This paper presents the proof of concept for a new solution to the problem of recomposing missing information at the SCADA of energy/distribution management systems (EMS/DMS), through the use of offline trained autoencoders. These are neural networks with a special architecture, which allows them to store knowledge about a system in a nonlinear manifold characterized by their weights. Suitable algorithms may then recompose missing inputs (measurements). The paper shows that, trained with adequate information, autoencoders perform well in recomposing missing voltage and power values, and focuses on the particularly important application of inferring the topology of the network when information about switch status is absent. Examples with the IEEE RTS 24-bus network are presented to illustrate the concept and technique.