An enhanced grid integration of residential photovoltaics through a kinetic storage solution

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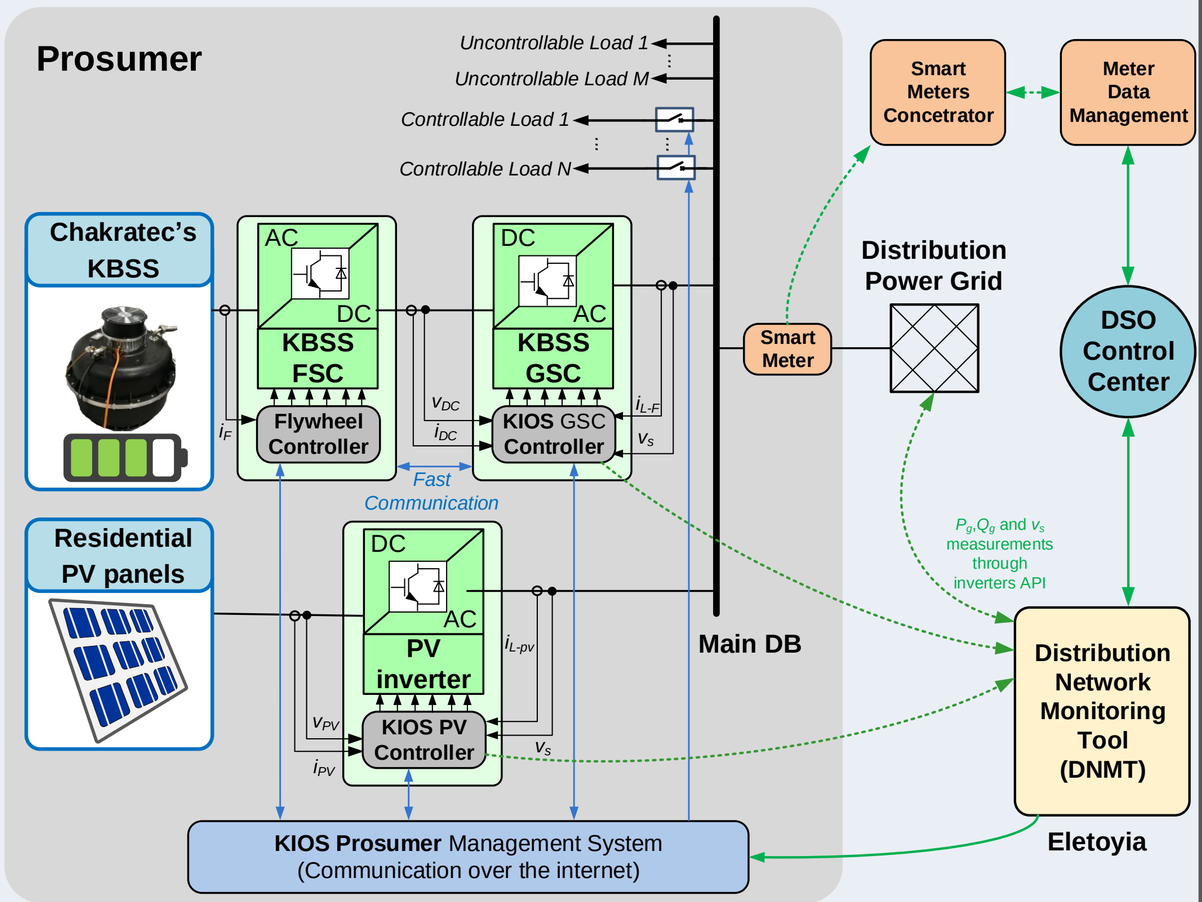
Expected Results of ENHANCE project

- **A novel PV system architecture equipped with:**
  - **a Kinetic Battery Storage System (KBSS)** (from Chakratec)
  - **a PV/Storage inverter with advanced capabilities** (from KIOS)
  - **smart meters and communication infrustructure** (from PowerCom)
  - **a prosumers power management system** (from KIOS)
  - **a Distribution Network Monitoring Tool (DNMT)** (from Eletoyia)
- **Advanced voltage-frequency support schemes for the power grid**
- **PV system with new functionalities and flexible capabilities**
- **Low-cost monitoring of the distribution grid (through DNMT)**
- **Nowcasting of rooftop PVs production with the minimum cost**

