

sion grid is about six hours. By the end of the fourth hour, several of the faster coal plants in the red island have cranked, so the transmission in that island can be largely energized, with load added regularly as the units ramp up. The green island likewise has several units operating by this point. The blue island is slower to energize the transmission system because the first few generators are used to supply the critical loads in this area and begin the cranking process for slow-start, large coal plants needed for later in the restoration. A similar metric is the time to restore 50% of the load, which for this scenario is about 12 hours. Reference [23] discusses a timeframe of 7-16 hours for most of the transmission grid to be restored, and simulated scenarios for industry training sessions in [29] involved about half the system load served by hour 13.

The time for full restoration was 36 hours, as can be seen in Fig. 5. The last set of load requires the second large coal unit to be cranked and ramp up so that there can be sufficient energy reserves. Reference [3] suggests 90% of the load to be restored in 6 hours as a goal, but this may be with assistance from neighboring transmission. Data reported from simulation in [29] suggests about 32 hours to full system restoration for that particular study.

VI. SUMMARY

This paper presents a methodology to build and validate synthetic datasets for blackstart restoration scenarios. It delineates dataset feature requirements to be adequate for restoration studies and assembles test case datasets from synthetic base power flow cases, with restoration parameters gathered and validated from available public resources. Lastly, the paper presents a heuristic feasible strategy for solving the restoration problem based on directed graph decomposition. The purpose is both to provide a benchmark solution to the synthetic scenario case, and to validate the dataset overall against actual energization profiles. All of this is demonstrated on a geographically-embedded, realistic 200-bus test case for which all data is publicly available [17] including a benchmark restoration plan action sequence and associated time series simulation data.

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