

Scenario: Using the three area mini WECC system, Figure 1, a 200 MW step event was simulated in the South (Area 3) at $t = 2$. Initially, ≈ 2545 MW are being sent South over the COI. MW flows from Bus 89 to Area 3 are compared for both a 200 MW load step and a -200 MW generation step. Additionally, ω input to three generators in the North (Area 1) were delayed by 40 seconds. The combined MW capacity of the generators with delay is 16,900 MW, which is $\approx 40\%$ of the area governed capacity or $\approx 13.8\%$ of the total system governed capacity.

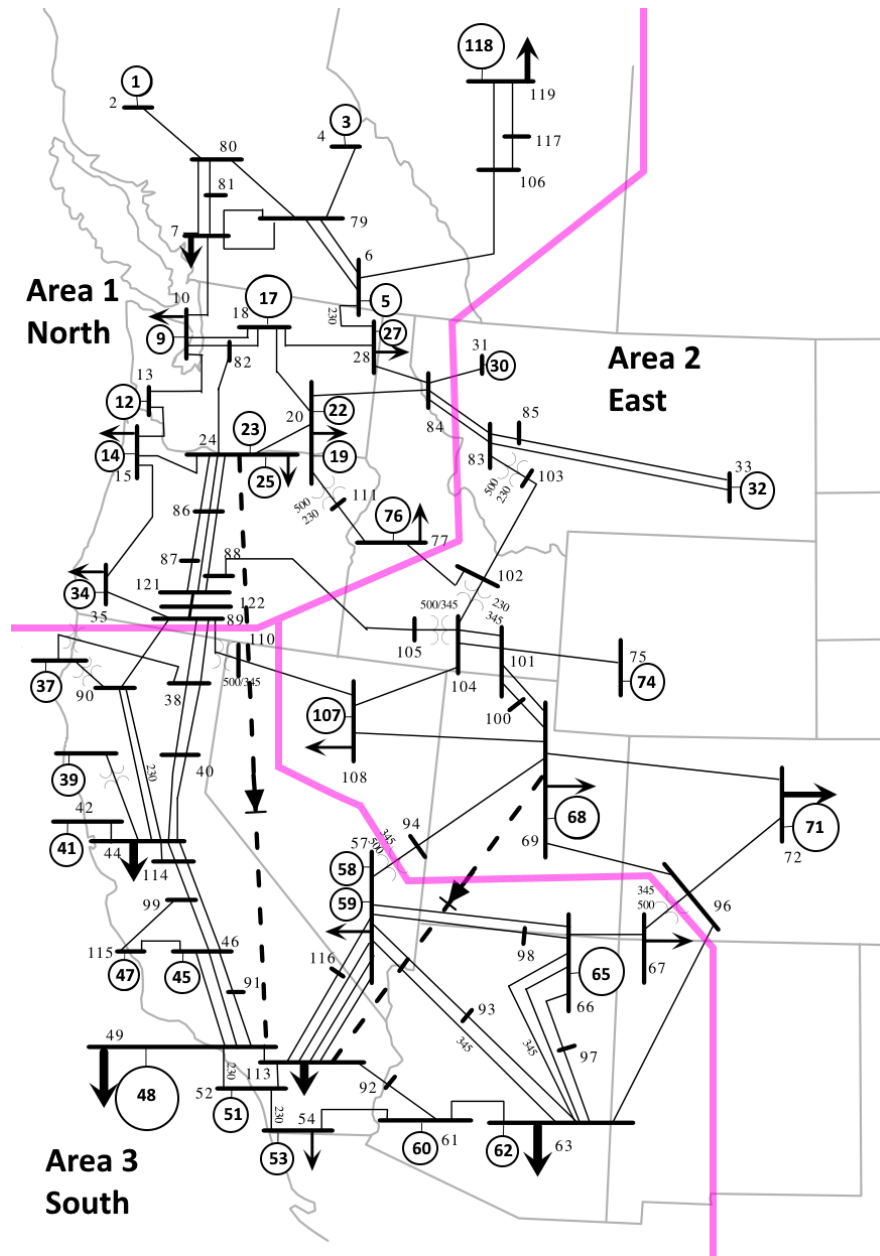
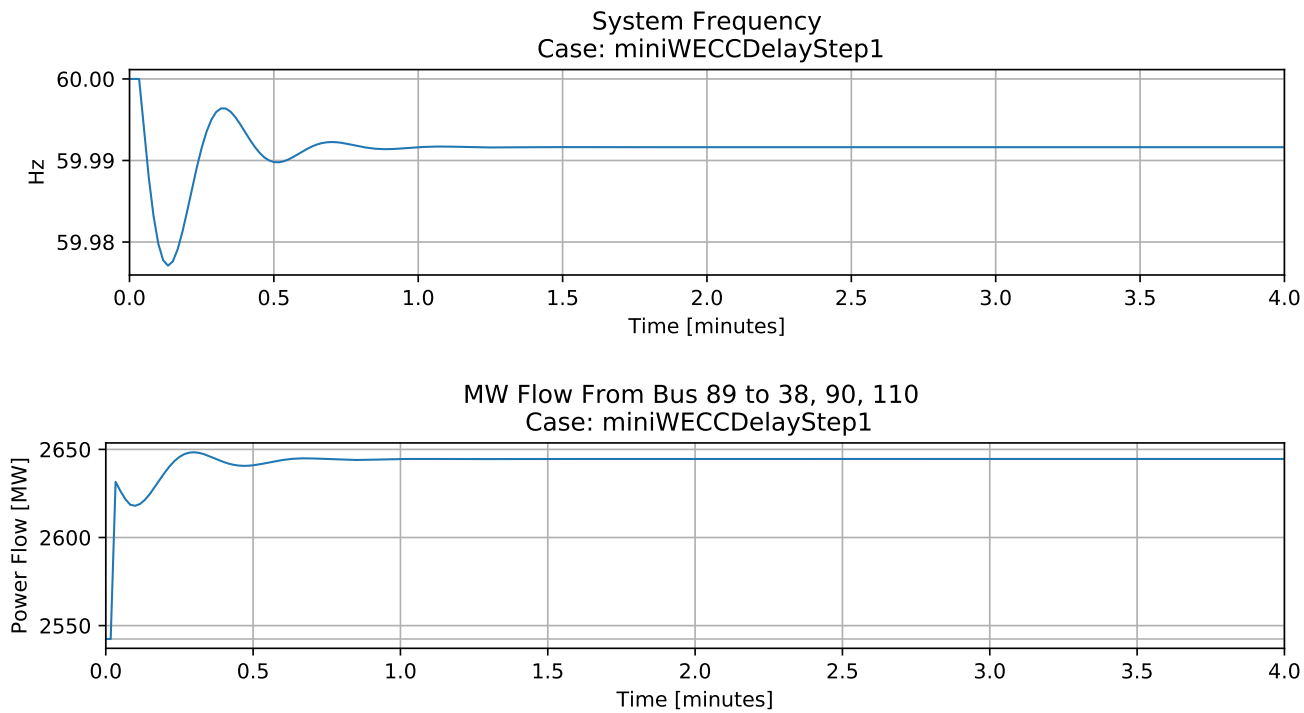


