# Four Possible Long-Term Scenarios Topics for 2022–2023 SWG Study Effort (20-year Horizon)

## Climate-Change-Driven “Worst Case” Scenario

What bulk power system (BPS) vulnerabilities will a worst-case, climate-change-driven drought produce across the Western Interconnection over a 20-year horizon? What system impacts will potentially result from the combination of long-term drought with any other affecting events or conditions?

Drought and specific events continue to increasingly affect system performance across the Western Interconnection, yet little to no consideration is being given to any “worst case” scenario. That gap prevents any meaningful decision-making to best prepare for such events and avoidably jeopardizes BPS operation. This examination will treat this extreme scenario to illustrate—at least initially—possible system performance profiles and direct the audience to what may be needed to mitigate worst-case results.

* Consider the scenario against load-growth projections.
* Refer to “climate” models from subject experts.
* Refer to other WECC work on extreme natural events.

## Microgrid Impacts Study

What is the potential significance of microgrid technology deployment, and how will microgrid deployment across the interconnection potentially affect BPS performance?

Microgrid technology offers advantages to delivery system stability and is being deployed world-wide (e.g., U.S. military) for that reason. Deployment across the North American BPS is inevitable but not being analyzed for its potential operational significance; this study would help bridge that gap in understanding.

* Consider significance to system stability (advantages/disadvantages), generally and with specific deployment projections (e.g., stabilization of high-vulnerability points vs. creation of operational complexity).
* Will proliferation be determined by cost?
* Use context of a potential “national grid” effort reference/review?
* Old WECC study as reference (Tres Amigos)?

## EV Deployment Impacts Scenario

How will extensive EV use across the WI potentially affect the performance of the BPS? What role will battery charging practices occupy in the system? What system stability risks can be associated with that role? Can specific EV battery use practices be encouraged to improve system stability? Will practice requirements be needed?

EV deployment is expanding more rapidly than previously projected and already encompasses individual consumer, freight, and a broader transit sector. The BPS is unchanged in response to this expansion, despite it likely being the single largest change in system history. Without modification, unrestricted consumer access to the technology leaves the system vulnerable to unmanageable load conditions. This scenario study will examine the significance of EV growth on the performance of the Western Interconnection.

## Impacts of Emerging Resources

How might expanded use of hydrogen resources affect the stability of the Western Interconnection? To what degree could hydrogen displace other resources, and which resources would be replaced? Will hydrogen offer system stability advantages over other resources, and, if so, what significance will that have in the expansion of hydrogen as an energy resource?

Hydrogen’s base load requirements distinguish it from other emerging technologies. It could be a key resource to replace fossil fuels, but little analysis has been performed to consider the profile of the Western Interconnection with hydrogen in that role. To avoid being unprepared, as is appearing with EV deployment, this study will evaluate potential advantages and disadvantages of a hydrogen-profiled BPS.