

RENEWABLE ENERGY AND AND CREATING A DYNAMIC, FLEXIBLE GRID GRID

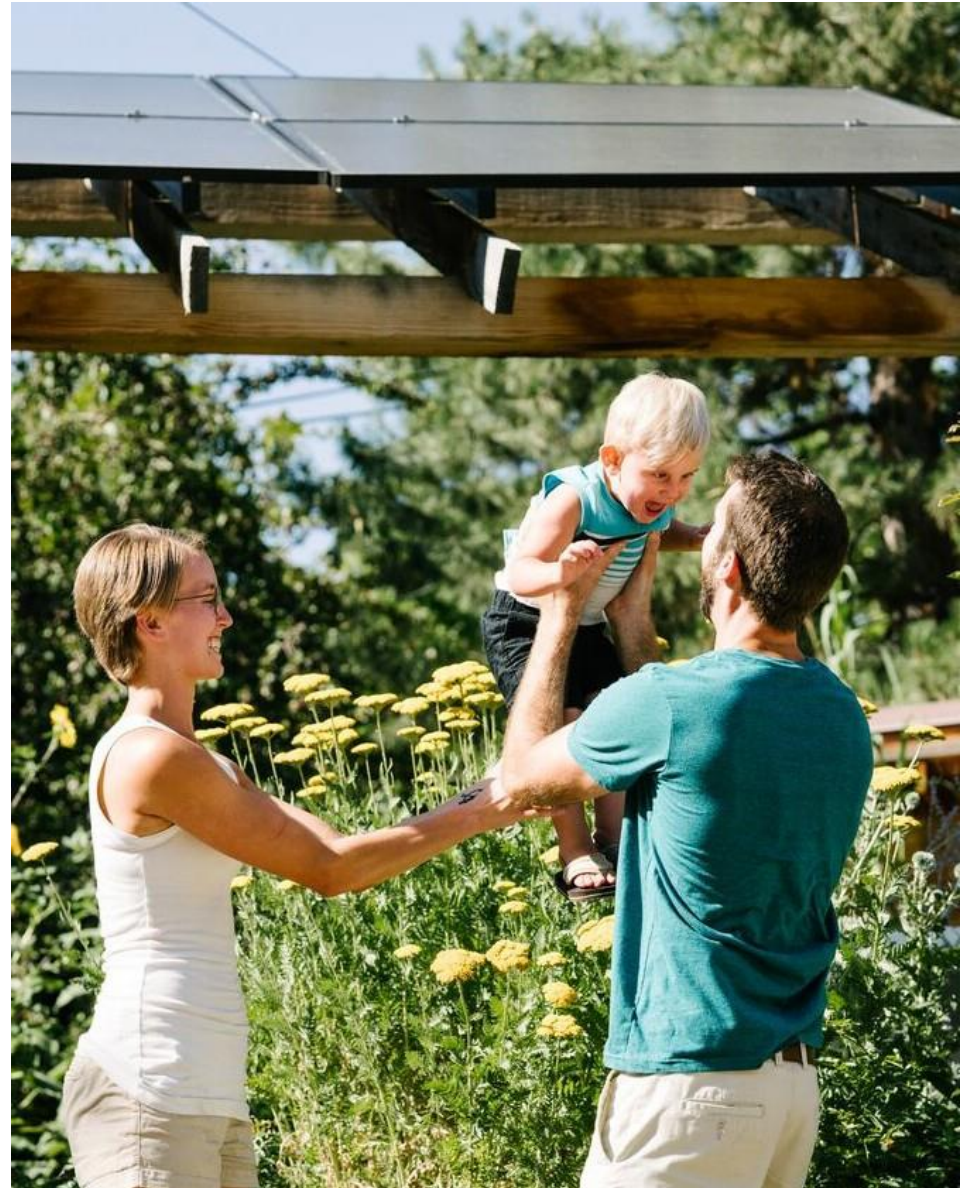
SARAH WRIGHT, EXECUTIVE DIRECTOR

UTAH CLEAN ENERGY

SEPTEMBER 18, 2019

