

# **MICROGRIDS**

## **Locational Value**

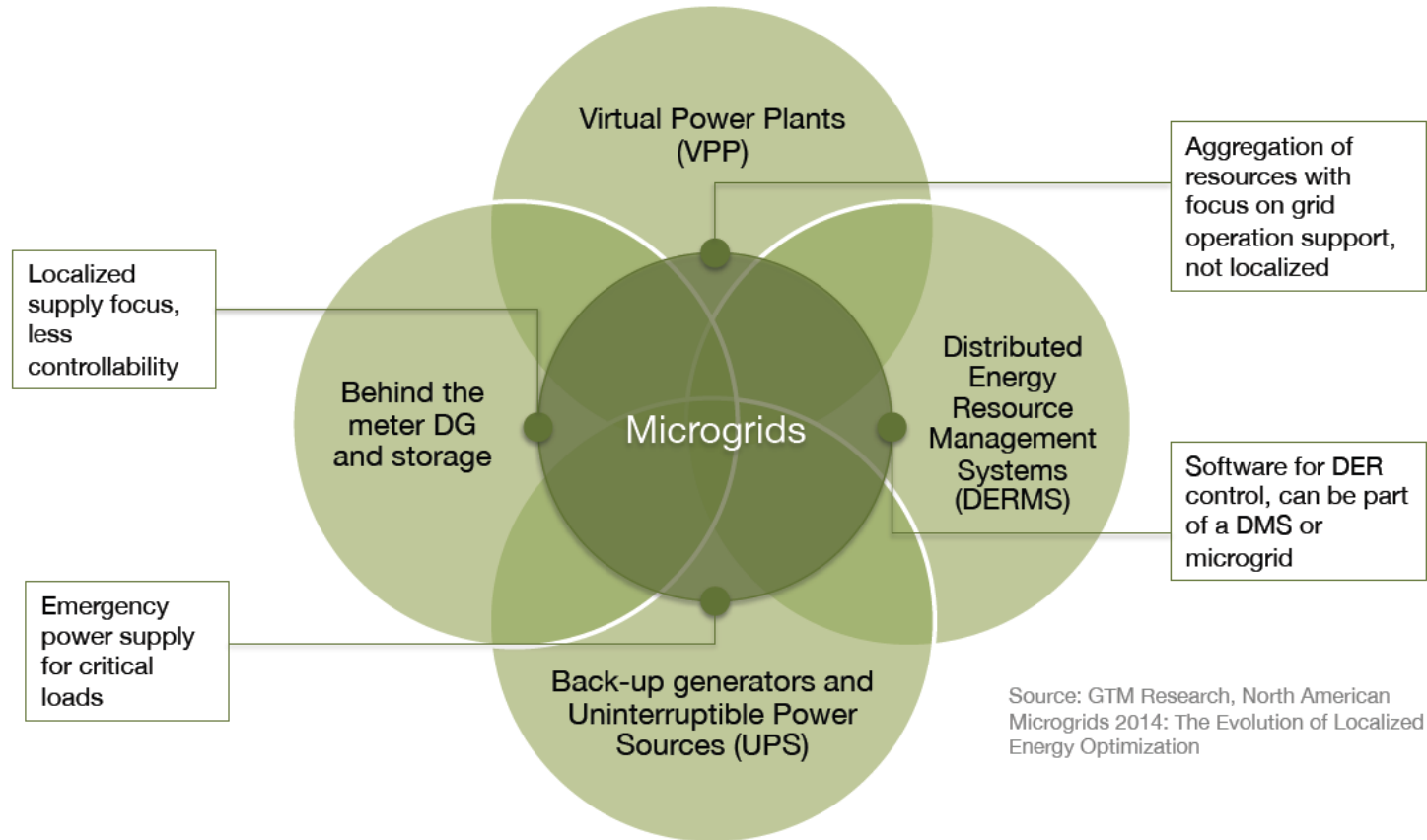
**Jim Reilly, Consultant**

**CRITICAL INFRASTRUCTURE AND MICROGRIDS WORKSHOP**

**Chicago, IL**

**May 16, 2017**

# Microgrid vs Related DER Concepts



Courtesy of GTM

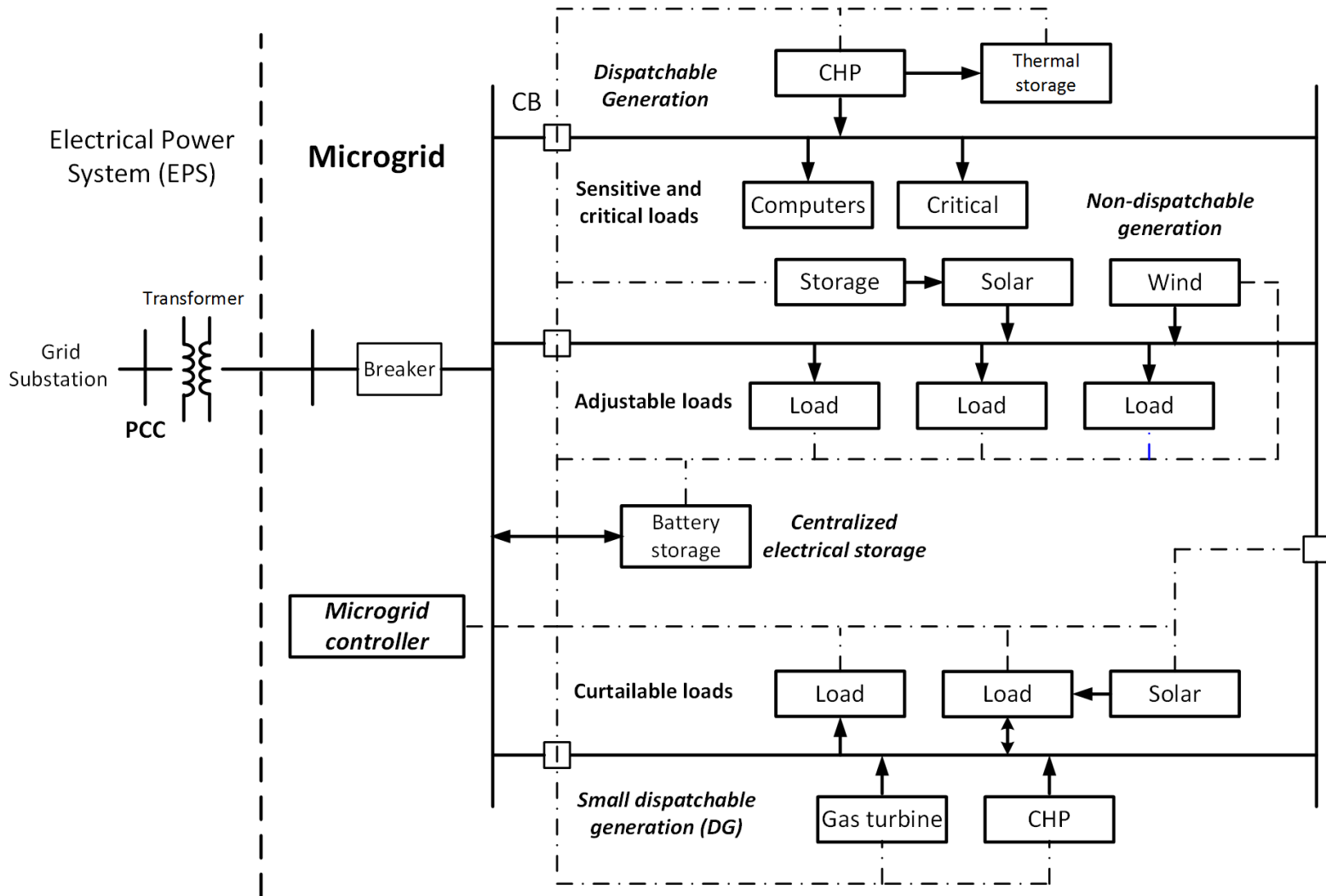
# Microgrid – Definition / Features

- Geographically delimited
- Connected to the main grid at one point (PCC)
  - fed from one substation
- May operate islanded
- Includes distributed resources (DR), but generator agnostic according to needs of customer
  - renewables (inverter interfaced)
  - fossil fuel based (synchronous generators)
- Includes an energy management system
  - controls for power exchanges, generation, load, storage and demand response
  - load management controls to balance supply and demand fast

Power and information exchanges take place on both sides and across the PCC in real time.