Figure 1: Three Area Mini WECC system.

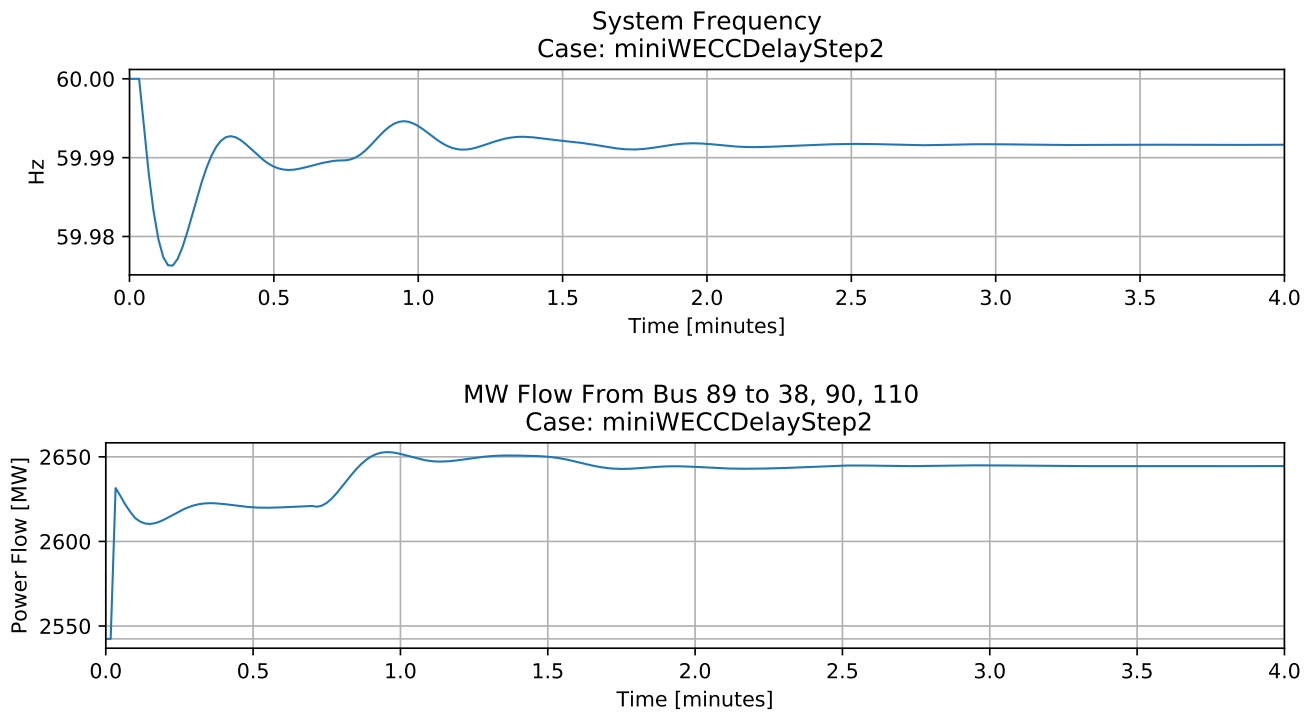
Results: In a system of this size, delaying governor response has negligible effect on frequency nadir, however, the delay introduces a second frequency perturbation roughly 40 seconds after the first frequency event that leads to a slight MW flow over response from $t = 1$ to $t = 1.5$ minutes. Additionally, while the frequency response appears essentially the same between load step and generation step cases, MW flow is approximately 25 MW larger during a load step.

