

RENEWABLE ENERGY SOLUTIONS

# Unlocking stored energy in biomass



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Biomass energy, which refers to renewable energy from plant and animal waste, takes advantage of stored energy from the sun. Through photosynthesis, the sun's energy is stored in plant material and passed along to animals and people in chemical form when consumed. As a global leader in energy efficiency and sustainability, Johnson Controls offers biomass energy solutions designed to unlock the energy stored in plant and animal waste. We can design, engineer, install, commission, operate and maintain a biomass solution that will reduce your dependency on fossil fuels while providing long-term energy and operational savings.

### Biomass to power options

- **Biomass Boilers** – The use of biomass for power generation is growing due to the increase in demands for limiting greenhouse gas emission. When burned, the chemical energy in biomass is released as heat. The heat is used to boil water in biomass boilers, creating steam. The steam is then used to turn turbines and generators to produce electricity.
- **Biomass Gasification Plants** – When biomass is heated with little or no oxygen it gasifies to a mixture of carbon monoxide and hydrogen known as synthesis gas. Like natural gas, synthesis gas can also be burned in gas turbines as a more efficient electrical generation technology than steam boilers, which are limited to solid biomass and fossil fuels.

### Common types of biomass include:

- Wood, wood residue and wood products
- Crops such as corn and sugar
- Orchard prunings
- Animal litter
- Logging residue (slash)
- Nut and grain hulls and chaff
- Coffee bean hulls and grounds

### Why Johnson Controls

Johnson Controls is a \$32 billion leader in energy and environmental solutions. Our contracts often include a performance guarantee, reducing your risk. Our global experience in energy supply- and demand-side businesses, along with 120 years of building expertise, make us well suited for these applications. With 500 offices around the world, we can deliver solutions anywhere you need them.



### BIOMASS FACTS:

- Biomass supplies almost 15-times as much energy in the U.S. as wind and solar power combined.
- Biopower refers to burning biomass directly, or converting it into gaseous or liquid fuels that burn more efficiently, in order to generate electricity
- It is estimated that over 500 million dry tons of biomass, equivalent to 8.09 quads of primary energy, are available now.

**Source: DOE Energy Efficiency and Renewable Energy Web page ([www1.eere.energy.gov/](http://www1.eere.energy.gov/))**

### WHERE WE'RE WORKING:

#### Indiana Department of Corrections

Four industrial-grade biomass boilers and fuel delivery systems will use an estimated 1.3 million bushels of corn annually. Will result in a forecasted savings of 6.8 million kilowatt hours of electricity per year.

#### University of South Carolina

A biomass gasification plant burns waste wood for fuel, providing an added 60 Mlb/hr steam capacity to the central utility plant, and nearly 2 megawatts of electric generation. The plant will cover approximately 85% of the University's annual consumption. The self-funding performance contract guarantees long-term reductions in energy and operational costs.