Source: Dr. Geza Joos

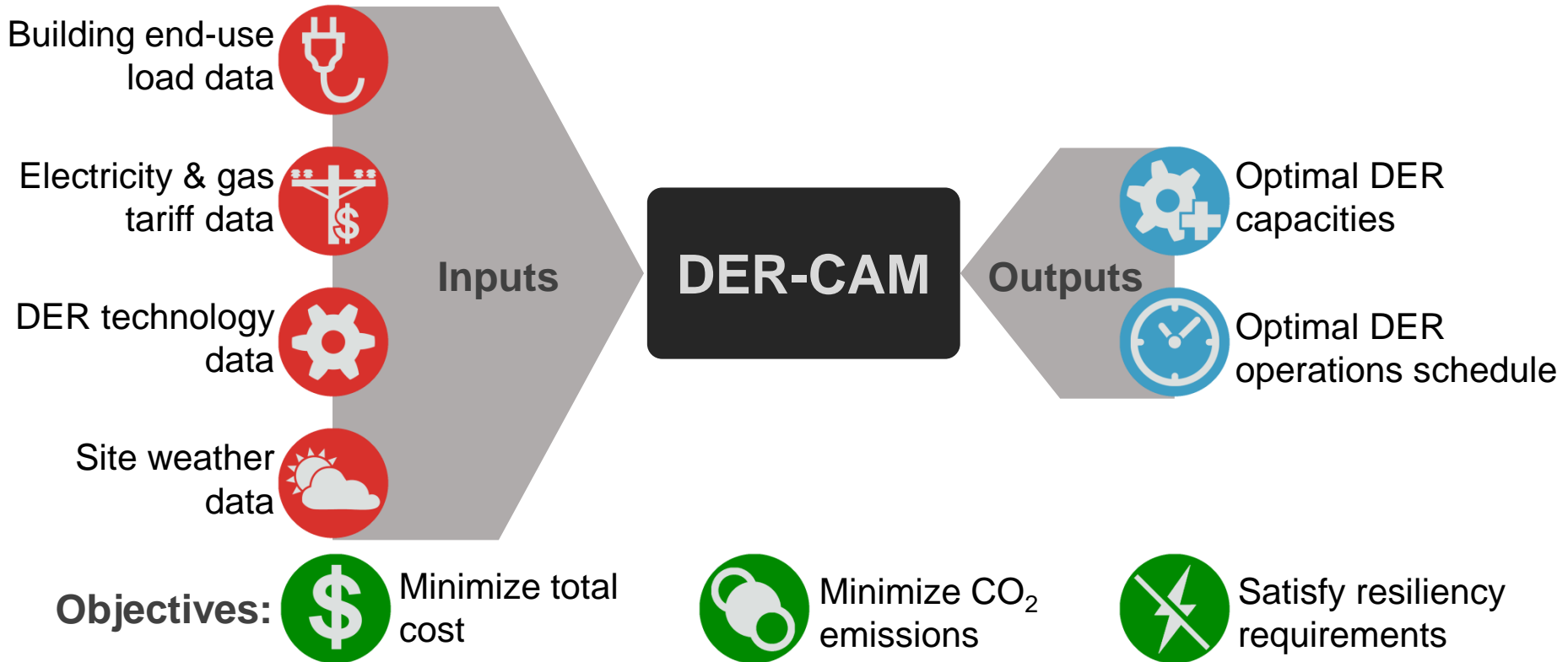
# Microgrid – Constituent Components



Courtesy of Prof. Geza Joos

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# Modeling for Optimal Configuration



**Investment & Planning:** optimal equipment combination and operation based on *historic* load data, weather, and tariffs

