

### **OCS Data Request 3.21**

NPC – Page 12 – Mr. Duvall discusses that the value of generating energy during startups is small. Concerning this portion of Mr. Duvall’s testimony, please respond to the following:

- a. “Extra reserves have to be held back to provide intra-hour regulate down services for the gas plant while it ramps up to minimum load.” Please explain in more detail what is meant by “have to be held back” and “regulate down services for the gas plant while it ramps up to minimum load”.
- b. “Reserves for regulate up services would also need to be held when the gas units cycle off from minimum load. If these are met by hydro resource, then the value of the energy during startup would be near zero.” What evidence, or mathematical proof does the Company have that shows that the value of gas generation when units cycle off from minimum load is near zero given that hydro reserves are needed during this cycling period. Please supply that information electronically with all formulas intact.
- c. “If the ramping was done by coal plants, the value would be based on coal fuel cost savings” – Why would the value necessarily be based on coal fuel cost savings. Couldn’t a coal unit that ramps and produces energy, avoid higher cost gas generation or market purchases?
- d. “...and would need to account for the cost of operating the coal plant at a higher heat rate than it otherwise would have operated.” Is Mr. Duvall taking the position that because a coal unit operates at a less efficient point while ramping, that coal units at lower efficiency results in the energy generated during ramping having no value?

### **Response to OCS Data Request 3.21**

- a. Due to their operating characteristics, when a gas plant is started it must ramp up from zero output to its design minimum output, with no stopping or holding in between, at the units design ramp rate. This required “ramp to minimum” most often occurs at a rate that exceeds that rate of load rise during the same period. Therefore, in order to avoid an over-generation condition, other plants must “regulate down” to keep the overall system in balance.
- b. Similar but inverse to the example in 3.21.a, when a gas unit ramps off line, it must follow a operating design ramp rate from minimum load to zero output, with no stopping or holding in between, at the unit’s design ramp rate. Likewise, this required “ramp to zero” occurs at a rate that exceeds that rate of

load decrease during the same period. So, in this case, in order to avoid an under generation condition, other plants must “regulate up” to keep the overall system in balance.

- c. This comment is applicable to the scenario in 3.21a. As the gas unit ramps up and other units (coal units in this example) back down they reduce their fuel input and there are resulting fuel cost savings. To the extent that *another* gas unit can provide the “regulate down” service, the fuel cost saving would apply to the gas generation. This regulation need occurs during the operational hour. Since there is no intra-hour power market, that generation, once regulated down, cannot be raised back up intra-hour to displace a hypothetical intra-hour purchase.
- d. Again as applicable to the scenario in 3.21a. If a coal unit is backed down to regulate down for a ramping gas unit there are coal fuel cost savings. However, that savings is offset in part by efficiency losses due to operating the coal plant at a less efficient operating point.

Because there are no intra-hour markets for energy, energy generated during startups must be accommodated within the Company’s own system and cannot be sold at market prices. The benefit, then, is the value of the fuel saved when regulating down. However, that benefit is offset by lower efficiency rates at the regulating plants as well as, of course, the cost of fuel to power the starting generating. It is this combination of factors, along with the fact that using hydro to regulate up and down has little to no cost, that explain Mr. Duvall’s statement that the value of energy during start-up is small.