Base Case - Load Step +200 MW

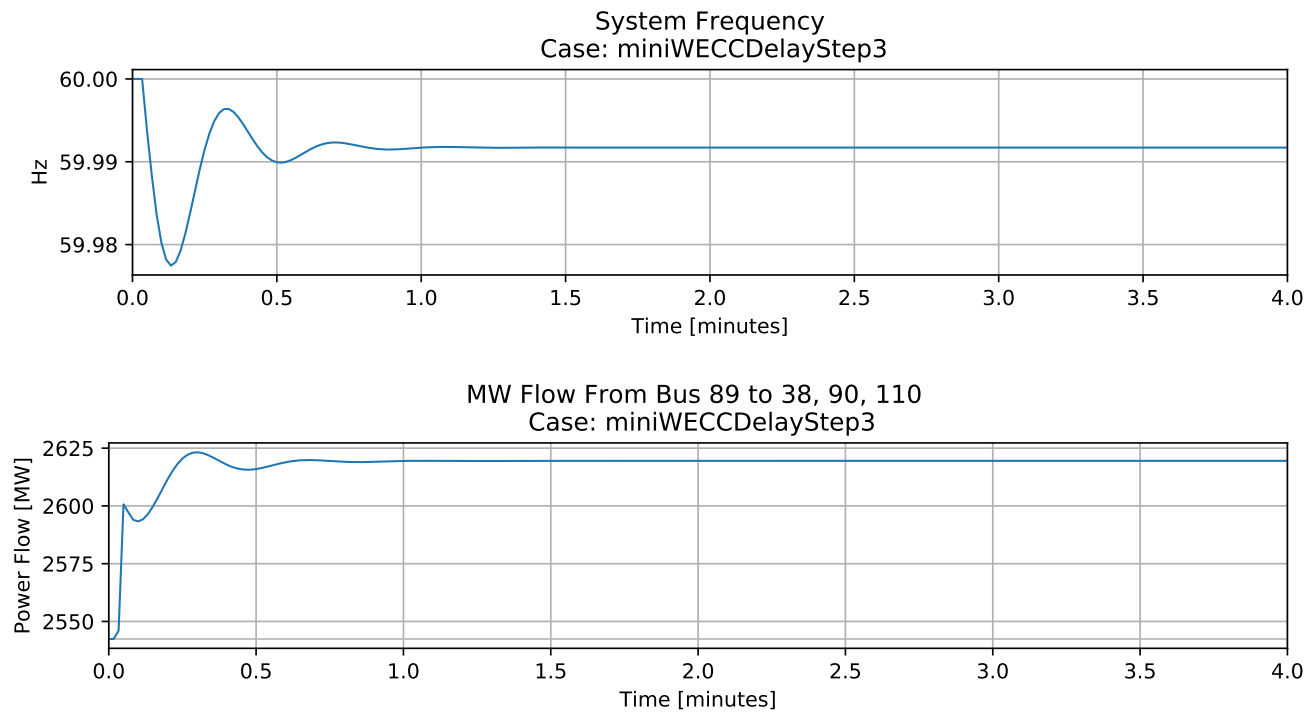


Delay Case - Load Step +200 MW

Input ω was delayed by 40 seconds.



Base Case - Generation step -200 MW



Delay Case - Generation step -200 MW

Input ω was delayed by 40 seconds.

