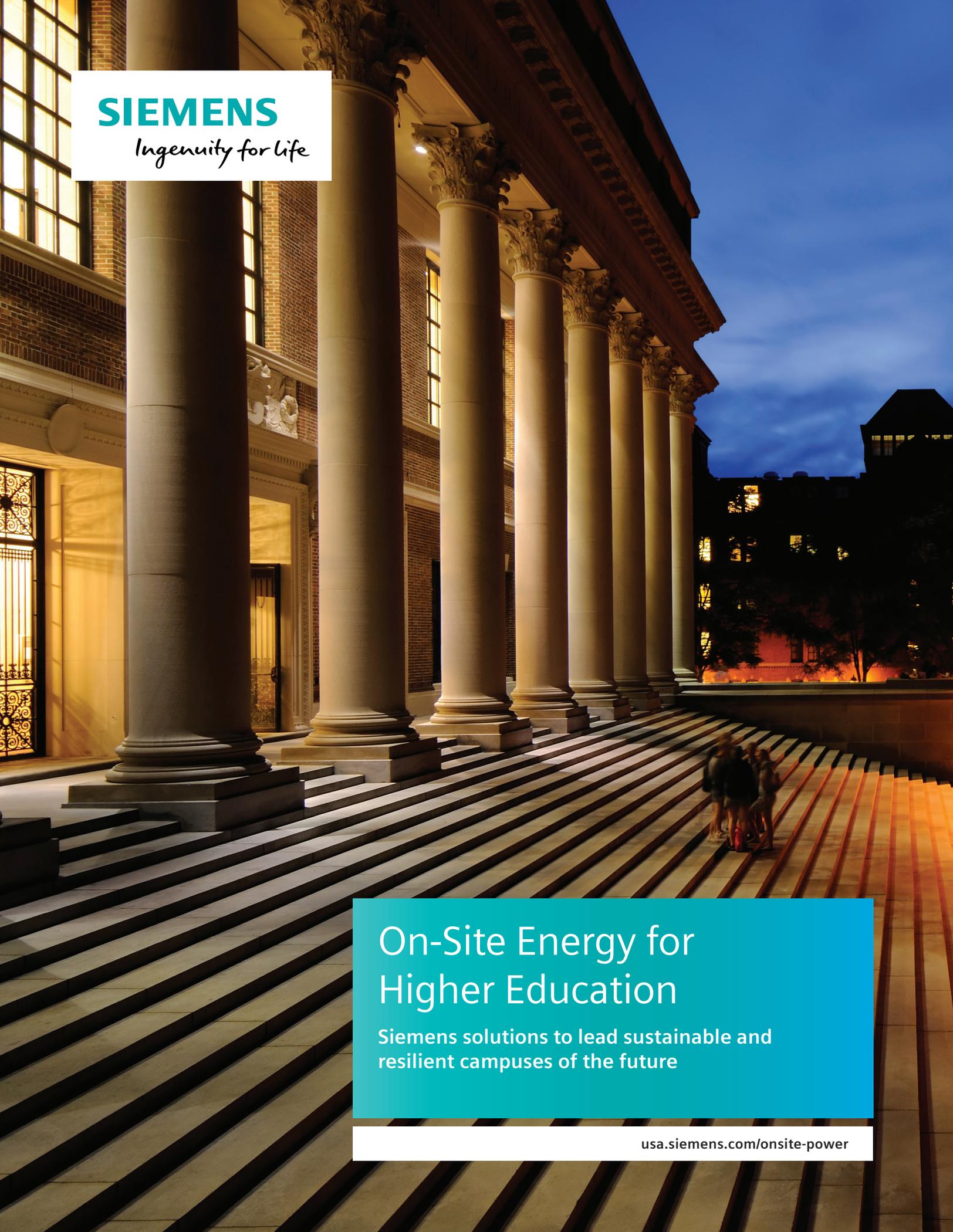




SIEMENS

Ingenuity for life



On-Site Energy for Higher Education

Siemens solutions to lead sustainable and
resilient campuses of the future

usa.siemens.com/onsite-power



Putting Power and Control in Your Hands

Keep your campus up and running with proven on-site energy solutions.

Keeping the lights on is a 24/7 job at colleges and universities. You can rest assured that your campus will always be on for your faculty, students, and staff when Siemens is your energy partner. Our on-site energy solutions help protect your power supply while reducing greenhouse gas emissions and cutting overall energy costs – savings that help preserve capital for your institution's core mission.



High cost of energy, outages

The stakes are high. The nation's 4,000 colleges and universities spend over \$6 billion on annual energy costs for 5 billion square feet of floor space, according to the Department of Energy's Better Buildings® program. In a typical facility, as much as 33% of consumed energy is wasted.

