Electric Transmission

- Electrical energy cannot be stored in large amounts
    - It must be used immediately when generated

- Major sources of electric generation are coal, hydro, natural gas, and wind
    - Coal is good for base load (continuous operation)
    - Hydro can respond quickly but is often limited by water schedules
    - Natural gas is good for “peaking”, running during peak load hours of a day
    - Wind is “fuel replacement”, not ideal for reliability, but allows other generation to reduce at times of high wind

- Electrical load varies during the day by hour, and also seasonally as well

- Therefore in real time all sources of generation are blended into the grid to service the load

- Regional markets are set up to help schedule generation most economically

- Electricity follows the path of least resistance
    - This makes it difficult to route along a specific path
    - Can result in transmission limitations

- Electricity transmission capacity and efficiency increases with higher operating voltage
    - Electricity is most useful for the consumer at a lower voltage
    - Bulk electric transmission uses as high a voltage as possible
    - Alternating Current (AC) allows easy conversion of voltage with transformers

- Transmission operators must respect North American Electric Reliability Council standards
    - Loss of any single network transmission facility should not result in loss of customer load