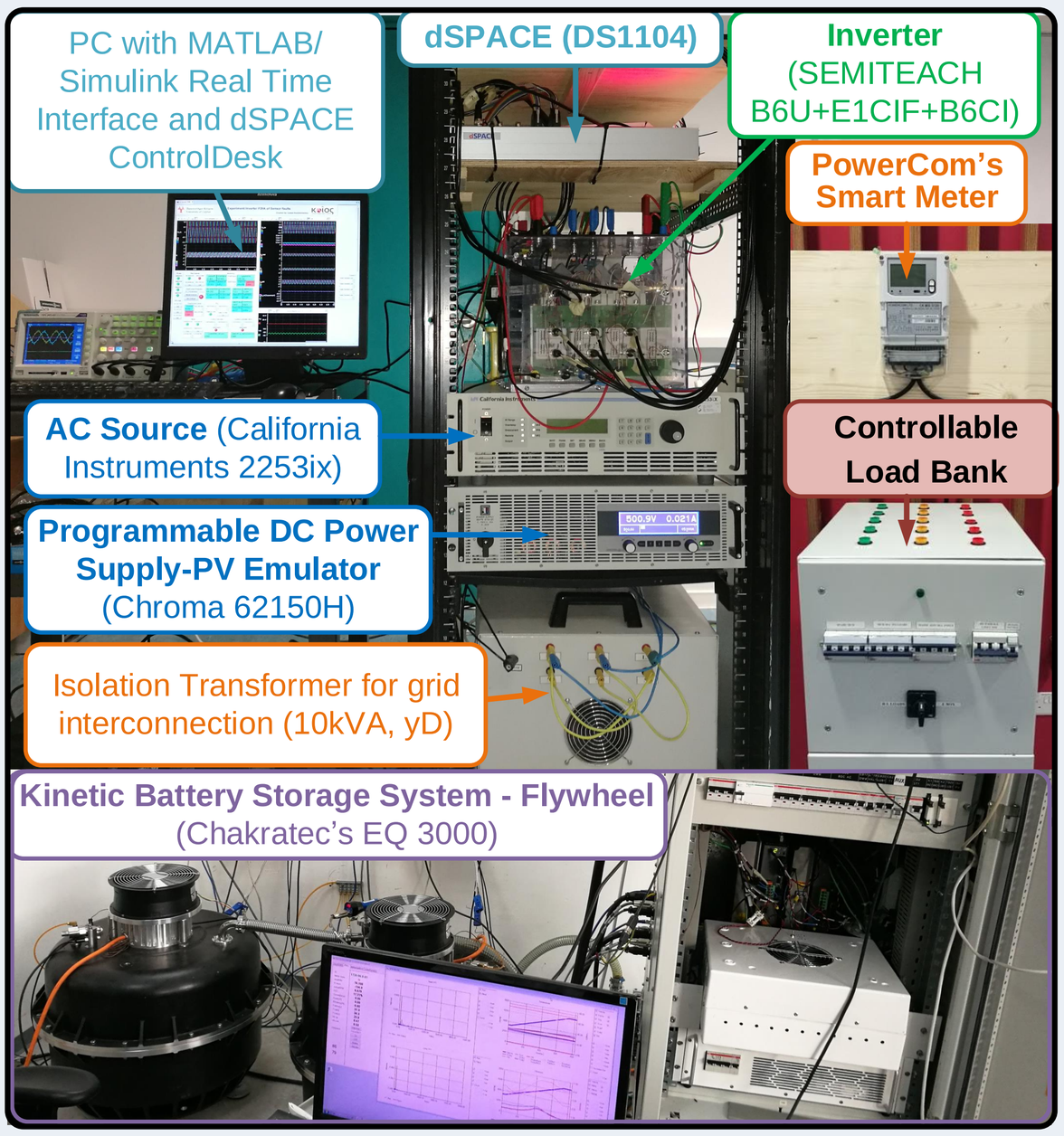
Impact of the project

- **7-10 years extension of the PV inverter lifetime**
- **Low-cost monitoring of residential PV production**
- **Awareness of the distribution grid operating conditions**
- **5-8% increase of the KBSS efficiency**
- **Increase the allowable penetration limits for solar energy**
- **Improve the power system quality and stability**
  - **Voltage/frequency support scheme and congestion management**
  - **10% decrease of the peak demand ratio**
  - **20-30% decrease of the prosumer's exchange power**
  - **2-3% minimize of the prosumer losses**