**Operations:** optimal week-ahead scheduling for installed equipment and *forecasted* loads, weather and tariffs

# Sendai – Multi-Power Quality Microgrid



Courtesy of NEDO

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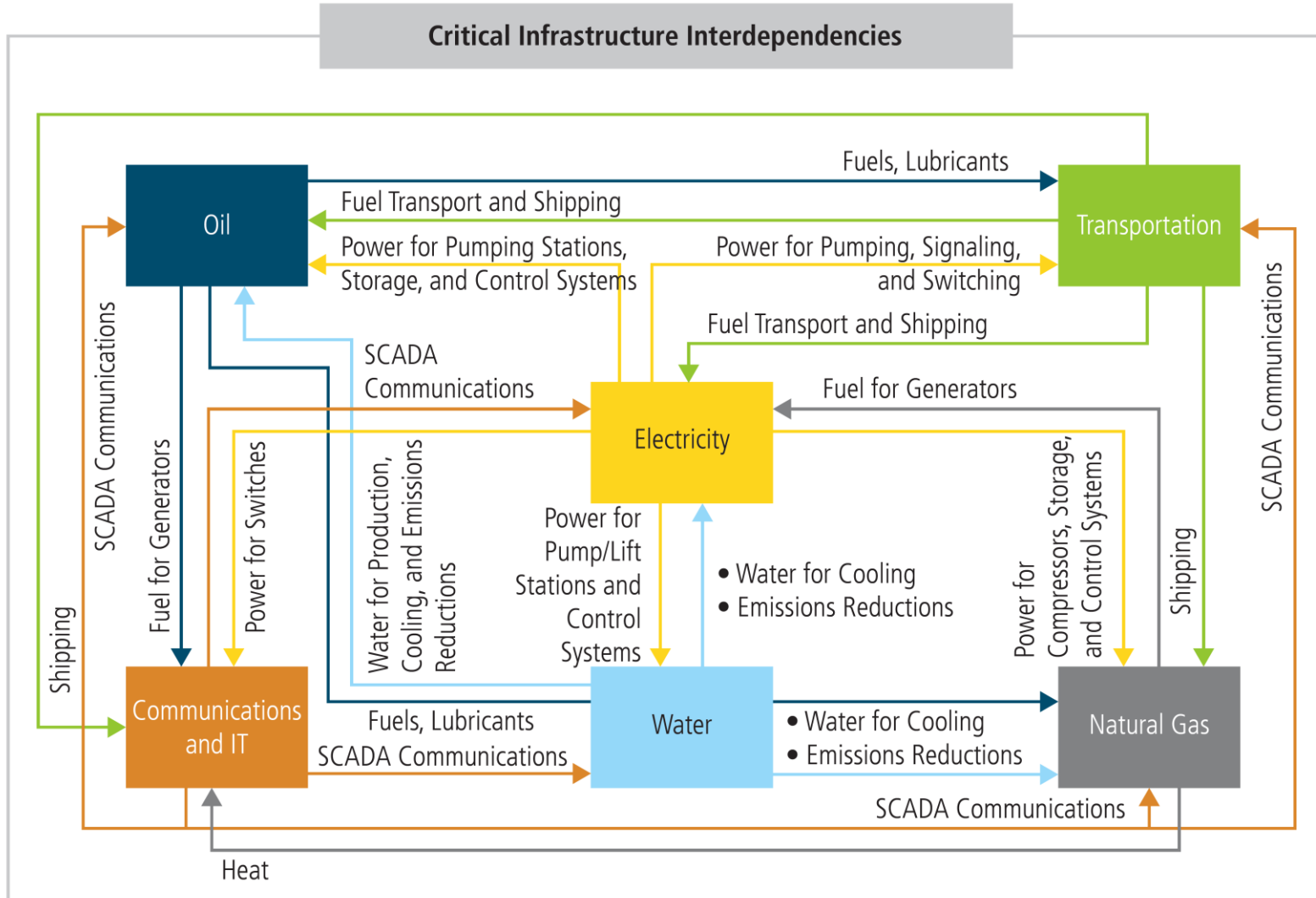
# Hudson Yards – Urban Development



