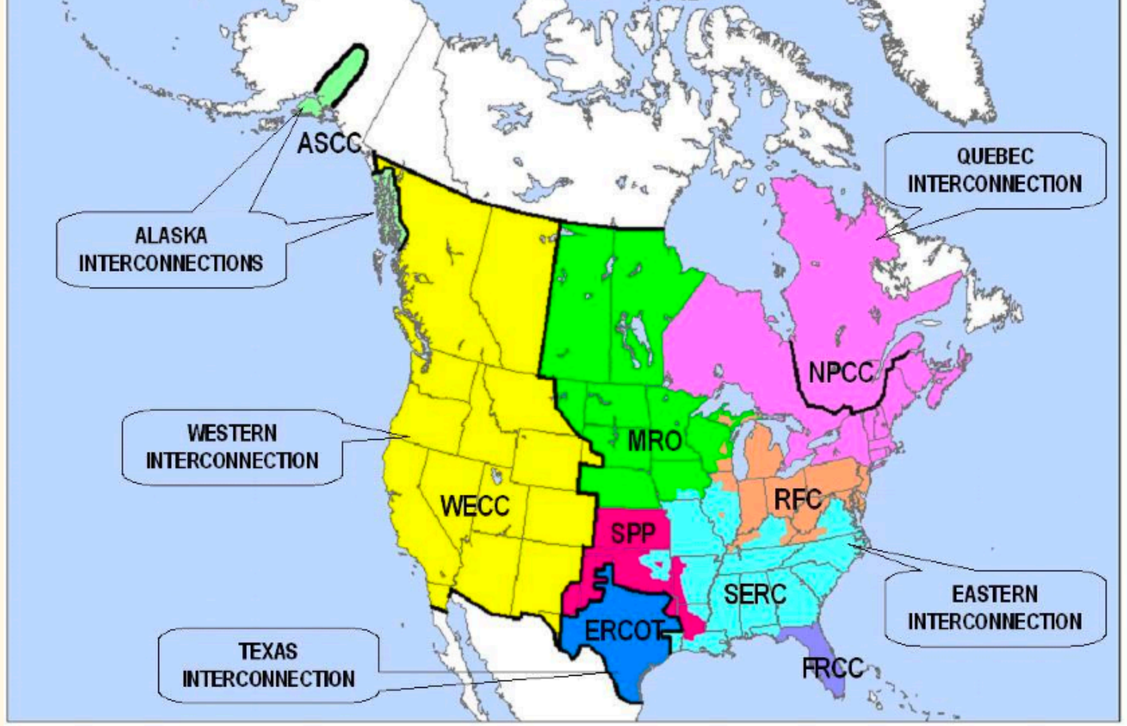
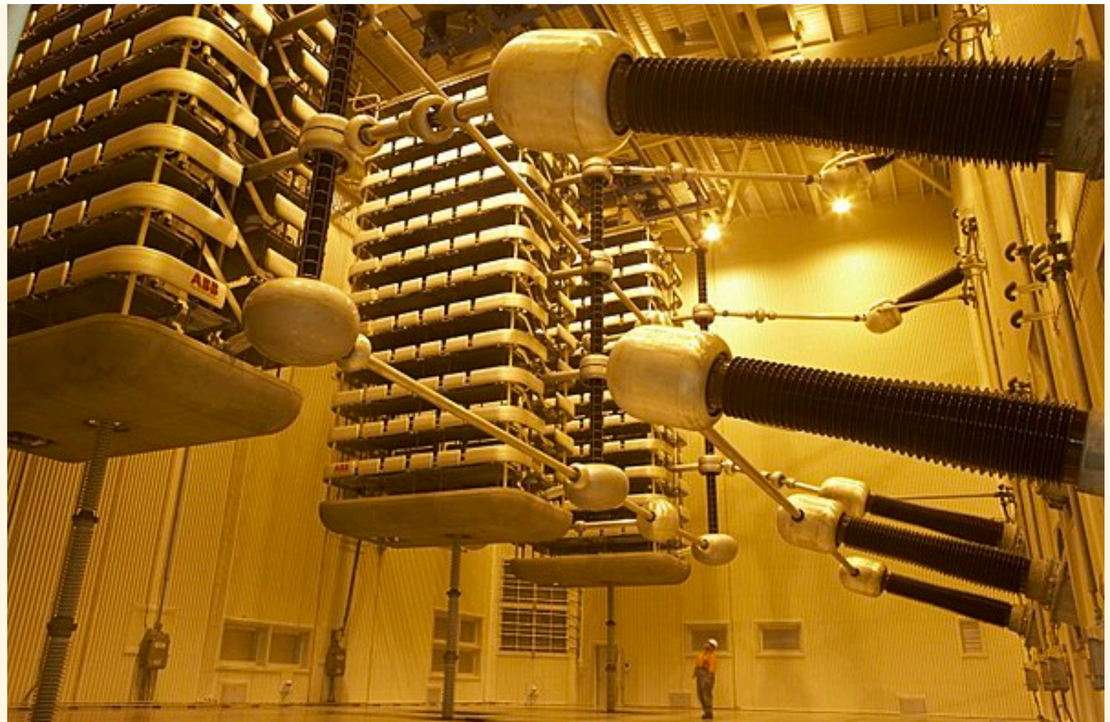
So how do power grids work?

- ## High-voltage 3-phase AC
  - Easier to convert than DC
  - Old-school: Transformers + fuses
  - Modern: Capacitors + Thyristors + Optic coupling
- ## Dealing with changing load is difficult
  - Frequency synchronization
  - Phase balancing
  - Kinetic energy management
- ## Grid-scale tooling is really weird
  - Signals bounce off the ends of wires!
  - Microcontrollers cant get anywhere near >10kv!
  - The whole grid is a giant antenna!





HVDC ... Edison wins after all!

It's all about long distance grid-to-grid connections.

- More efficient wiring than AC
  - No skin effect
  - Fewer conductors
- Easier to control digitally
  - Static VAR compensation
  - Simpler control circuity
- It's a rescue lifeline
  - Restarting downed power plans
  - Re-syncing drifting frequencies
  - De-Icing!