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Advanced Platform for Virtual Power Plant Operation

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A virtual power plant is a link-up of small, distributed power resources, such as wind farms, CHP units, photovoltaic systems, small hydropower plants and biogas units, and also of loads that can be switched off, in order to form an integrated network. The plants are controlled from one central control room.
The advanced software platform enables aggregators to provide control of electric energy consumption through activating distributed energy resources, controlling loads with DR functionality or both at the same time.
The communication with distributed energy resources (DER) is carried out using communication devices that enable the observation of current load or production at the measurement point. The change of load or production can be communicated either via e-mail, phone call and text messages or automatically using control protocols.
Acquiring reliable data from energy sources and loads is vital. Intensive data flows from specific domains are merged and their time stamps are aligned. Time alignment enables the creation of complex data attributes, the key building blocks of accurate prediction models. The platform includes special functionalities for the online aggregation of intense data flows and near real-time system response.
The platform provides support for the full process of activation. The process starts with a request for activation, then the calculation of the available sources and the optimal engagement of sources is carried out. The actual set for activation is determined. The activation is then performed and controlled. After the activation is finished, the reports and analyses of the activation are created as well as the billing reports.
The optimization process identifies the potential distributed resources that are available and can fulfil the requested power increase or decrease. It then builds different activation sets of distributed resources that together form the requested activation block (time and power). These sets are ordered according to the chosen criteria, e.g. price, and put to the operator to choose the proper set of activation.
Because the distributed resources included in the VPP are very different in their nature, the set of models that describe their behaviour are different as well. The prediction model management functionality helps to find the best model for each resource at the right situation.

Models employ methods of artificial intelligence and machine learning which help the models to adequately describe each resource.
There are two user interfaces, one for each role in the VPP process. First is the user interface for the VPP operator with a Monitoring panel, an Activation Panel, an Alarms and Alerts Panel, a Billing Panel and a Resources panel. The VPP partner interface excludes some functionality from the Activation Panel and limits the partner's access to only their own data.