



## **Chapter 1**

# **POWER SYSTEMS: A CHANGING LANDSCAPE**

## NATURE OF POWER SYSTEMS

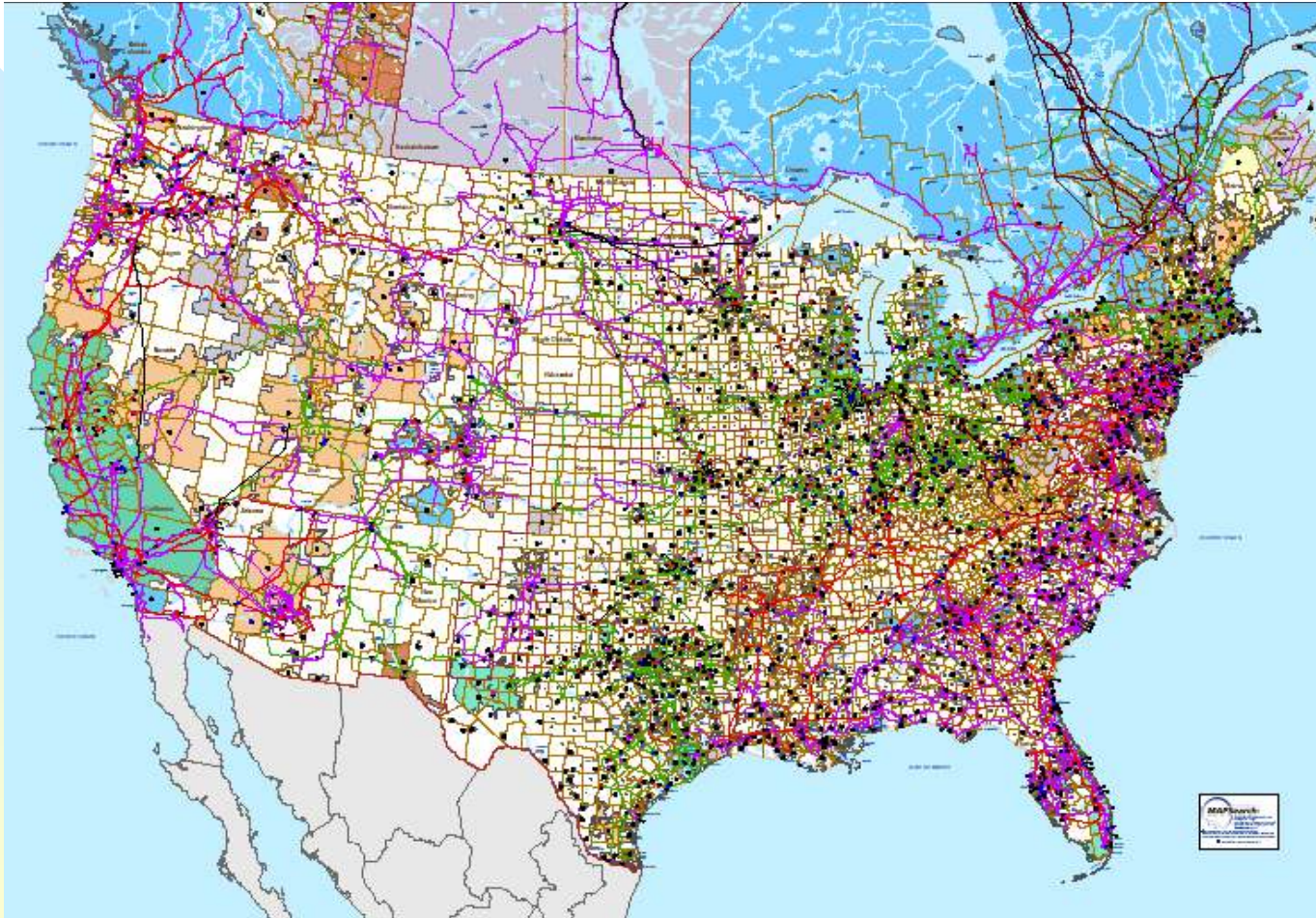


Fig. 1-1 Interconnected North American Power Grid [2].

