**Panel Session, Calculation of LOLE, Probabilistic Line Flows, Extreme Renewables in ERCOT**

by Eugene G Preston
Transmission Adequacy Consulting

Methodology: A Direct Calculation procedure avoids problems with Monte Carlo

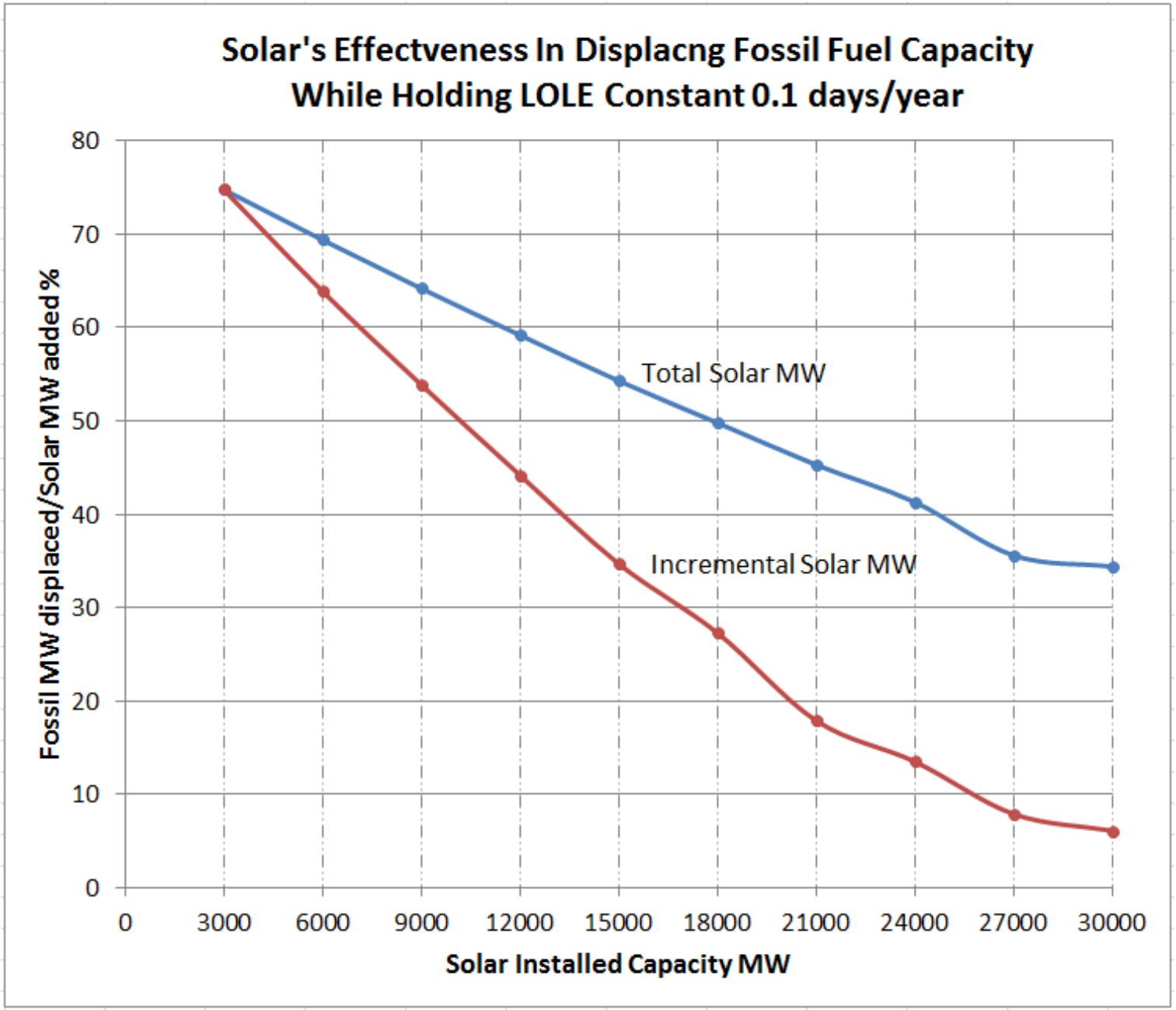
Uncertainties: Use hourly historical load and renewables data directly to avoid study biases

Modeling Transmission:
* Transmission forced outage rates can be estimated from a few system snapshots
* Highly simplified networks are hard to create and hard to link to the real network
* Probabilistic flow distributions can be easily calculated for a few lines in a full network
* A two area probabilistic LOLE model is the simplest in that the electric network is elementary

Reliability Indices Simplified Definitions:
* LOLP loss of load probability is the probability each hour of not meeting the demand
* LOLE loss of load expectation is the annual sum of daily maximum LOLP's
* LOLH loss of load hours is the annual sum of hourly LOLP's

Study Results for Extreme Renewables:
* The renewable’s capacity credits decline as more renewables are added
* Reserve margins are likely to need to be increased to maintain the same system reliability

- **Can a reserve margin be a proxy for LOLE when renewables dominate?**
  - Not likely because of the moving target of renewable's capacity credit



**ERCOT 2010 HISTORICAL PEAK DEMAND DAY WITH 24 GW WIND AND SOLAR AT 0 GW AND 30 GW**