

## **TYPES OF ENERGY HUBS IN A DECENTRALIZED MODEL OF THE POWER GRID**

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The global trend in the energy industry is the transition to a decentralized model. The approach involves breaking the standard centralized model into independent energy hubs, but with connections with each other for different situations.

Energy hubs are divided into three types [1, 2]: 1) overabundant; 2) balanced; 3) underabundant.

Overabundant type involves the predominance of generation or there is no consumption at all. An example of generation only is the case when a powerful power plant is allocated to a separate power plant – a powerful TPP or NPP.

The second type is an ideal case when, within the energy center, it is achieved, with its own resources, the balance of electrical energy.

Underabundant type is diametrically opposed to the first. It is dominated by consumption, or it consists of only one powerful consumer. An example of such a consumer can be a powerful industrial enterprise.

The boundaries of energy hubs [2] are determined on the basis of the condition of the maximum possible balance. With the prevalence of generation or consumption, the primary solution is the injection of electrical energy storage systems [3].

The connection between energy nodes maintains the overall balance in the power grid. And directly when modeling relationships, it is necessary to be guided by the principles of consensus management [4], this is also used for management directly in the energy complex itself.

These principles should be used in the preparation of a mathematical model, and can be implemented in two ways – in the Matlab Simulink environment, or using the Python programming language. Python is more optimal in view of the versatility and perspective of application.

### **References:**

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