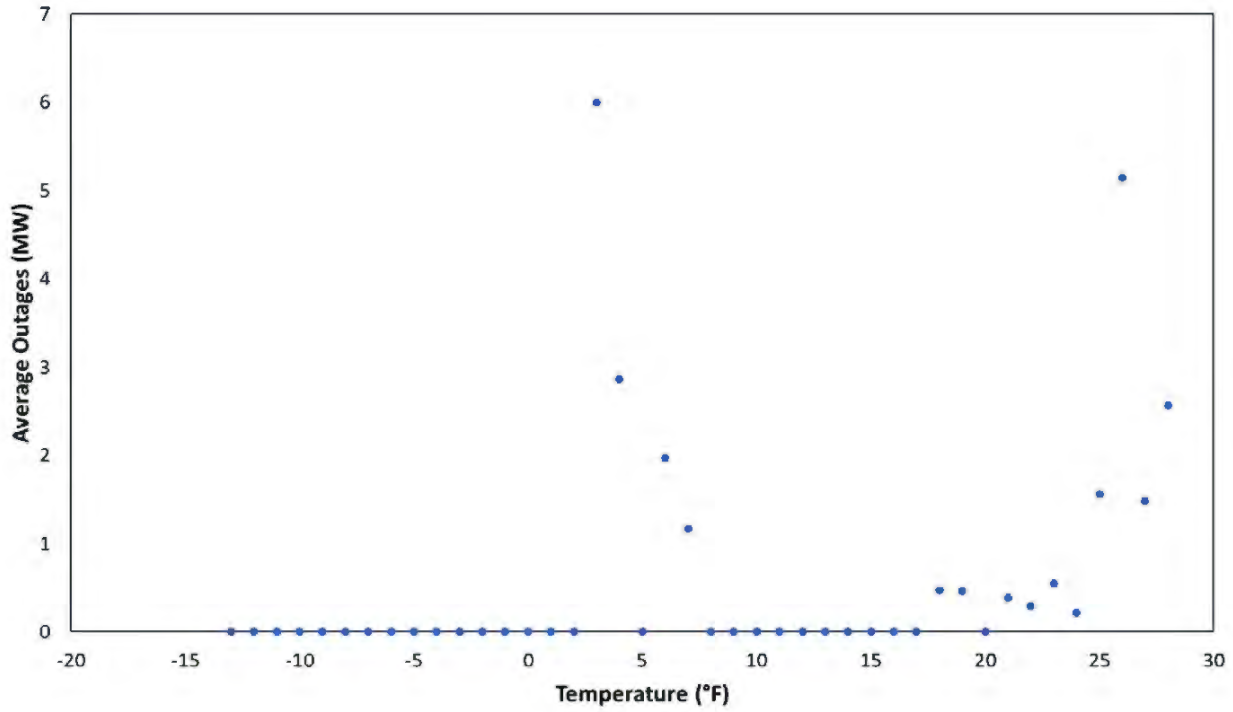


Figure 3. Coal/Diesel Average Outages

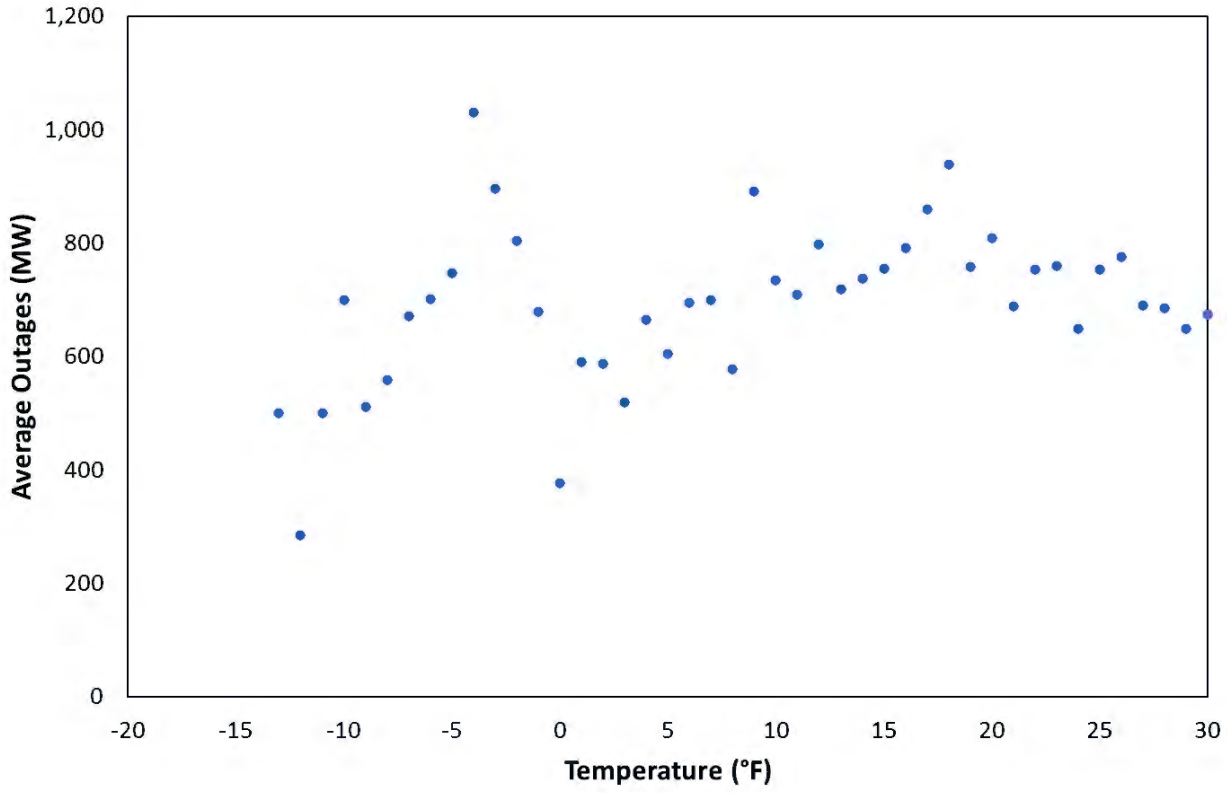


Figure 4 shows the resulting curve for the combustion turbine (2,721 MW of nameplate capacity) and Figure 5 shows the modeled incremental outages along with historical incremental outages. The combustion turbine units in SERVM were given an incremental forced outage rate and tied to a weather profile so that as the temperatures decrease, the units have an increased chance of going on forced outage.