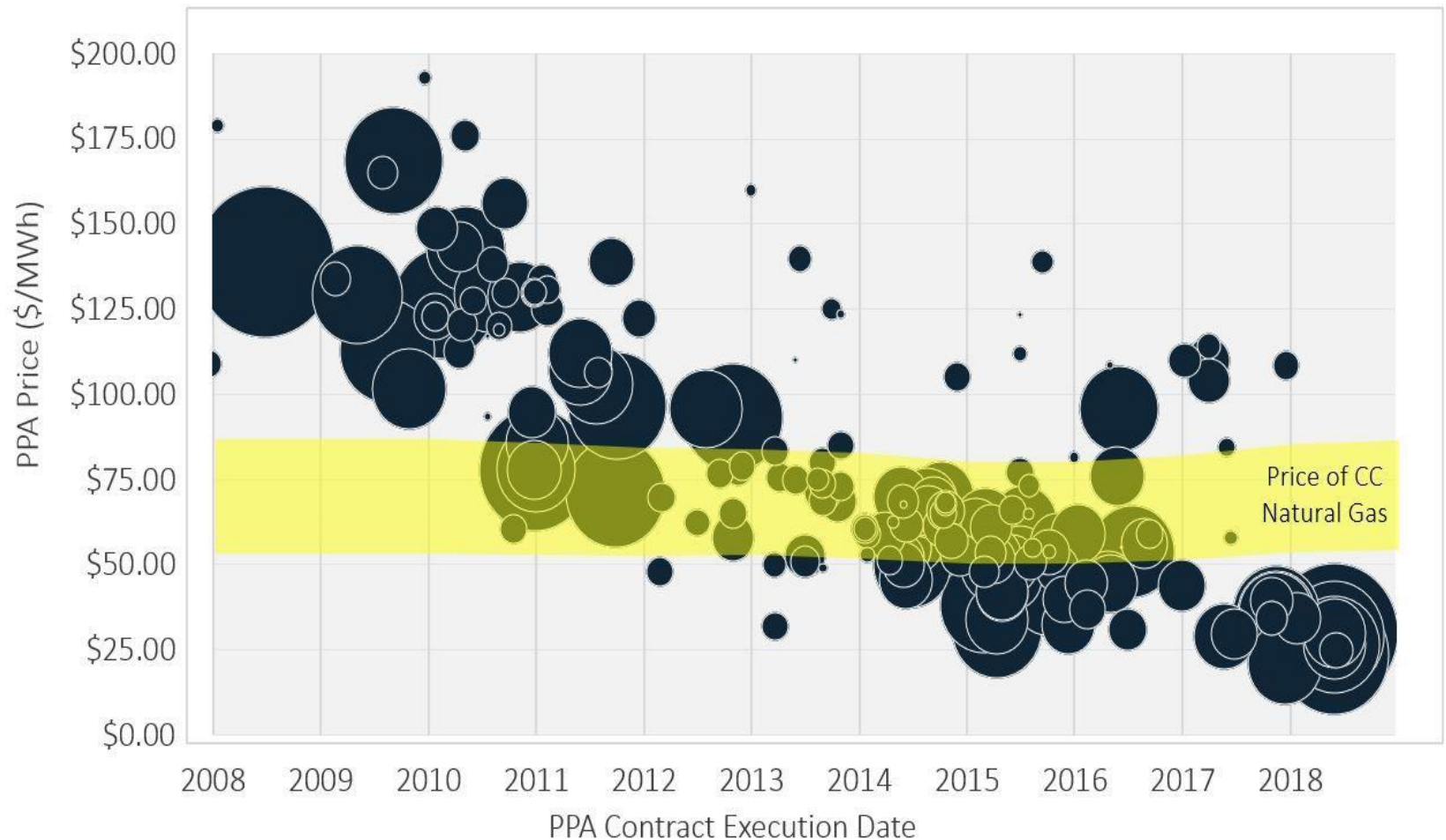


- Non-Profit Organization, Est. 2001
 - Policy and Regulatory Expertise
 - Public Education & Outreach
 - Solutions-oriented approach
- www.utahcleanenergy.org



