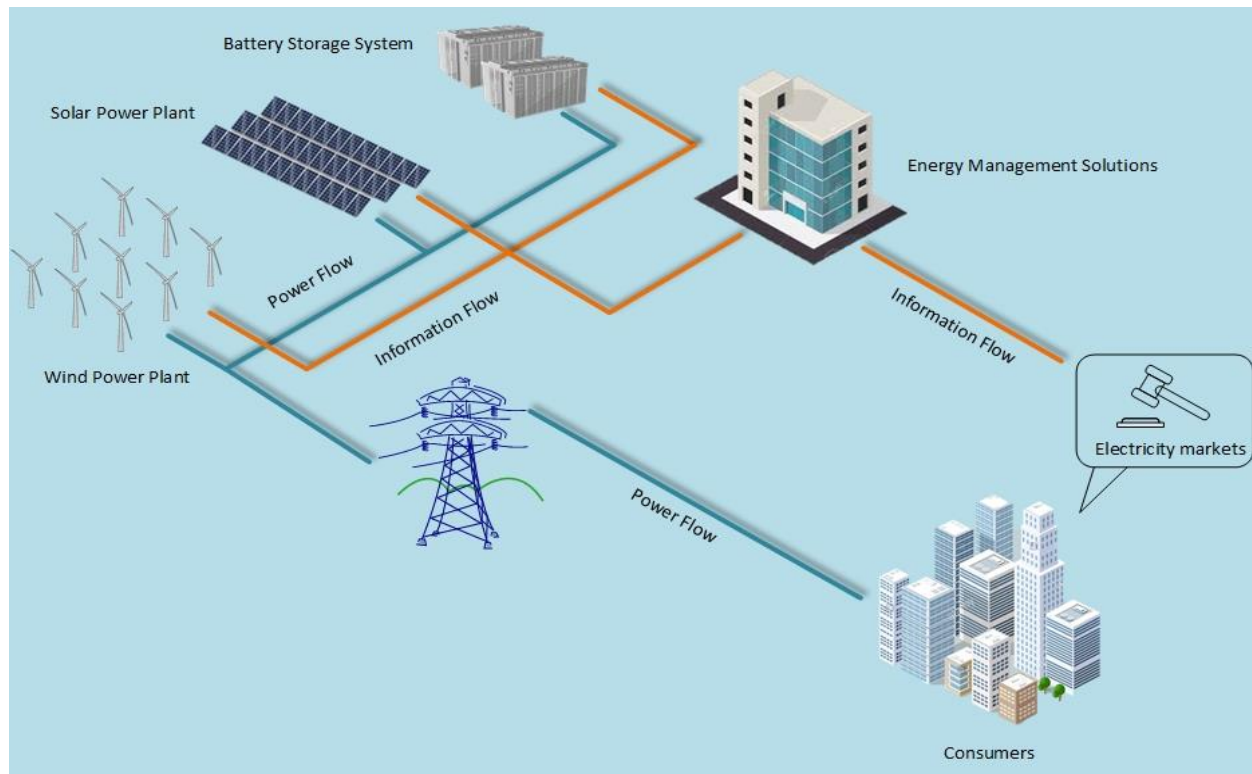


# Optimal Energy Management of Wind, Solar and Storage in Hybrid Power Plants

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The increasing integration of renewable energy sources (RESs), such as wind power, might replace some traditional power plants, currently responsible for supplying power balancing services. Because of the variability and uncertainty associated with wind power, the reliable operation of highly wind power integrated power system might then bear risk unless the wind power plants (WPPs) are able to support and participate in power balancing services. Currently, this expectation is coming true by co-locating battery energy storage systems (BESS), solar power plants, and WPPs at one interconnection point to form a new type of power plants, Hybrid Power Plants (HPP), as they potentially offer rapid active power compensation, thus improving the frequency stability of large-share renewable power systems. Our goal is to develop optimal energy management systems to achieve maximum value of HPPs in markets.