PRESS RELEASE

20,000x Faster Grid Calculations
envelio Unlocks More Grid Capacities and Accelerates Speed to Power with Game-Changing GPU-based Power Flow Solver

- **Up to 20,000 times faster: The new GPU-based grid solver significantly accelerates power flow calculations compared to industry-standard legacy tools**
- **Transparency & reliability: Physics-first results instead of AI "black box" approach**
- **Game-changer to unlocking grid capacities: The patent-pending solution is the key for more flexible grids and achieving a higher speed to power for distributed generation, data centers and other loads**

Cologne / Boston, June 11, 2026 – envelio has achieved a technological breakthrough: The grid tech company has developed a GPU-based power flow solver that cuts the time required for annual time-series simulations from days or weeks to less than 30 seconds – up to 20,000 times faster than industry-standard processes relying on desktop grid calculation tools. For the first time, utilities can run continuous, large-scale grid simulations as part of their daily operations – fundamentally changing how grid capacities are assessed, unlocked, and managed.

The timing could not be more critical. More than 2,500 gigawatts (GW) of generation, storage, and large industrial projects are currently waiting in grid connection queues worldwide – and that figure only counts large-scale requests in the megawatt range. Data centers urgently needed for AI infrastructure, EV charging networks, heat pumps, and renewable generation assets are all stuck in the same bottleneck.

This is precisely the problem that envelio's new GPU-based power flow solver solves: "Transparent and flexible grid management depends on complex time-series simulations, a process that traditionally took days or even weeks with legacy desktop grid calculation tools and fragile scripting around the solver core," says **Dr. Simon Koopmann, CEO of envelio**. "Our new solver reduces annual time-series simulations to less than 30 seconds, delivering performance that is up to 20,000 times faster than processes relying on conventional desktop solvers."

This high-performance solver allows utilities to simulate in real time how power grids will behave when new loads such as data centers, electric vehicle (EV) charging stations, heat pumps or generators such as photovoltaic (PV) systems, wind parks, or battery storage systems want to get connected. Combined with the IGP's underlying digital twin of the power grid, it enables new use cases that were previously not feasible.

Unlike black-box, AI-based estimation approaches, the new technology solves the real physics of the grid on a digital grid model. This gives utilities results that their engineers can trust while making large-scale scenario simulations, faster connection assessments, more flexible grid operation and more robust grid investment decisions part of everyday practice.

"Grid operators are under pressure to evaluate significantly more connection requests, scenarios and flexibility options under tight timelines. Our GPU-based solver transforms grid planning, replacing periodic, worst-case-based studies with continuous, time-series-driven decision-making. This allows grid operators to make better use of existing capacity and invest more effectively, which ultimately helps to keep the energy transition affordable", concludes **Dr. Simon Koopmann, CEO of envelio**.

Physics-first trust at GPU speed instead of AI estimations

Some providers have responded to the demand for faster simulations by turning to AI-based estimation – trading accuracy for speed. envelio has taken a fundamentally different approach.

"The need for faster simulation is so high that solutions have emerged in the industry that rely on AI-based estimation just to speed things up. We have opted to still accurately solve the real physics in the grid – but with a new technology that is at least as fast as, if not faster than, AI-based estimation approaches out there", explains Dr. **Fabian Potratz, CTO of envelio.**

envelio's solver is built on deterministic, physics-based models that follow established electrical engineering principles – not statistical approximations trained on synthetic data. For dependable grid decisions, envelio uses a true AC (alternating current) power flow model, capturing complex voltage behavior and reactive power effects in distribution grids. Results are fully transparent and auditable, giving grid engineers outputs they can verify, trust, and stand behind. The GPU architecture delivers this engineering-grade reliability through massive parallelization – simultaneously computing across scenarios, time steps, and grid segments. Speed without trust is not a solution.

Unlocking new potential for power grid infrastructure

The high-performance solver delivers tangible benefits across key areas of power grid planning and operations:

- **Faster grid connection studies:** New loads and generation assets can be assessed significantly faster, reducing waiting times and allowing the analysis of more complex connection solutions based on flexible connection agreements. This results in a shorter time-to-power for developers and reduced engineering workloads at utilities
- **More precise hosting capacity analysis:** Grid operators gain a detailed and time-series-based understanding of how much additional load or generation each grid segment can accommodate before limits are reached instead of relying only on worst-case evaluations. This reduces speculation by DER, data center, and battery storage developers and leads to a better, more reliable site selection without unexpected costs.
- **Better use of existing infrastructure:** More comprehensive simulations enable grid operators to maximize available power grid capacity before investing in expansion.
- **Improved investment decisions:** Instead of relying on a few standard scenarios, grid operators can now run millions of scenarios to identify the most targeted grid investments – and save billions in unnecessary expansion costs.
- **Flexibility management as a game-changer in the energy transition:** The increased computational performance enables a more flexible grid management throughout the core processes from planning to operation

The GPU-based solver enhances the existing IGP Grid Hub functionality. It has been integrated into select time-series and hosting capacity workflows and is currently available. Further expansion to additional use cases is planned throughout the year.

"We see the GPU-based solver as a true game-changer for the industry. It creates entirely new possibilities and workflows for the energy system, including smarter connection assessments and large-scale scenario planning that were previously impossible. We will leverage this breakthrough across our entire platform to support grid planning, connections, and operations – accelerating the energy transition and the AI-fueled data center boom", concludes **Dr. Simon Koopmann, CEO of envelio**.

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About the Intelligent Grid Platform (IGP):

envelio's Intelligent Grid Platform (IGP) is a comprehensive software solution for the efficient planning and operational management of distribution grids, providing a digital twin that processes, corrects and visualises existing data. As smart metering increases the volume of data, the platform's accuracy improves, providing transparency into grid processes. The award-winning software adapts to different sizes of grid operators, making it a unique solution to the challenges of decentralised energy supply and distribution grid expansion. envelio's IGP enables grid operators to optimise and automate processes, laying the foundation for a rapid and decentralised global energy transition.

About envelio:

envelio GmbH was founded in 2017 as a spin-off from RWTH Aachen University and is headquartered in Cologne, Germany. The award-winning cleantech company develops smart grid software that helps utilities worldwide modernize their energy infrastructure through automation and digitization.

With its proprietary Intelligent Grid Platform (IGP), envelio offers grid operators transparent insights into actual grid operations and a comprehensive suite of tools for resilient grid planning. The digital twin enables utilities to address grid vulnerabilities, visualize and plan hosting capacity, and automate grid connections. More than 90 utilities worldwide have adopted and scaled the IGP, including E.ON, which operates the largest distribution grid in Europe.

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