# Control Areas

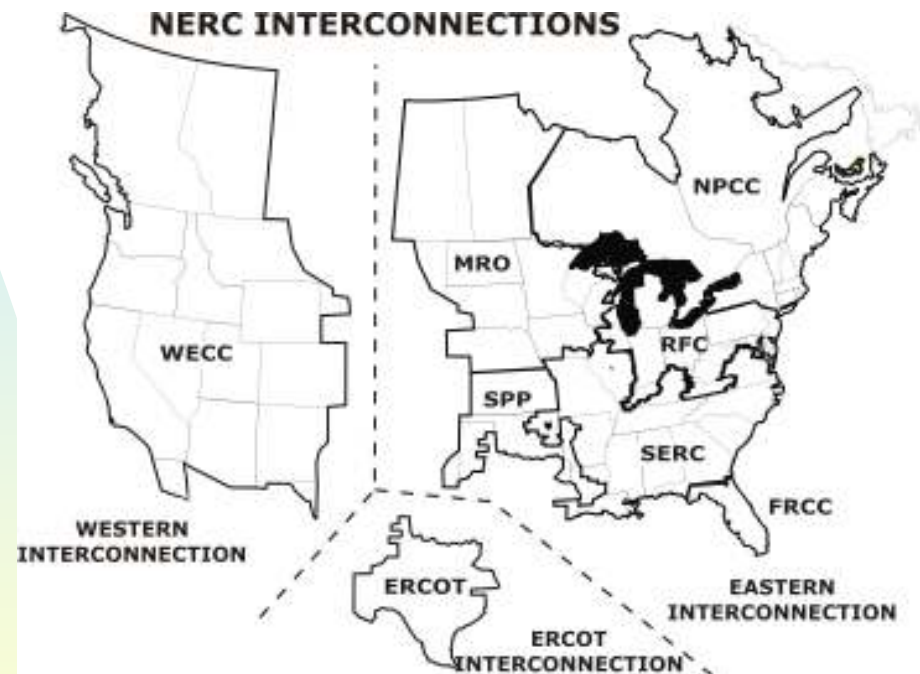


Fig. 1-2 NERC Interconnections [3]. Source: NERC.

# One-line Diagram

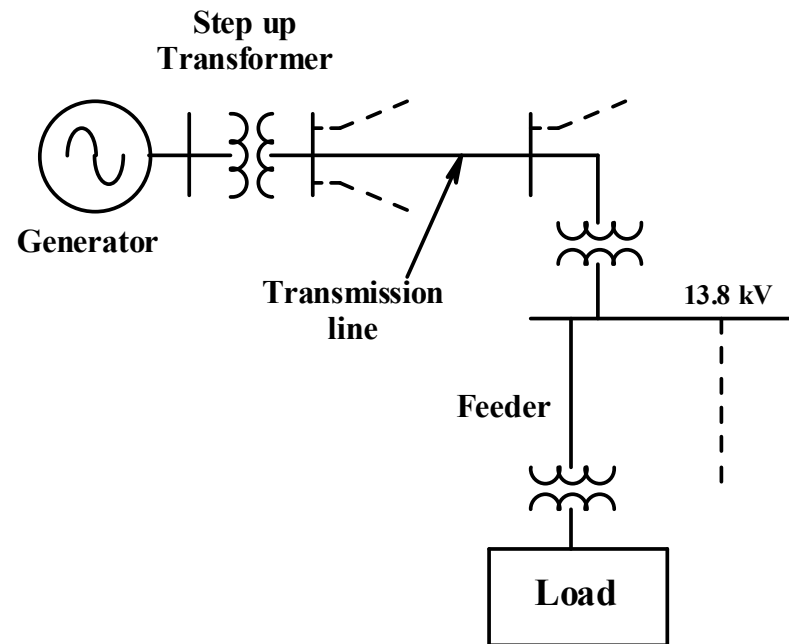


Fig. 1-3 One-line diagram as an example.