Proposed prosumer architecture

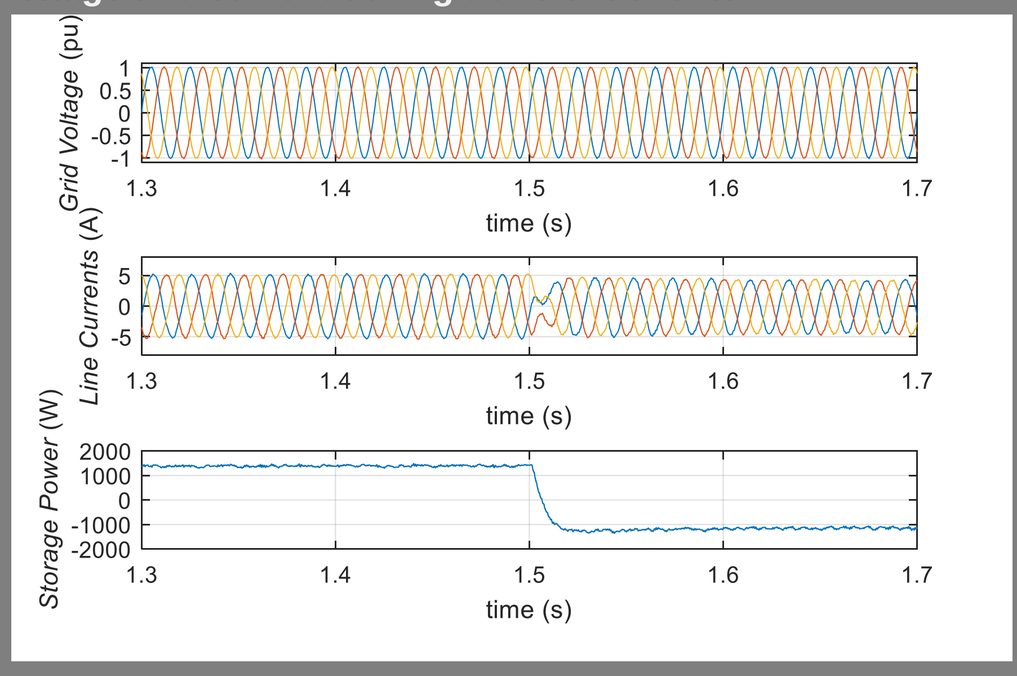


Laboratory setup for experimental validation

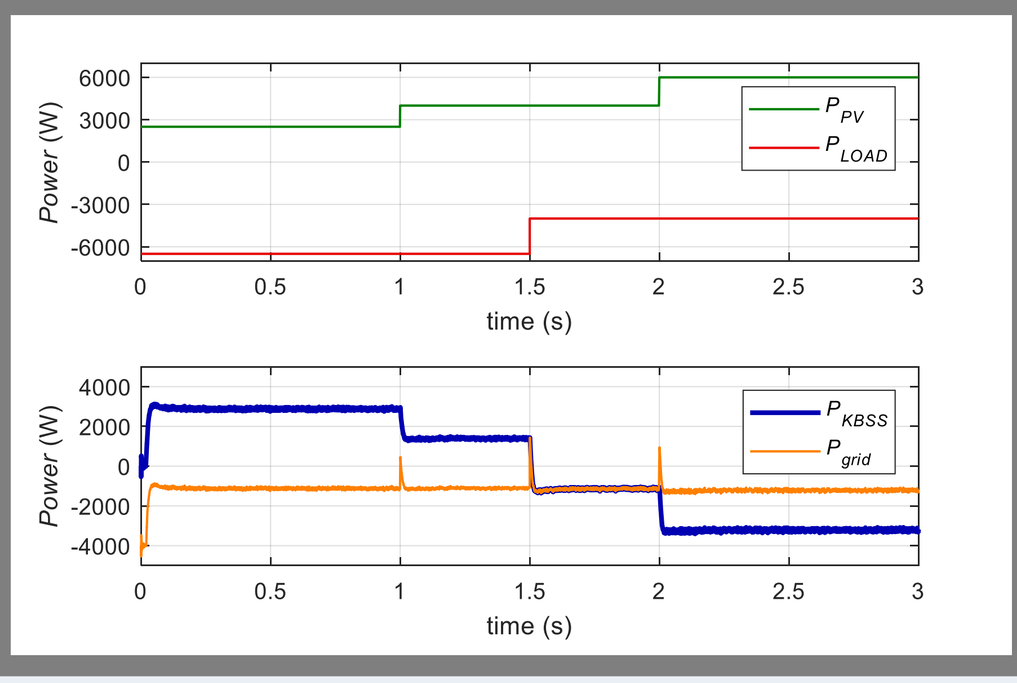


Initial results

- **Voltage and current during transient events**



- **Storage is controlled in order to maintain a constant power exchange between the prosumer and the grid (equal to 1 kW)**



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