Figure 4. Combustion Turbine Average Outages

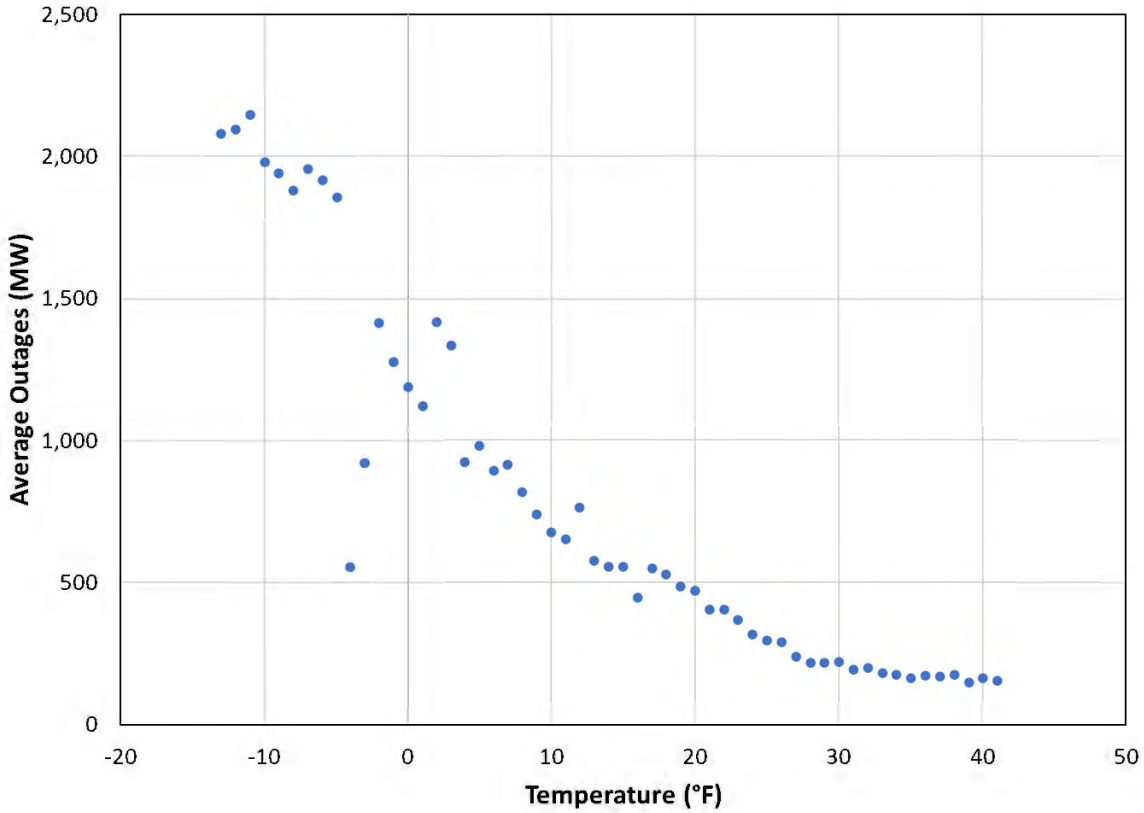
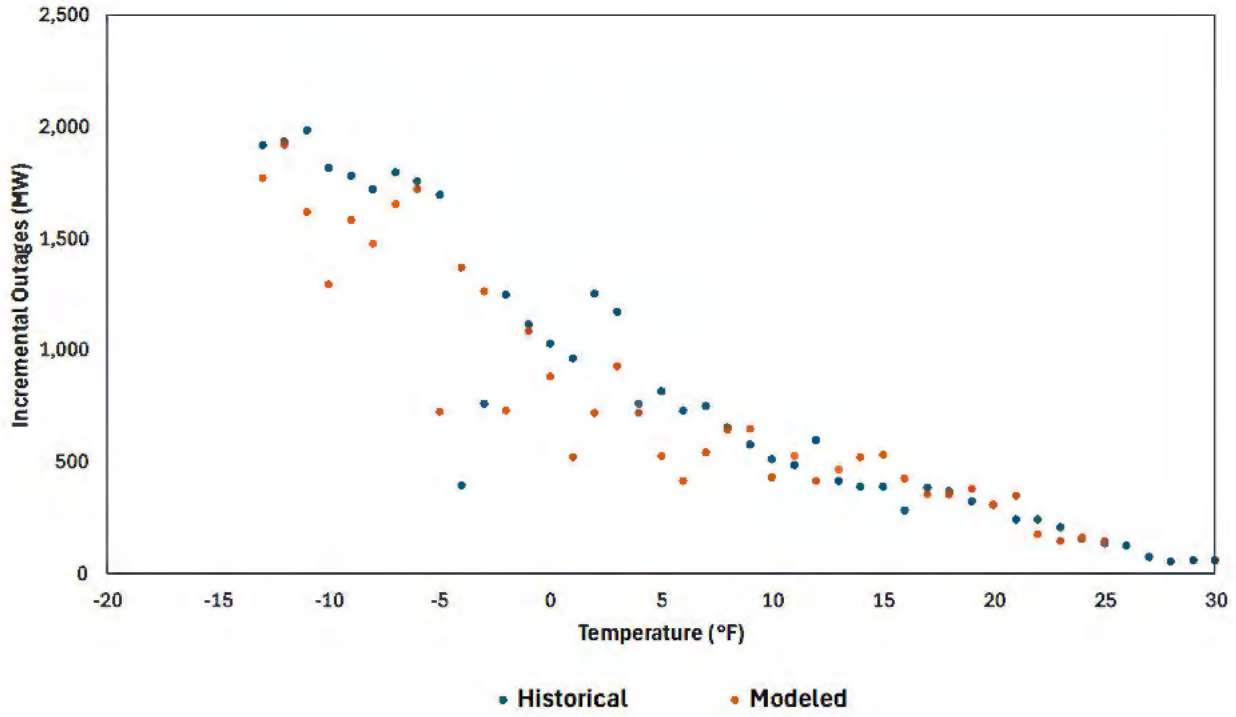


Figure 5. Combustion Turbine Incremental Outages



NEIGHBOR MODELING

SOUTHWEST POWER POOL

Astrapé used publicly available data to model the neighboring regions of SPP Load Zones 1-6. As a starting point, the EIA 860[1] form was used to provide generator data. As shown in Table 2, below, different entities were mapped to each SPP load zone.