## CHANGING LANDSCAPE OF POWER SYSTEMS AND UTILITY DEREGULATION

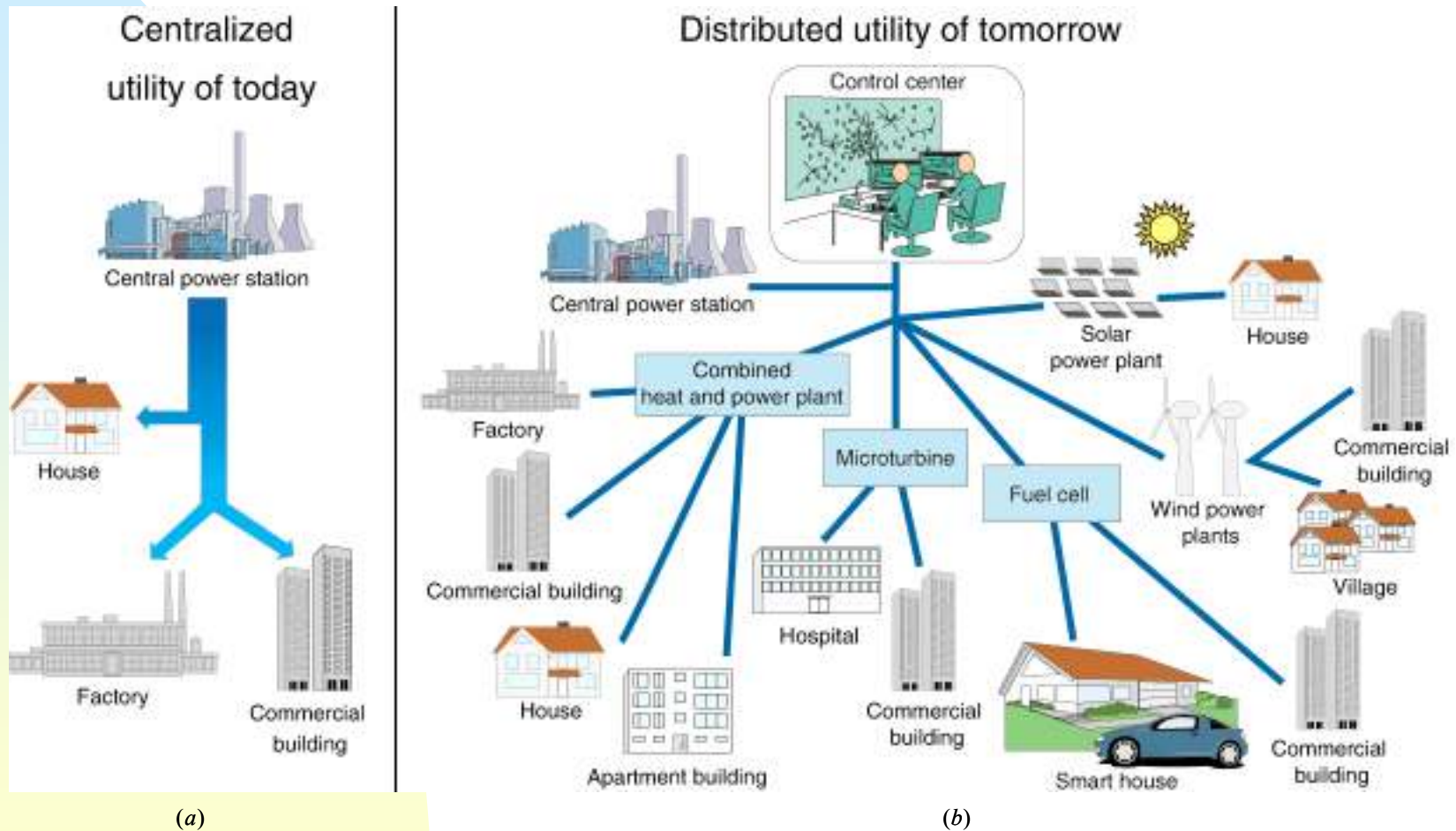


Fig. 1-4 Changing landscape [4]. Source: ABB.

# Points to Emphasize to Students

- New problems imply lots of new opportunities for engineering
- Field trip(s)
- Increased emphasis on HVDC transmission
- Lots of smaller more intermittent power sources
- Applications to hybrid vehicles
- Convey sense of excitement
- Real opportunity for engineers to have a big impact on economics and environment



# Points to Emphasize to Students

- Real opportunity for engineers to have a big impact on economics and environment
- More and more energy takes the form of “high quality” electrical energy
- Rekindle student interest in ECE
  - ◆ ECE vs ME enrollment trends nationally
  - ◆ Combined EE/ECE program with application focus on hybrid vehicle
- “Sustainable Energy -- without the hot air”