

Spokane Microgrid Distributed Generation and Storage



TEAM SMART SPOKANE

PROBLEM STATEMENT

Downtown Spokane, WA experienced a major transmission line loss due to a windstorm in 2015. Power was not able to be restored for four weeks and facilities vital to the public were out of service. The city unfortunately lacks sufficient alternative power sources to supply these critical loads in case of emergencies. These critical loads must be served during major outages in order to maintain the safety and health of the citizens of Spokane.

SOLUTION

Avista Utilities is working with federal programs such as Smart Cities to develop a smart grid for Spokane. As a part of the smart grid package, a microgrid will be developed for the downtown area. These developments will improve reliability of the power service and thus raise the level of quality service, and also decrease costs caused by blackouts.



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POWERWORLD SIMULATION:

Simulation of the design helps us understand the steady state operation of the microgrid. This information can then be used for analysis such as load shedding schemes.

ENERGY STORAGE:

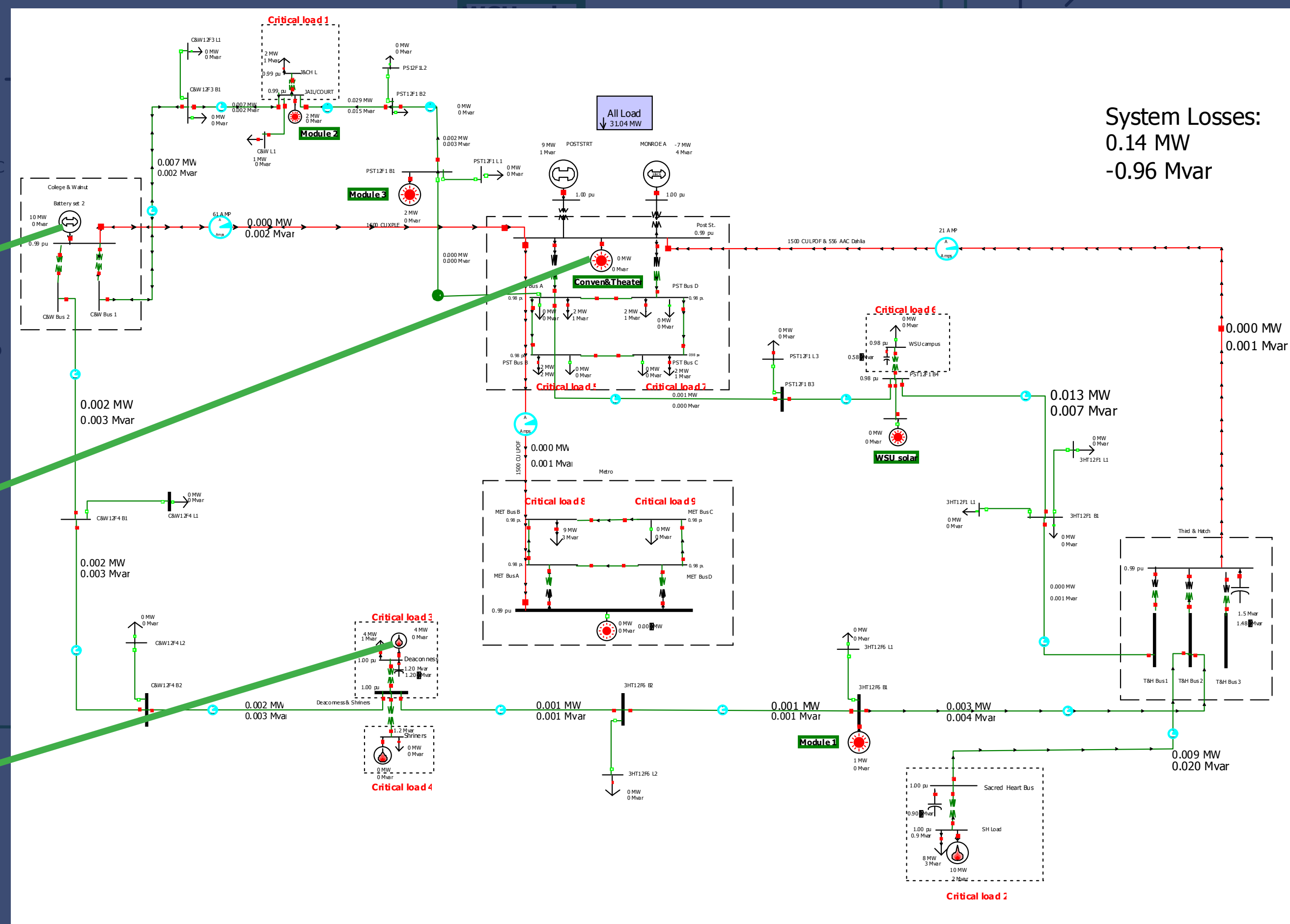
Hospitals and critical facilities alike suffer severely from sudden loss of power. Installation of megawatt level batteries will help reduce these problems. The chosen Vanadium Flow Batteries can also help to offset peak load times.

SOLAR POWER:

The chosen solar panel is the Sunmodule Bisun. This bidirectional solar panel will improve energy collection, particularly during the winter months when snow covers the panel's front.

GENERATOR FUEL CONVERSION:

There are underutilized generators in Spokane that can be brought to supply the microgrid. To increase use, Diesel/Natural Gas Hybridization kits will be used to reduce the environmental impact of the diesel exhaust.



PROJECT RESULTS

- Provided option for converting 18 diesel generators into a 70/30 natural gas to diesel operation. Thus enabling the microgrid to benefit from an extra 14.75 MW of power.
- Designed switching scheme in order to synchronize photovoltaics, batteries, and backup generators to the microgrid.
- Determined 37 building locations to place photovoltaic generation on, which would generate approximately 5.59 MW of power to feed the microgrid.
- Provided option for battery banks storing 15.5 MW of power (worst case scenario to match load profile) to feed the system from 3 different locations.
- Developed a Powerworld simulation showing the microgrid power flow during summer, fall, winter, and spring seasons.