Table 2. SPP Entity Mapping

Region	EIA 860 Entities Included
SPP Zone 1	Western Farmers Electric Co-op
	Northwestern Energy
	Corn Belt Cooperative
	Basin Electric
SPP Zone 2	Lincoln Electric System
	Nebraska Public Power District
	Omaha Public Power District
SPP Zone 3	Sunflower Electric
	Kansas Electric Power Co-op
	Midwest Energy
SPP Zone 4	City of Springfield
	City of Coffeyville
	Kansas Municipal Energy Agency
	Missouri Joint Municipal EUC
SPP Zone 5	Southwest Public Service
	Golden Spread
SPP Zone 6	Arkansas Electric Cooperative Corporation
	Empire District Electric
	Grand River Dam Authority
	Northeast Texas Electric Co-op
	Oklahoma Gas and Electric
	Oklahoma Municipal Power Authority

[1] https://www.eia.gov/electricity/data/eia860/xls/eia8602023.zip

	Public Service Company of Oklahoma

Using these generators the SPP load zones were calibrated to 0.1 LOLE for 2029, 2033, and 2040. To add future capacity, nameplate capacity was added to the zones based on the following breakdown: 40% Gas CT, 25% Wind, 25% Solar, and 10% Storage. This heuristic was developed by consulting the available IRPs for the larger entities within SPP and developing a general trend in the buildouts that were published.

SERVM uses a pipe and bubble transmission framework. For the SPP topology, the transmission capability. The transmission limits were based on the 2024 ITP Study and the values used in the SPP SERVM LOLE model were provided directly from SPP to ensure that the Evergy database matched the SPP topology.. See Figure 6 below for a visualization of the topology along with Table 3 for the transmission capability MW limits modeled in SERVM.

Figure 6. Study Topology

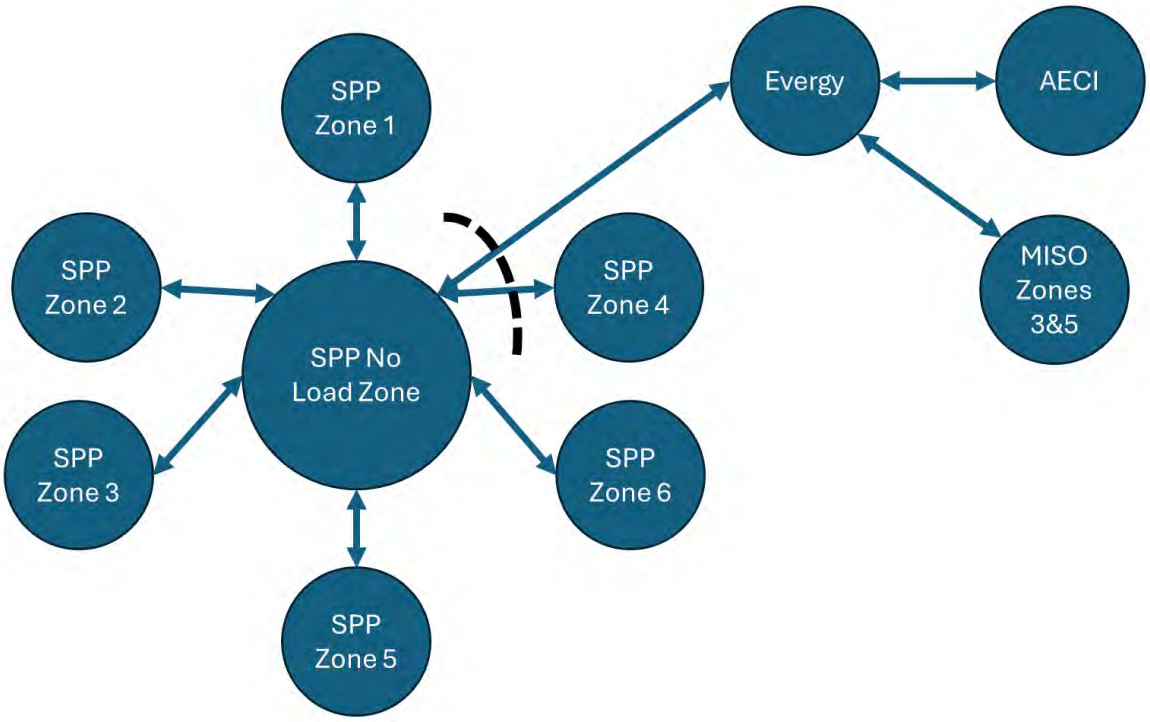


Table 3: SERVM Transmission Limits *CONFIDENTIAL*[2]

MISO LRZ3_5 AND SERC AECI

MISO LRZ3_5 was built out to match the MISO 2A Futures buildout and SERC_AECI was based on the Astrapé's Eastern Interconnection database which has been built out to match publicly available data from EIA, FERC, publicly available IRP's, etc.

[2] The transmission ties to Evergy and SPP Zpne 4 from the No Load Zone share an aggregated limit so that the total import and exports into and out of the No Load Zone does not exceed the values in the table.