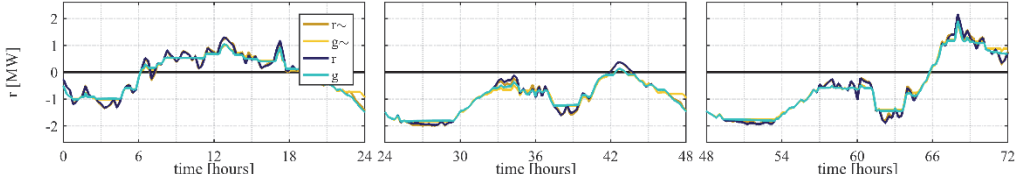
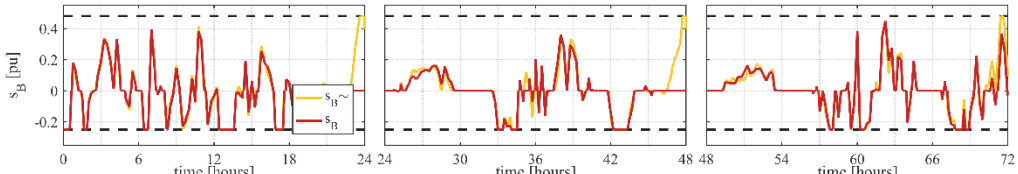
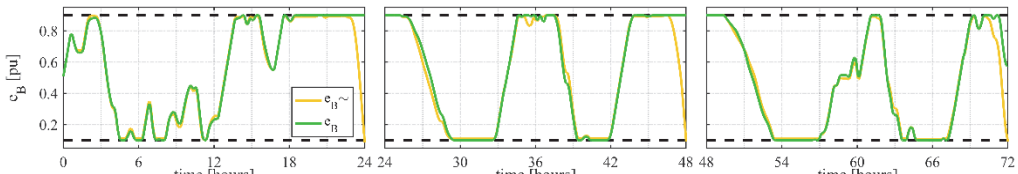


Optimal Management Algorithm

<p>Name of the HW/SW technology: Optimal Management Algorithm</p> <p>Purpose of the HW/SW technology: Providing the reference power for the battery of the MV Hybrid Energy Storage System to provide peak shaving</p>	
Detailed description	<p>The optimal management algorithm developed by UNICA is able to compute the reference power of the battery of the MV HESS for providing peak shaving optimally over a given time horizon. The computation is based on load/generation forecasting and battery status (actual energy level and power limits).</p>
Applications	<p>The optimal management algorithm can be used for providing different power and/or energy services through energy storage systems. It can be useful for both electricity prosumers and distributed system operators.</p>
Technical specification	<p>The optimal management has been implemented through the LabView environment on a suitable hardware/software platform, namely the cRIO-9039 from National Instruments. This is an Embedded CompactRio Controller with Real-Time Processor (Intel Atom E3845, quad-core, 1.91 GHz, 2 MB) and Reconfigurable FPGA (Xilinx Kintex-7 7K325T).</p> <p>The cRIO-9039 communicates with the CRS4 interfaces directly, which provides data on forecasted residual profiles over different scenarios (long, medium and short). They also provide the energy status of the MV battery, which is achieved from the EMP.</p> <p>The cRIO-9039 runs a web service waiting for a request from the EMP, by means of which the EMP can select the most suitable forecasting scenario. When queried, the cRIO-9039 sends a request to the CRS4 interface and to the EMP with the aim of downloading forecasting data and SOC data respectively.</p> <p>Then, the optimal management algorithm is run accordingly, by computing the optimal battery power profile for peak shaving purposes over the required time horizon. This power profile is then transmitted back to the EMP through the CRS4 interfaces.</p>
Images, drawings	 <p>Residual and grid power profiles achieved by the optimal management algorithm over three days: \tilde{r} and \tilde{g} (dark orange and orange, forecasted at the start of each day), r (dark blue) and g (cyan).</p>  <p>The battery power profiles achieved by the optimal management algorithm over three days: \tilde{s}_B (orange, forecasted at the start of each day) and s_B (red, actual evolution).</p>  <p>The battery energy evolution achieved by the optimal management algorithm over three days: \tilde{e}_B (orange, forecasted at the start of each day) and e_B (green, actual evolution).</p>



The cRIO-9039 used for implementing the Optimal Management Algorithm.

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