

Work package number	WP2-TA2.3	start date of event:	M6	end date of event:	M42
Work package title	Transnational Access @AIT				
Participant number	2	Participant short name		AIT	
Description of the infrastructure					
Name(s) of the infrastructure(s):	BattLab				
Location (town, country):	Austria (Vienna)				
Web site address:	https://www.ait.ac.at/themen/battery-technologies/ https://infrastructure.der-lab.net/research-infrastructure/austrianinstitute-of-technology-ait/				
Legal name of organisation operating the infrastructure:	AIT Austrian Institute of Technology GmbH				
Location of organisation (town, country):	Vienna, Austria				
TA1.3 BattLab					
<p>AIT has the following battery manufacturing and testing infrastructures:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Dry room with modern research pilot line for the production of stacked pouch cells <input type="checkbox"/> Modular approach with automated machines – manual transfer between stages <input type="checkbox"/> Model-assisted battery material development and optimisation <input type="checkbox"/> Industry-oriented electrode engineering and cell production <input type="checkbox"/> Comprehensive physicochemical and electrochemical characterisation (in- and ex-situ methods) <input type="checkbox"/> Post-mortem analysis <input type="checkbox"/> Accredited electrical, environmental and safety tests on cell, module and system level <input type="checkbox"/> SOX (State of Health, State of Charge, etc.) determination <input type="checkbox"/> Simulations in 1 and 3D at cell and system level including ageing <input type="checkbox"/> Cell selection and benchmarking based on extensive battery databases <p>AIT has a large research Infrastructure, represented by the Cluster Electric Drives Laboratory. (see below), with a Cost (€) of 13.36 EUR/hour (2019 tariff). AIT puts its extensive research infrastructure at the disposal of this project. The hourly rate is applied across the board for all person hours spent on it, since it is also calculated as an average. This methodology has been assessed and formally recognized by the European Commission. AIT has the following battery manufacturing and testing infrastructures: (1) Dry room with modern research pilot line for the production of stacked pouch cells. (2) Modular approach with automated machines – manual transfer between stages. (3) Model-assisted battery material development and optimisation. (4) Industry-oriented electrode engineering and cell production. (5) Comprehensive physicochemical and electrochemical characterisation (in- and ex-situ methods). (6) Post-mortem analysis. (7) Accredited electrical, environmental and safety tests on cell, module and system level. (8) SOX (State of Health, State of Charge, etc.) determination. (9) Simulations in 1 and 3D at cell and system level including ageing. (10) Cell selection and benchmarking based on extensive battery databases.</p>					

AIT is claiming costs for its Large Research Infrastructure LRI, specifically the machine cluster “Electric Drives Laboratory”, which includes the battery labs. As per agreement with the Commission, the applicable hourly rate is added to every person hour booked on the project, since it was calculated as an average overall technical personnel effort at AIT. Large research infrastructure is approved by the EC for AIT, and relevant confirmations are received.



Left: Reel-to-reel coater as part of the AIT research

Right: Dry room for cell manufacturing with relative humidity of < 0.1%

Furthermore the lab includes widely configurable low-voltage networks, flexible high-bandwidth grid simulators, high-performance PV simulators, and environmental chambers for the purpose of testing of components at rated input and output power under extreme temperature and humidity conditions. The Infrastructure additionally offers the opportunity to simulate complex electrical grids both in offline mode as well as in real-time mode and connect them to the lab networks. These configuration techniques allow for the integration of real components into a virtual grid environment and for testing under realistic conditions with existing interactions to the grid. Moreover, the lab infrastructure provides full functionality for design and validation of power electronic systems and components. The following major facilities are available:

SmartEST High-Power Lab

- High bandwidth AC grid simulation units (3 x 400 V, 800 kVA) and dynamic DC sources and PV array simulators (1500 V, 1500 A, 960 kW)
- 3 independent laboratory grids (grounded/isolated mode)
- Freely adjustable RLC load banks (1 MW, 1 MVar) and LVRT test setup (1 MVA)
- Adjustable line impedances
- Data acquisition system and laboratory SCADA system
- Environmental test chamber (-40°C to 120°C, size 3,6 x 2,6 x 2,8m)

SmartEST Inverter Lab

- High bandwidth AC grid simulation units (3 x 400 V, 30 kVA)
- Anti-islanding test setup (30 kVA)
- High bandwidth, linear PV-array simulation system (3 x 12 kW)
- Data acquisition system, measurement instruments

SmartEST Storage & Electric Vehicle Lab

- Battery simulator (DC source)
- Data acquisition system, measurement instruments
- Electric vehicle (EV) and electric vehicle supply equipment (EVSE) simulator
- AIT LabLINK communication gateway

SmartEST Digital Simulation Lab

- Multicore Opal-RT real-time simulator (including software licenses)
- Typhoon HIL and PLECS real-time simulators (HIL)
- License for MATLAB TPC Target HIL simulation environment
- Server hardware for power system simulation and co-simulation
- PC-based simulation terminals
- Licenses for power system simulation (DigSilent Power Factory, Sincal) and for dynamic

system simulation (Dymola)

- Licenses for MATLAB Simulink, Simscape
- Powerful computing cluster for advanced simulation studies and data analytics

SmartEST Micro-Grid lab

- Various DER devices
- Micro grid automation and control equipment

AIT is organizing regularly battery seminars of 1-3 days for industrial and academic partners (e.g. recently in July 2019 with 60 participants which was also the official opening of the pilot-line with the Austrian Ministry). Participants are industrial customers that include raw material manufacturers, battery pack developers, OEMs and special equipment manufacturers. Topics covered include basic working principles of battery cells up to cells design and future battery technologies. AIT is also heavily involved in services, which include contract research for novel materials research, cell testing, cell design and generation of technology roadmaps for special applications. Cell testing includes testing according to ISO norm 12405-1,2, as well as tailored test design including drive cycle testing, abuse testing and high precision cell performance measurements. StoRIes will extend the outreach of those services and will increase the market perspectives of the services significantly.

The facilities offered by AIT battery research, enable scientists and engineers to bring novel technologies in the battery field from laboratory environments towards industrial realisation. This includes material research for improved manufacturability and demonstration at pilot scale level. The current European landscape of battery manufacturing and research has a need for highly skilled individuals to realise the implementation of the many gigafactories required for the full electrification of the mobility sector. The EU has declared its ambition to become an innovation leader in the manufacturing sector of batteries and electric mobility solutions. The training of qualified personnel as well as the in-depth applied research of eco-friendly large-scale manufacturing will be of utmost importance for this undertaking. Therefore, access to such facilities as the research pilot line at AIT and the testing and characterisation facilities for prototype pouch cells, is vital to support the European ambition.