



# Solar Integration and Batteries at Xcel Energy

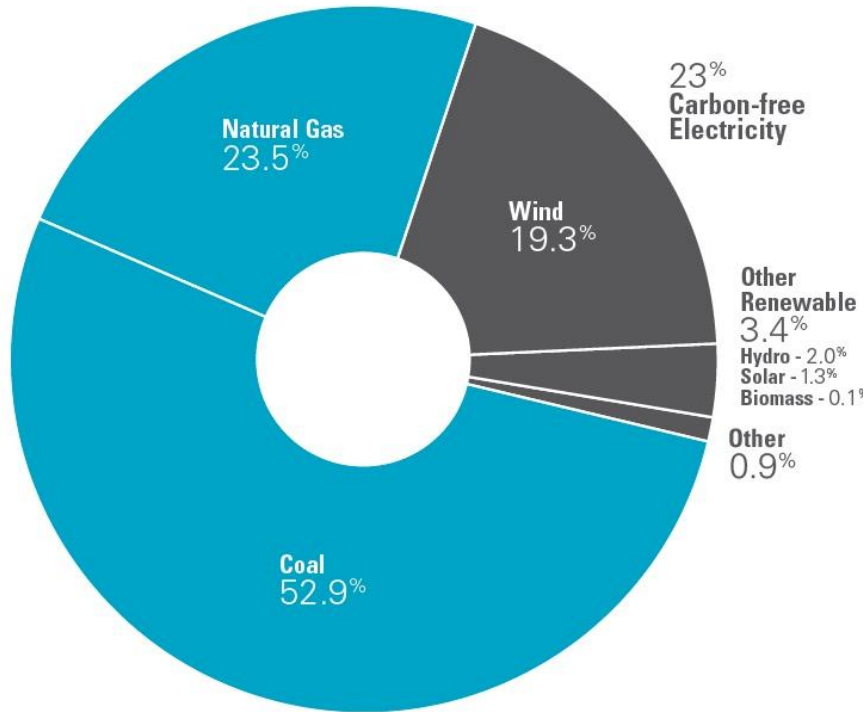
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# Xcel Energy CO Energy Supply

