

**OMS Regional Planning Work Group Staff Comments on the Proposed Methodology for
Future Scenario Weighting**

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OMS Regional Planning Work Group (RPWG) Staff appreciate the opportunity to comment on the MTEP Future Scenario Weighting methodology proposed at the April 25, 2012 PAC meeting. Although we support the exploration of how to improve the current scenario weighting process we have a number of concerns with the proposed methodology.

Probability distributions are used for predicting random variables and the shape of a probability distribution is based on past history. If the population follows a normal probability distribution, then for any sample size the sample mean will also be normal. However, if you start with a distribution that is skewed or has thick tails, it may require sample sizes of more than 30 to observe the normality feature.¹ There are a number of uncertainty variables that we use in the MTEP process for which we do not have even 30 data points. For example, the MISO market has been in existence since 2004. We have seven years of demand and energy growth rates for the MISO footprint. We also do not have 30 years of data on emission costs.

Then there is the Black Swan problem-assuming a normal distribution will understate the probability of an unlikely event. The financial sector faith in the Black Scholes Model led to ruinous results. Many ignored warnings because of their faith in or ignorance of statistical modeling. In the energy industry the judgment of a wide variety of professionals working in the industry may provide a better assessment on some uncertainty variables than probability distributions.

In addition, probability distribution functions are utilized to help us predict random variables. However, some of these uncertainty variables are driven by public policy and changing technology. Will a probability distribution function based on historical data be an appropriate predictor of coal retirements under the new EPA regulations? Will a probability distribution function based on historical data be an appropriate predictor of fuel costs if the federal subsidies go away? What would be the probability of today's natural gas price based on a probability distribution function? What happens to the probability of a low gas price if the EPA changes its regulatory policy on fracking?

Some variables may be conducive to this approach, for example the overall inflation rate. There should be very careful consideration of which uncertainty variables are appropriate for this type of probability assignment.

Another problem with this methodology is that there is likely to be covariance between some of these variables. It is the *combination* of variables within a scenario that determines its plausibility, for

¹ MISO claimed that 30 data points is good enough to apply Central Limit Theorem (CLT). However, CLT doesn't state anything about sufficient sample size. In fact, in certain cases, it never converges to normal distribution with any sample size.

example, the combination of low demand growth coupled with higher RPS standards would make a scenario less plausible. One must be careful in assuming that the average of the probabilities of individual variables represents the probability of a particular scenario. This problem is not addressed in the proposed methodology.

Some lessons could be learned from the EISPC/EIPC process. EISPC used a diverse group of experts from different fields to judge the plausibility of variable combinations within a number of possible futures. Linking an expansion planning model to a macro-economic model with feedback loops to prevent inconsistent reactions between the “interdependent variables.” is a very good idea. The other lesson from EISPC is the development of “strategies” or detailed transmission plans to accommodate a range of scenarios. Risk assessment can be conducted to identify elements which may put the strategy at severe risk.

OMS RPWG Staff acknowledges the difficulty of predicting these uncertainty variables and the assignment of probability to various scenarios. We are supportive of continued exploration of this issue in the new economic modeling user group as well as in the PAC.