The costs go even higher when the price of power outages and major fluctuations in the power grid are factored in. From extreme weather to cyber attacks, there are more threats than ever that can interrupt an institution's operations. In critical environments such as research laboratories, where consistent temperatures are necessary for the specimens they house, the damage can be irreparable.

Taking control

It takes a predictable power supply to keep a college or university up and running. That means taking control of your power source: it's a thing of the past to depend solely on the central grid. With Siemens proven options for local energy generation, distribution, storage, and management, you'll have your own energy supply if the grid goes down. You'll be able to maintain student safety and

comfort while protecting against risks such as loss of data, lost or interrupted student work, and damages due to failure of critical heating and refrigeration equipment.

And local generation has never been more important or more viable. Distributed generation technologies such as turbines, batteries, and solar arrays as well as the latest in combined heat and power (CHP) solutions help ensure operational continuity for colleges and universities of all sizes.

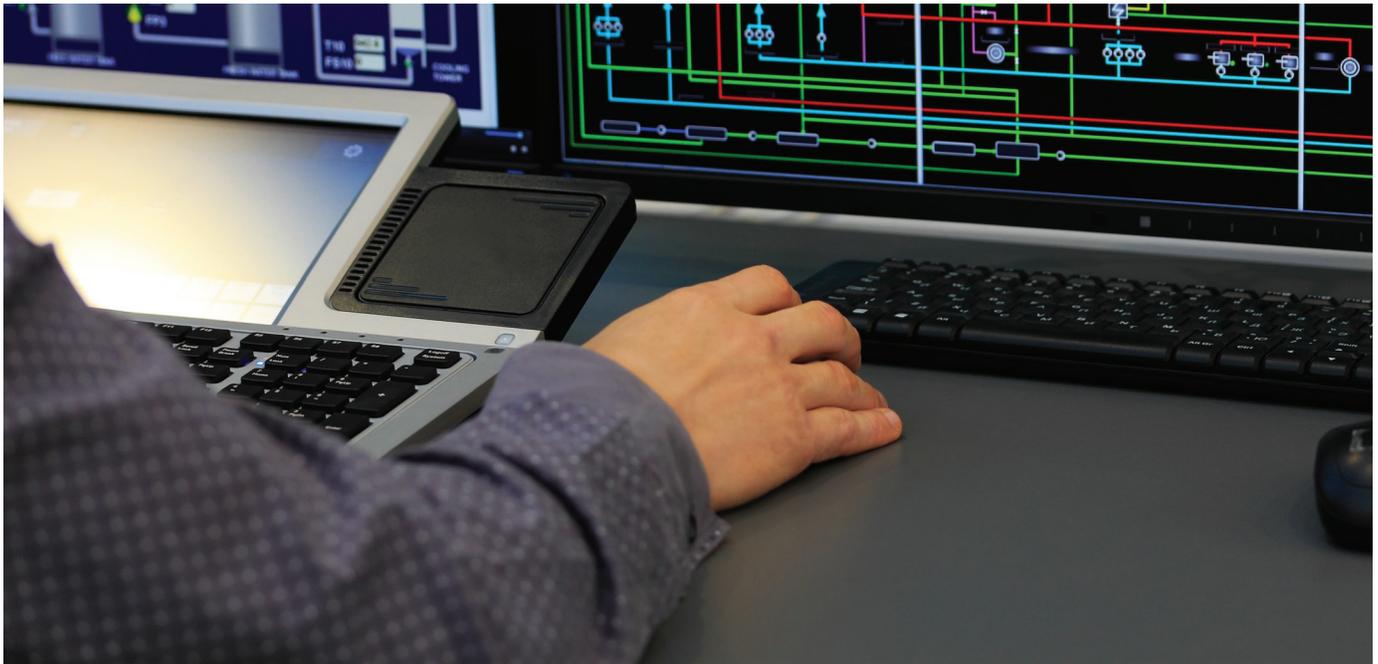
Becoming a prosumer

The days of being a passive consumer of power are also numbered. Siemens on-site energy solutions are helping leaders like you transform their institutions into active prosumers who have a two-way relationship with the grid. For example, energy can be purchased from the grid when rates are low and generated locally when rates are high, yielding significant savings. Excess energy can be sold back to your local utility, reducing your overall energy costs.

Whatever is needed to keep your institution operating 24/7, our energy experts are on hand to help you develop and implement an energy plan that leads to a safe and secure energy future.

Virginia Tech, Blacksburg, VA

Virginia Tech's 100kW solar application on the roof of an existing parking garage produces 130,000 kWh of solar power annually. The results: an \$8,800 reduction in annual utility costs. It also reduces Virginia Tech's carbon footprint by saving the equivalent of 208 barrels of oil or one acre of forest from deforestation annually. Importantly, in a nod to aesthetics, the solar application was designed to coordinate with the university's architecture.



