



FUPWG - Energy Resilience

Zak Kuznar-May 18th, 2016



the EVOLUTION of ENERGY

NEXT 25 YEARS

First power plants



1890 – 1920s

Cities and homes lit by electricity

Electric appliances becoming commonplace

More reliable service

Nuclear and hydro scale up



1950s

Rates remain stable, cleaner air

More efficient plants built

Scrubber technology to reduce emissions introduced



1970s – 1980s

Natural gas shortage contributed to higher energy prices

Greater awareness of energy conservation measures

Installation of scrubbers on some older units

Increase in renewables (wind and solar)

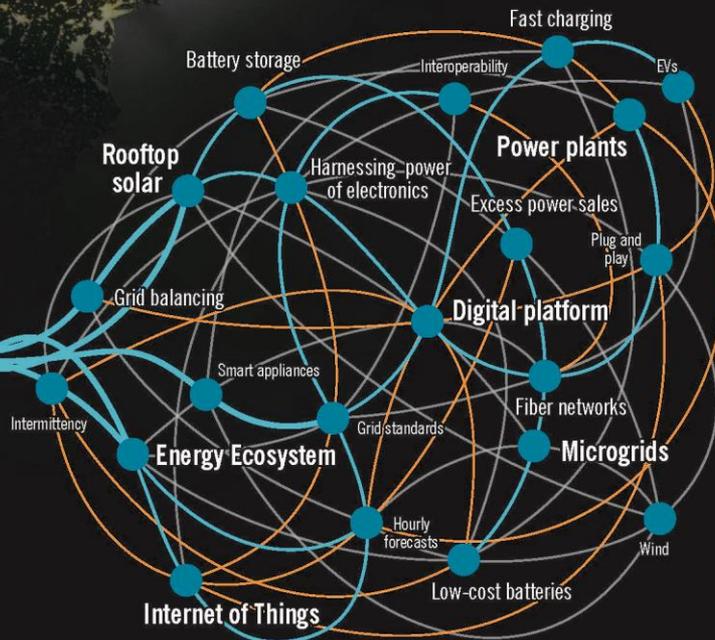
Increase in natural gas combined-cycle generation



2000s – present

Environmental stewardship and energy conservation became mainstream

Reduction in air emissions: sulfur dioxide about 90%; nitrogen oxides about 80%



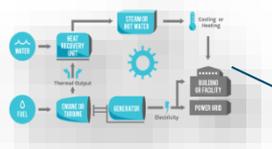
Preparing Duke Energy for a Clean and Distributed Energy Future

Solar



Distributed Generation assets closer to load centers leads to a more resilient grid

Combined Heat and Power (CHP)



Energy Storage



Customer Driven



Electric Vehicles

Microgrids



Demand Side Management (DSM)



Biomass

