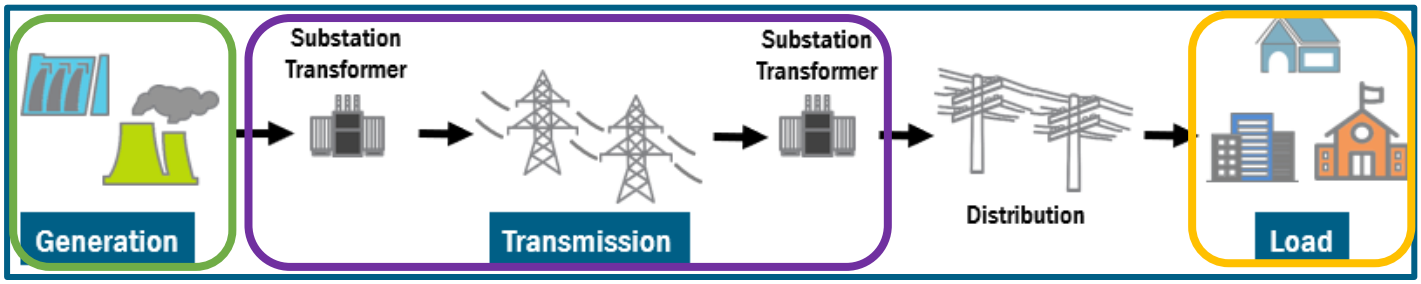
Power System Fundamentals

Primary Physical Components

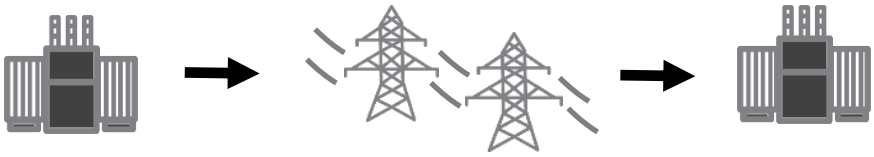


Generation

- Equipment that converts energy sources, *e.g.* mechanical, solar, etc. into electrical energy to serve load

Transmission

- Bulk transfer of electrical energy from the generating power plants to substations located near load (demand) centers



Load

- Total electric power consumed by all users connected to the distribution network of a system, and the power used to compensate for losses in all parts of the network

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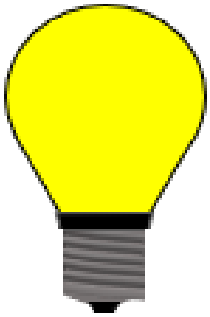
Power System Fundamentals

Units of Measure



Watt

- Unit of power that measures the rate of energy transfer

Megawatt (MW)

- Equal to 1 million watts; Generation is produced/sustained on this sale

Megawatt-Hour (MWh)

- Equivalent to 1 million watts consumed over 1 hour; Also equivalent to .5 million watts consumed over 2 hours

VAR

- Volt-Amperes Reactive; Also known as Reactive Power
  - Reactive Power supports the Voltage that must be controlled within limits for System Reliability

MVAr

- The product of voltage and the out-of-phase component of alternating current
- Reactive Power, usually measured in MVAr, is produced by capacitors (synchronous condensers), over-excited Generators, and Qualified Non-Generator Voltage Support Resources, and absorbed by reactors or under-excited Generators and other inductive devices including the inductive portion of Loads

Power System Fundamentals

Identifiers

NYCA

- New York Control Area; The area in which the NYISO, among other things, balances load and generation. The area includes the entire state of New York

Neighboring Control Area

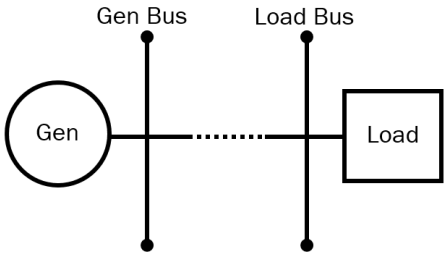
- New York is electrically connected to four bordering control areas: ISO NE, PJM, IESO, HQ

Interface (Internal & External)

- A group of transmission lines that define an internal or external boundary

Bus

- A conductor or group of conductors that serve as a common connection point for two or more electric circuits



POI

- Point of Injection; *Source*, or where the power is coming from, *e.g.* Generators

POW

- Point of Withdrawal; *Sink*, or where the power is going to, *e.g.* Loads

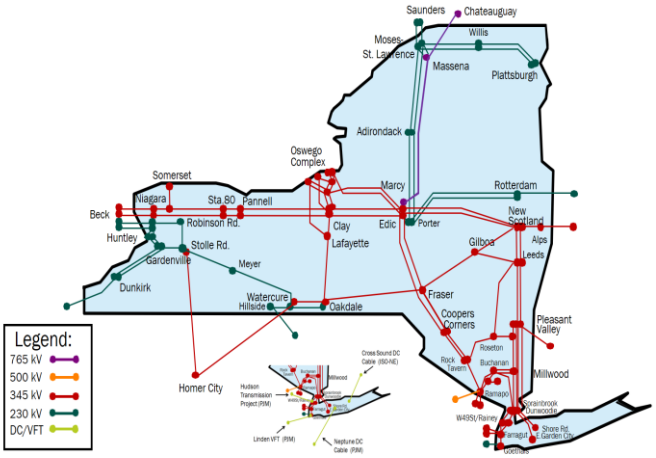
New York ISO
Independent System Operator

Power System Fundamentals

Transmission System Concepts

Bulk Electric System

As defined by the Regional Reliability Organization, the electrical generation resources, transmission lines, interconnections with neighboring systems, and associated equipment, generally operated at voltages of 100kV or higher.



The NYISO operates to more stringent facility requirements

nerc.com

Constrained Facility

- A transmission facility (line, transformer, breaker, etc.) that is **approaching, is at, or beyond** its System Operating Limit or Interconnection Reliability Operating Limit

nerc.com

Contingency

- The **unexpected failure or outage of a system component**, such as a generator, transmission line, circuit breaker, switch or other electrical element

nerc.com

Congestion

- A **characteristic of the transmission system produced by a constraint** that prevents optimum economic operation of the power system, such that the marginal price of Energy to serve the next increment of Load, exclusive of losses, at different locations on the Transmission System is unequal

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