This paper proposes a general framework for determining the effect of communication delays on the convergence of certain distributed frequency regulation (DFR) protocols for prosumer-based energy systems, where prosumers are serving as balancing areas. DFR relies on iterative and distributed optimization algorithms to obtain an optimal feedback law for frequency regulation. But, it is, in general, hard to know beforehand how many iterations suffice to ensure stability. This paper develops a framework to determine a lower bound on the number of iterations required for two distributed optimization protocols. This allows prosumers to determine whether they can compute stabilizing control strategies within an acceptable time frame by taking communication delays into account. The efficacy of the method is demonstrated on two realistic power systems.