

# Transitioning from a meta-simulator to electrical applications: an architecture

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**Abstract—** Nowadays, simulators are used in different applications, such as benchmarking tools, for entertainment and educational purposes, to test scenarios that otherwise would not be possible to analyze (e.g., for security reasons) or to evaluate business and regulatory models. Nevertheless, simulators are usually tailor-made for a specific application. This paper proposes an original approach, an architecture for a software tool capable of simulating any electric power system application, the first energy-oriented meta-simulator. This tool would only require the definition of a set of behavior rules, easing the process of developing new simulators aimed at the energy sector. Its applications range from pure software simulators, that could be used with, for example, benchmarking, decision-making or competition purposes, to applications monitoring and controlling energy assets in real-time, such as hardware devices (e.g., sensors, actuators, or power plants) or digital twins. The proposed architecture resulted by studying previous tools and simulators with the objective of finding common blocks and elements to abstract them. For this reason, the proposed architecture intends to encompass any tool that aims to model the energy sector. Additionally, the proposed architecture is compliant with lightweight Internet of Things (IoT) protocols and smart systems and supports the synchronization with other frameworks at different levels.

**Index Terms—** Electricity market, Internet of Things, Meta-simulator, Energy platforms, Software architecture

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