With the deregulation of the electricity sector, organized electricity markets have been established in many parts of the U.S. These electricity markets are currently operated by the independent system operator (ISO), whose responsibility includes reliable system operation, market administration and system planning. Different from many exchanged-traded commodities such as oil, gas, corn, and wheat etc., electricity cannot be stored in a large quantity. Maintaining the balance between supply and demand on a second to second basis becomes an important part of the electricity market operation. To satisfy such reliability needs, in addition to the energy product, ancillary service products such as regulation, reserves and capacity, have been created and traded in the electricity markets in the last two decades, making the operation of electricity market much more complicated. This talk will start with the major responsibilities of the ISO and provide an overview of the current state of wholesale electricity markets. Each type of the markets and the corresponding operational process will be discussed. Finally, challenges for the future grid operation will be presented.