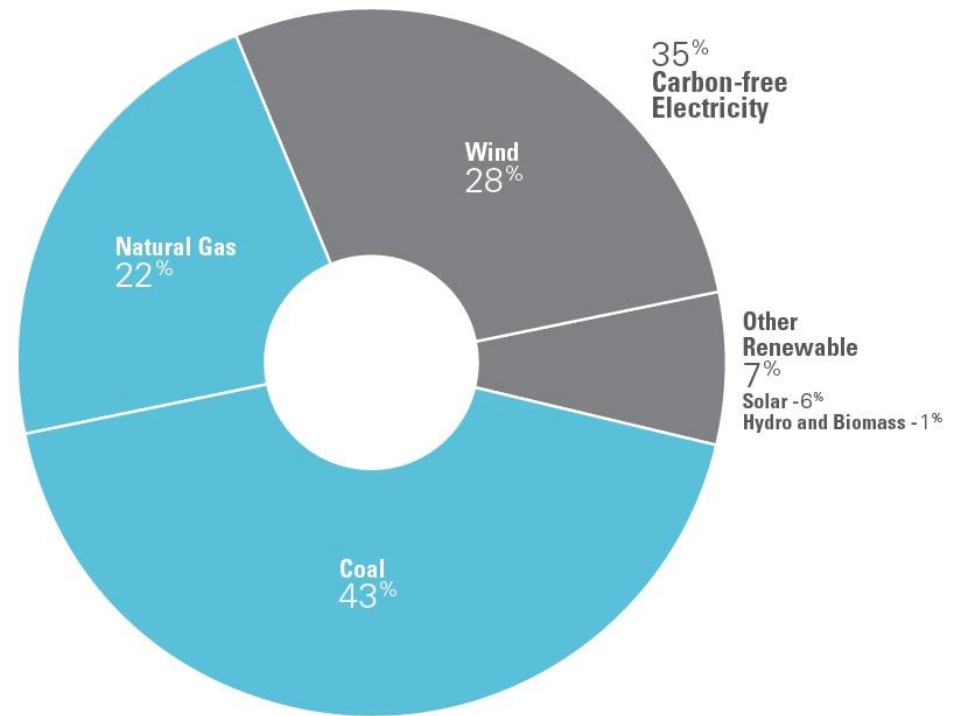
## Colorado

2015 Electricity Supply by Energy Source





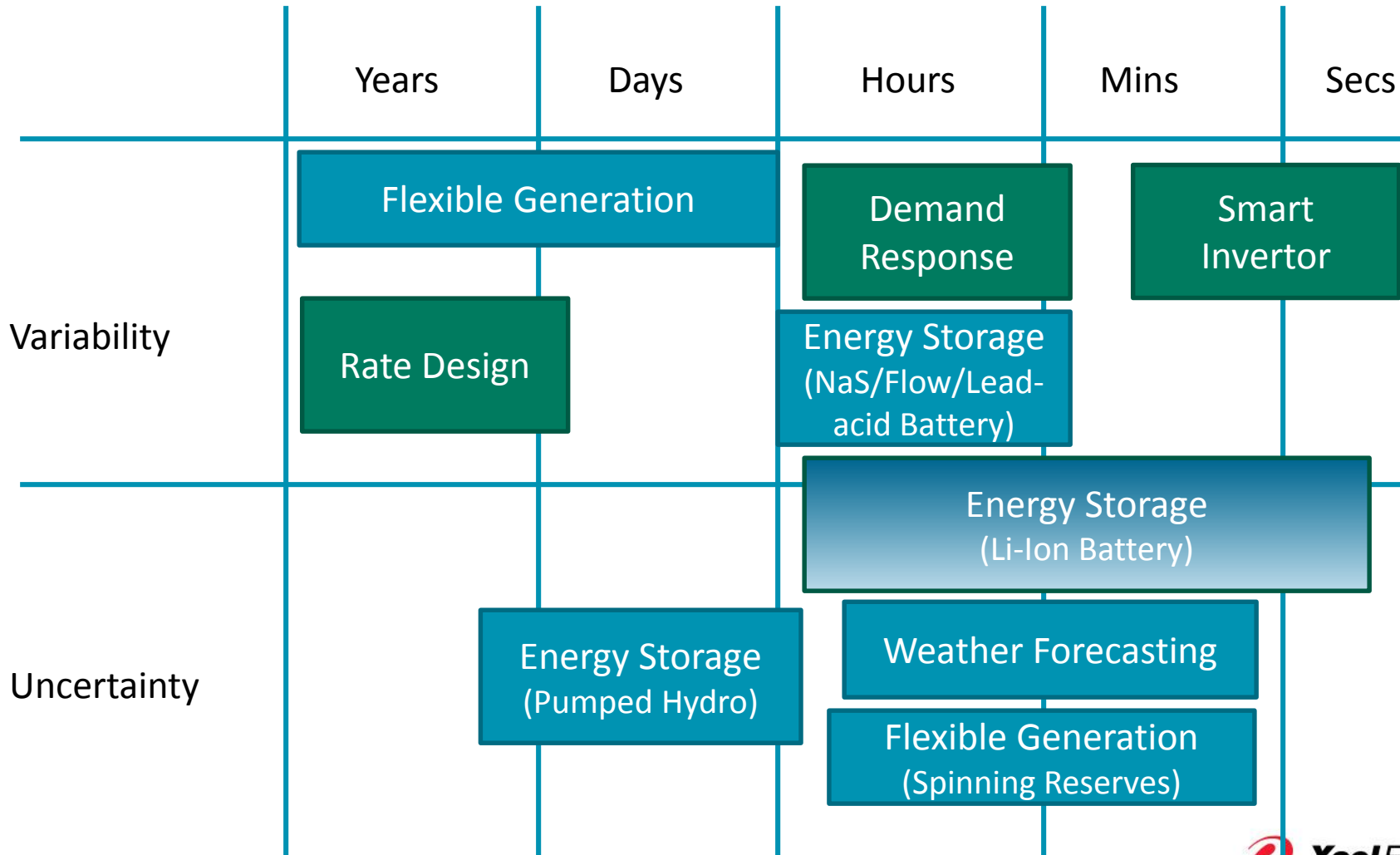
## Colorado

Projected 2020



# Integration Tools

Supply-side   
 Demand-side 



# Past Battery Projects

2010

## Wind to Battery

(Luverne, MN)

- Sodium Sulfur battery
- Store excess wind energy
- Power 500 Homes for 7 hrs



2012

## Solar2Battery

(SolarTAC Aurora, CO)

- 1.5 MW battery connected to a simulated 4 home neighborhood
- Solar time shift, smoothing

## Community Energy Storage Project (SolarTAC Aurora, CO)

- 25 kW battery connected to a simulated 4 home neighborhood



# Panasonic Microgrid Project



- Partnership with Panasonic Enterprise Solutions & City of Denver, CO
- 1 MW/2 MWh Li-Ion Yunicos Battery Energy Storage System
- 1.3 MW Carport PV at Transit Station & 250 kW rooftop solar
- Feeder approaching ~20% PV penetration
- Performing multiple functions with the battery is key to making these systems more cost effective

# Stapleton Project



- Located in Stapleton neighborhood of Denver, CO
- 6 utility-sited batteries
- 6 customer-sited, utility-owned, behind-the-meter batteries
- 2015: Feeder ~18.5% PV penetration

**Thank You**