Factsheet Siemens & Aspern Smart City Research (ASCR)

**A globally recognized research program in Vienna.
From idea to economic standard – solutions for the energy transition of an intelligent urban district.**

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Background

aspern Seestadt Vienna is one of Europe's largest urban development areas. In 2023, Vienna surpassed the two-million population mark and is pursuing the goal of becoming climate-neutral by 2040. By the 2030s, a new district will be created in the 22nd district, serving as a blueprint for a climate-neutral city. Relevant key facts: around 70 % of the world's population will live in urban areas by 2050; buildings account for approximately 40 % of European energy consumption; a substantial share of energy is still used inefficiently today.

Unique Selling Points

- Unique living lab with real building and distribution-grid infrastructure as well as close customer involvement.
- Interdisciplinary collaboration between engineering, natural sciences and social sciences to deliver evaluated, practical solutions.
- Innovation ecosystem comprising the Stadtwerke Group, urban development and technology partners (Siemens).
- From greenfield to brownfield: in Phase 3, additional representative buildings and urban infrastructure in Vienna are being integrated.

Shareholder & Team

Siemens AG Austria (49.1 %), Wiener Netze GmbH (25 %), Wien Stadtwerke GmbH (19.95 %), Vienna Business Agency (4.66 %), Wien 3420 Holding GmbH (1.29 %). More than 150 people from the parent companies work directly on the research. Funding is focused on R&D and testbeds, including sensor technology, battery systems, automation and software.

Objectives tive of the third phase “ASCR NeXt Level” (2024–2028) – updated

Phase 3 links five real testbeds, including Technology Center 2 and SeeHub, with virtual co-simulation as well as data-driven, AI-supported methods. The focus is on system-serving flexibility in the low-voltage grid, interoperable grid models based on CIM, condition-based maintenance in substations and scalable building optimization using model predictive control. This enables solutions to be validated in practice, scaled in a targeted manner and prepared for transfer into standard processes.

Key Research Areas and Questions (Phase 3)

- Smart grids / grid capacity: derivation, communication and secure execution of dynamic operating limits (operating envelopes) based on forecasts, real measurement data and co-simulation – to limit peak loads (peak shaving) and avoid unnecessary grid expansion.
- Interoperable grid models & data quality: CIM-based data exchange between planning, operations and analytics; partially automated topology verification using sensors/simulation as well as AI-supported photo analysis.
- Condition monitoring in transformer substations: early detection of partial discharges and correlation with environmental parameters; intuitive visualization and actionable recommendations for maintenance and grid operation.
- Grid-interactive buildings: scalable MPC-based optimization (b.eos) with simplified commissioning (topology editor), simulated pre-testing and grid-supportive integration.
- E-mobility as a grid topic: addressing the volatility and simultaneity of many charging points through intelligent envelopes and suitable interfaces.

Facts & Figures Across All Program Phases – updated

Current research environments in aspern Seestadt include the Technology Center 2 and SeeHub buildings, as well as the low-voltage grid in and around aspern Seestadt (Aspern+). These locations are representative of building, district and grid use cases in Phase 3.

Insights & Achievements – curated (Phase 3 examples)

- Managing grid capacity dynamically: in urban low-voltage grids, operating envelopes can unlock additional connection and operating headroom when forecasts, real data and simulation are combined intelligently; AI supports parameterization and failure-case analysis.
- Data interoperability as an enabler: CIM profiles and standardized exports/imports reduce media breaks; topology verification and partially automated data checks noticeably improve data quality.
- Condition-based maintenance in substations: online partial-discharge measurement with environmental sensors and cable temperature measurements enable early indicators; visualization and automated analysis facilitate actionable measures.
- Scalable building optimization: MPC-based control (b.eos) with simulated pre-testing and simplified commissioning (topology editor) reduces effort, increases robustness and enables grid-supportive operation.
- AI-supported knowledge digitalization & compliance: structuring expert knowledge and rule sets, such as RAG/LLM approaches, and using GPU resources in the testbed for secure PoCs.

Technologies & Platforms Used in Support of Climate Protection – focused

- Gridscale X (LV Insights): active low-voltage grid management, faster time-to-value and a foundation for digital grid representations.
- Building X (Operations, Energy, 360°): open, AI-based suite for improving performance and efficiency and reducing data silos in buildings.

- Digital twin, AI/ML and co-simulation: connecting the real and digital worlds, simulation & analysis before roll-out; co-simulation as an enabler for "what-if" scenarios.
- Cybersecurity & data governance: NIS2-compliant protection requirements for critical infrastructures, secure data provision and clearly regulated access rights.

Future Challenges

- High complexity: increasing levels of integration require "plug & automate" approaches to reduce roll-out costs in installation, operation and maintenance.
- Building technical expertise: cross-domain interactions require openness to new technologies and ways of working.
- Cybersecurity: further development of suitable protection concepts for connected systems.
- Data management & quality: growing data volumes and quality requirements – particularly as a prerequisite for operating envelopes and CIM data exchange.

Contact

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