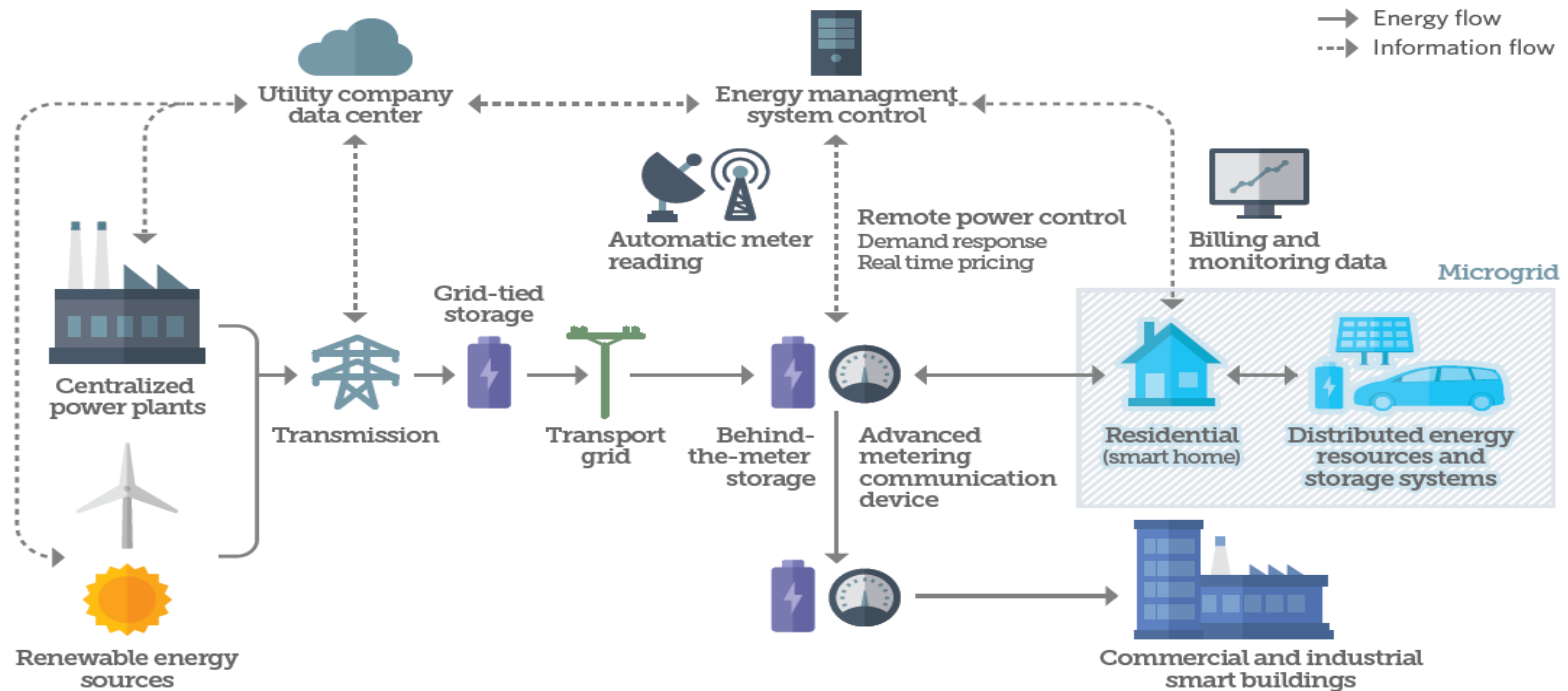
WHY WE'RE TALKING ABOUT INTEGRATING RENEWABLE ENERGY

RENEWABLE ENERGY PRICES ARE FALLING. REALLY.



WHAT ARE THE TOOLS
AVAILABLE TO DEVELOP A
MORE FLEXIBLE GRID?

Harnessing Flexible Demand



Source: LG CNS

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Flexible Generation Options

- “Dispatchable” solar
- Transmission
- Energy storage technologies
- Utilization of gas peakers

Utilities are moving forward with energy storage

APS Plans to Add Nearly 1GW of New Battery Storage and Solar Resources by 2025

The Arizona utility says it will deploy 850 megawatts of battery storage and at least 100 megawatts of new solar generation in the coming years.

JULIA PYPER | FEBRUARY 21, 2019

Magnum Development and Mitsubishi Hitachi Power Systems to develop 1,000 megawatts of clean energy storage in central Utah. [Click here](#) to learn how Magnum's Compressed Air Energy Storage will be used to turn intermittent renewable generation into reliable, dispatchable green power.

NV Energy to add 1.2 GW solar, 2.3 GWh storage as large customer exit slows



Credit: Array Technologies Inc.

DEEP DIVE

Rocky Mountain Power to operate largest US residential battery demand response project

Sonnen and the utility are partnering to build a virtual power plant at the new 600-unit apartment complex, with 12.6 MWh of energy capacity from a 5.2 MW solar array.

Preparing for a Grid with 50% Renewables

- Create a market for flexible demand and energy storage resources through technology-neutral resource procurements
- Help customers implement flexible and controllable loads to optimize use of electricity to align with variable supply resources
 - STEP Projects: Wasatch Solar+Battery project and Intermodel Transit Hub
- Considering moving to a day-ahead market for electricity resources across the West

THANK YOU!

Sarah Wright

Executive Director, Utah Clean Energy

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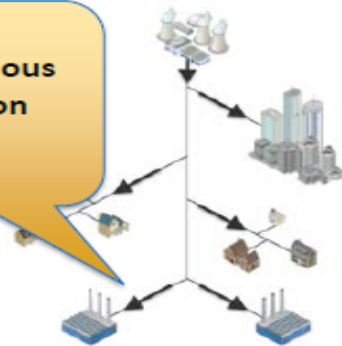
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MOVING TO A DIFFERENT ELECTRICITY GRID

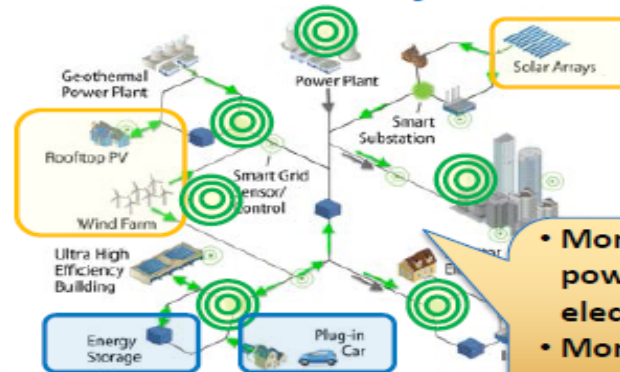
Evolution of the Power System

Current Power System

- Large synchronous generation
- Central control.



Future Power Systems



- More VRE—power electronics
- More data
- More distributed resources

New challenges in a modern grid:

- Increasing levels of power electronics-based VRE: solar and wind
- More use of communications, controls, data, and information (e.g., smart grids)
- Other new technologies: electric vehicles (EVs), distributed storage, flexible loads
- **Becoming highly distributed—more complex to control**