Courtesy of RELATED

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# Critical Infrastructure

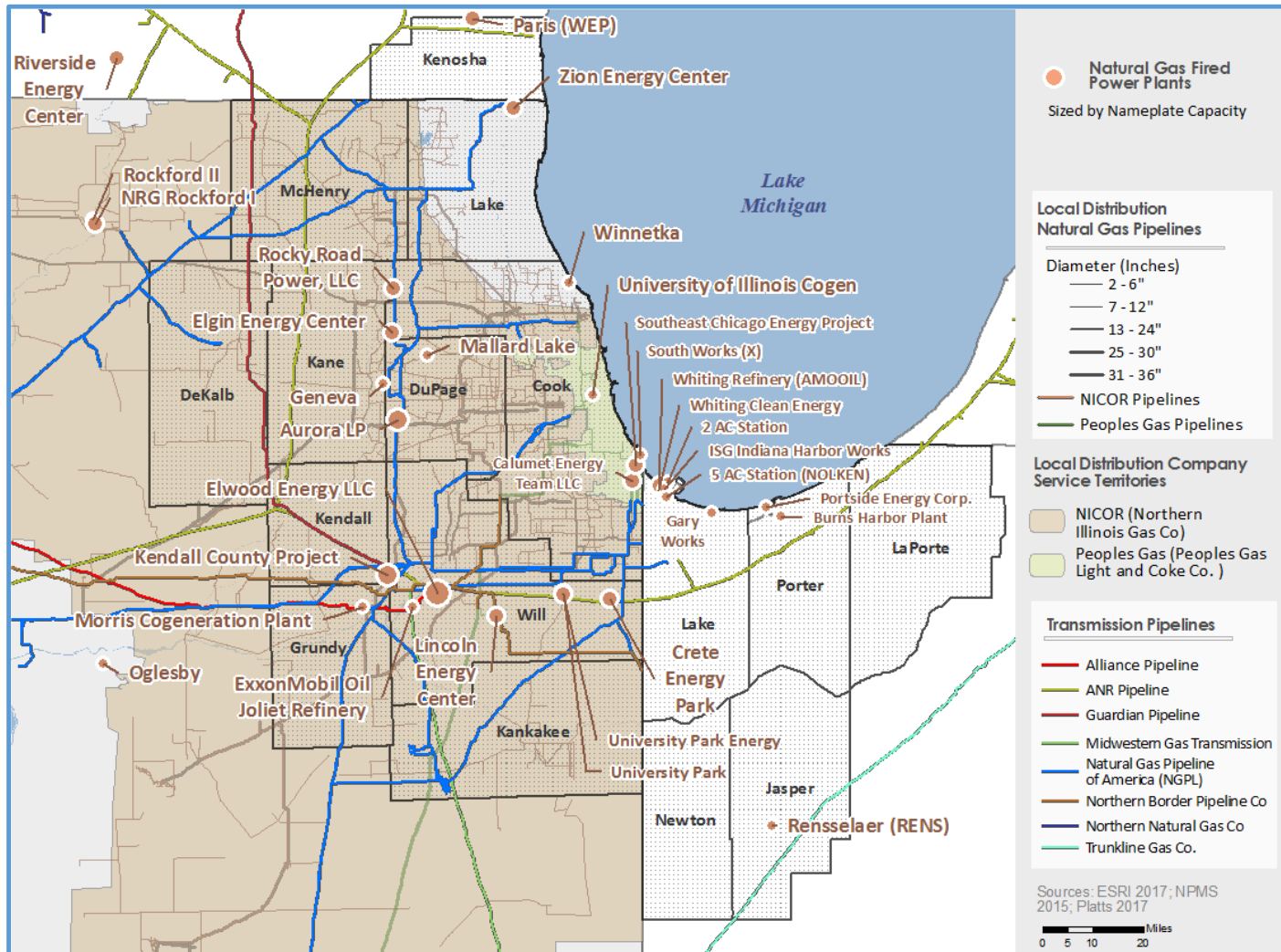


Courtesy of Argonne National Laboratory

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# Natural Gas Supply



Courtesy of Argonne National Laboratory

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