BALANCING SOLAR AND WIND POWER VARIABILITY WITH NATURAL GAS RELIABILITY

Flexible grid resources, such as natural gas and energy storage, can help manage the intermittency and variability of solar & wind power, and minimize challenges associated with a low-carbon power grid.

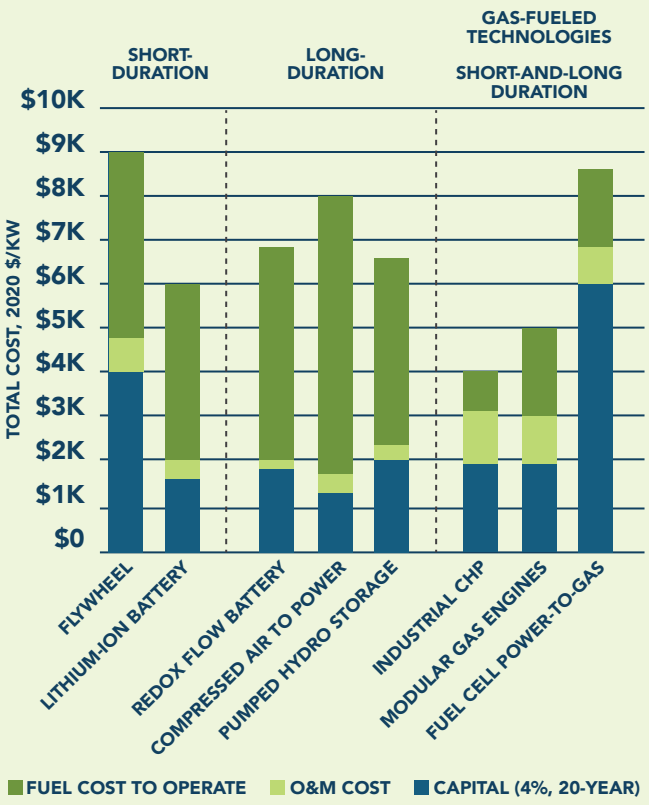
PLANNING FOR A HIGH RENEWABLE ENERGY FUTURE

In order to ensure system flexibility, utilities will need to balance the intermittent and variable energy output of solar & wind power with other, more reliable, energy generation technologies whose power output can quickly ramp up or down. Gas and storage resources can quickly adjust their output to compensate for changes in renewable power output and ensure a reliable and continual balance between supply and demand.

TYPES OF FLEXIBLE GRID RESOURCES

At the moment short duration technologies are more economically viable than long duration technologies. There are also gas-fueled technologies, which tend to be more commercially viable than other energy storage options.

20-YEAR LIFE CYCLE COST ANALYSIS



Source: ICF, Energy Storage Comparison Analysis with Gas-Fueled Technology

GAS AS AN OPTION FOR FLEXIBILITY

While grid-scale energy storage systems develop and become more cost-effective, utilities can use gas-fueled technologies to balance variable renewable energy output.

- **START-UP TIMES OF ABOUT 3-5 MINUTES[1]**
- **COMBINED HEAT & POWER AND GAS ENGINE GENERATORS HAVE THE LOWEST LIFECYCLE COSTS COMPARED TO ELECTRIC STORAGE TECHNOLOGIES**
- **FUELING WITH RENEWABLE NATURAL GAS PROVIDES FLEXIBILITY AND GREENHOUSE GAS (GHG) REDUCTIONS**
- **POTENTIALLY CAN BE RETROFITTED TO USE HYDROGEN[2]**
- **SUPPORTS LONG-TERM STORAGE OF HYDROGEN**
- **MAXIMUM UTILIZATION, COST-EFFECTIVE, RELIABLE AND RESILIENT**

FLEXIBLE GRID RESOURCES MINIMIZE COST OF DECARBONIZATION AND ENHANCE RESILIENCY

Flexible grid resources can provide power resiliency during periods of low renewable energy output. This will help reduce future electricity prices and save consumers significant amounts of money.[3,4]

1. Power-Gen International, Mid-Sized Generation: Reciprocating Internal Combustion Engines or Combustion Turbine, 2017
2. https://www.2g-energy.com/products/hydrogen
3. Progress in Energy, Role and Value of Flexibility in Facilitating Cost-Effective Energy System Decarbonization, 2020
4. Joule, The Role of Firm Low-Carbon Electricity Resources in Deep Decarbonization of Power Generation, 2018