

### 03-Electric Power Systems

Text: 1.6 - 1.7

ECEGR 451  
Power Systems



### Overview

- Transmission
- Distribution
- Load
- Load Duration Curve
- Generator Dispatch

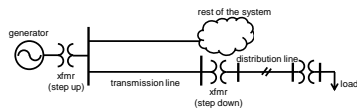
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### Introduction

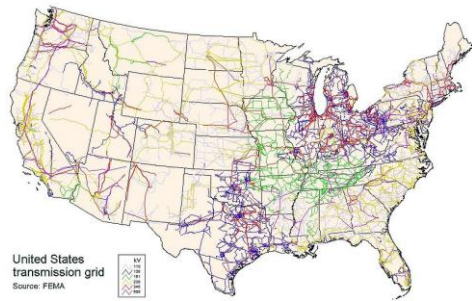
- Power systems can be divided in to three sub-systems
  - generation
  - transmission
  - load
- Transmission is often separated into transmission and distribution



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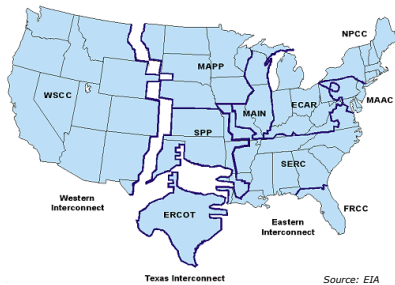
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### Transmission



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### Load



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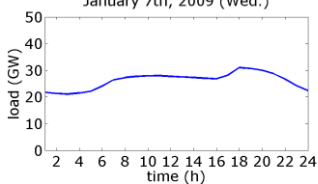
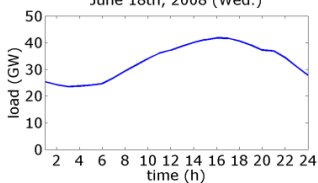


### Load


- Contiguous US: 760,108 MW
- Load follows patterns (Load Profile)

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- Seasonal impact of load (California)


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### Generator Commitment

- System operators attempt to **dispatch** and **commit** generators to match supply and demand, plus a safety margin in case of a contingency
- Mismatch in load and supply results in frequency deviation from the nominal (60 Hz)
- Prolonged or severe deviations damage equipment and can cause blackouts


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### Generator Commitment

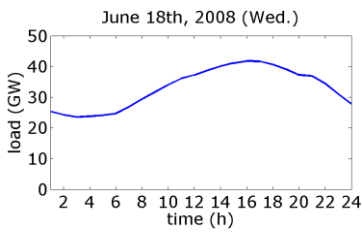
- Nuclear and Coal-fired power plants
  - Long start-up times from several hours to days
  - Slow ramp rates
  - Inexpensive
- Natural Gas power plants
  - Short start-up times
  - Fast ramp rates
  - Expensive

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### Generator Commitment

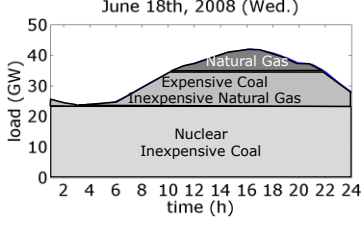
- How should power plants be dispatched to satisfy the load?



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### Generator Commitment



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