Take Charge of Your Power Supply

Local microgrids, generating options, and storage solutions meet any need

Project Financing Options

At Siemens, we're committed to providing financially viable solutions that make it easier for your organization to have its own on-site energy solution. Siemens

Financial Services offers investment solutions ranging from advisory services to technology and equipment finance. Our new turnkey approach, DBOOM (short for Design, Build, Own, Operate, and Maintain), transfers the burden of infrastructure financing, ownership, and operations to Siemens.

Self-sustainability and independent operation are within reach today. Siemens has the powerful automation controllers and management software, complete range of generating assets, and latest storage technology that make it happen. You'll be able to create a seamless grid that's resilient and cyber secure as well as cost-effective and reliable.

Powerful automated controls

With our automation controllers and Spectrum Power™ management software, you can optimally manage all of your generation resources and interact with the central grid. Siemens Spectrum Power ADMS lets you plan, optimize, and professionally manage your own microgrid. Our automation control technology is the "glue" that brings your new and existing assets together into a single, operable microgrid.

The Spectrum Power software predicts power loads and dynamically controls assets by integrating generation data with forecasting data and outside information such as weather conditions. Spectrum Power management also enables revenue-generating capabilities like demand response. It identifies ideal situations for cost-savings, such as when to generate power independently.

Our automated control technology integrates diverse power sources such as wind and solar, biomass fuel cells and cogeneration plants, and legacy systems such as diesel generators, regardless of the supplier. Thanks to a detailed view of all your power assets, you'll be able to proactively manage generation and usage accordingly. You can create and manage your energy mix without fear of outages or power interruptions due to the grid. If the grid goes down, you can easily island your operations and keep your institution up and running.



Tailor-made performance

As a leading player in power generation, we offer one of the broadest portfolios of generation options in the market, including gas turbines, CHP, and renewables. Our industrial gas turbines range from 250kW to 53MW and are ideal for colleges and universities. Aero derivative gas turbines offer a compact, lightweight design that delivers efficiency with fast start-up. High-performance steam and gas turbines up to 100MW are available for multi-building applications.

We have extensive experience in developing CHP solutions, which can produce electricity with roughly one-quarter the emissions of an existing coal power plant. Combining a gas turbine and a steam turbine that recycles heat exhaust improves efficiency by as much as 90%, reducing fuel consumption and carbon emissions.

Siemens renewable solutions deliver reliability and sustainability. Our experts can specify, design, and install complete solar arrays or customize a wind solution using technology developed for mid-to-low wind sites. We configure new solutions to work with other renewables and legacy assets in a full, turnkey solution.

Energy storage that's built to last

Modular energy storage systems make our on-site energy solutions that much more efficient. Siemens energy storage systems are built around Lithium-ion battery technology and are integrated into your local energy system via automated controllers. You'll be able to accrue energy during low periods and release it during peak periods, moving the energy equation in your favor and adding cost savings.

Our solutions also help balance and optimize the performance of all on-site energy assets by stabilizing frequency and voltage. They can also mitigate the intermittency of renewable assets like wind and solar, storing energy when it's sunny or windy and releasing it when it's not.

All of our storage solutions are designed based on your specific infrastructure. They are backed with a performance guarantee and are scalable to allow more assets in the future. They integrate with a wide range of generation assets, including renewables and fossil-based generation, as well as legacy and third-party assets such as solar arrays and diesel generators.

Algonquin College, Canada

A full-campus microgrid at Algonquin College in East Ontario, includes a 4MW cogeneration plant, solar photovoltaic elements, power storage, and electric vehicle charging points. It's all integrated by Spectrum Power Grid Control Platform. The results: a 48% reduction in annual energy costs, translating into CN\$3.2 million in annual operational savings that are being put into the classroom and student facilities. The technology is also part of student training and undergraduate and graduate coursework on sustainability.

Energy Expertise for Total Energy Management

Taking your overall energy program to the next level of success

Columbia University, NY

Columbia University is receiving clean electricity from two remote solar farms for its Lamont-Doherty Earth Observatory (LDEO) in Palisades, NY. The remote sites will reduce annual energy costs, cut CO₂ emissions in half, and also act as learning laboratories for students. The solar farms are replacing more than 20 electrical meters located at LDEO, with each generating 2.9 MW. That's enough to meet 75% of LDEO's electrical needs and trim energy costs by up to \$200,000 annually.

A new way of thinking

At Siemens, we have the expertise and resources you need to make sure you're getting the most out of your overall energy program. Our Total Energy Management approach is a new way of thinking that provides colleges and universities with greater control by looking at the big picture.

Using advanced technology and data analytics, we help you gain a comprehensive view of all your energy initiatives – from on-site production, to reducing consumption, to procurement – and how they can work together for maximum results.

Confident decision-making

Identifying your management goals and implementing a comprehensive strategy helps you define where your energy initiatives intersect. With across-the-board energy information like this, you'll be able to better prioritize your investments and create a

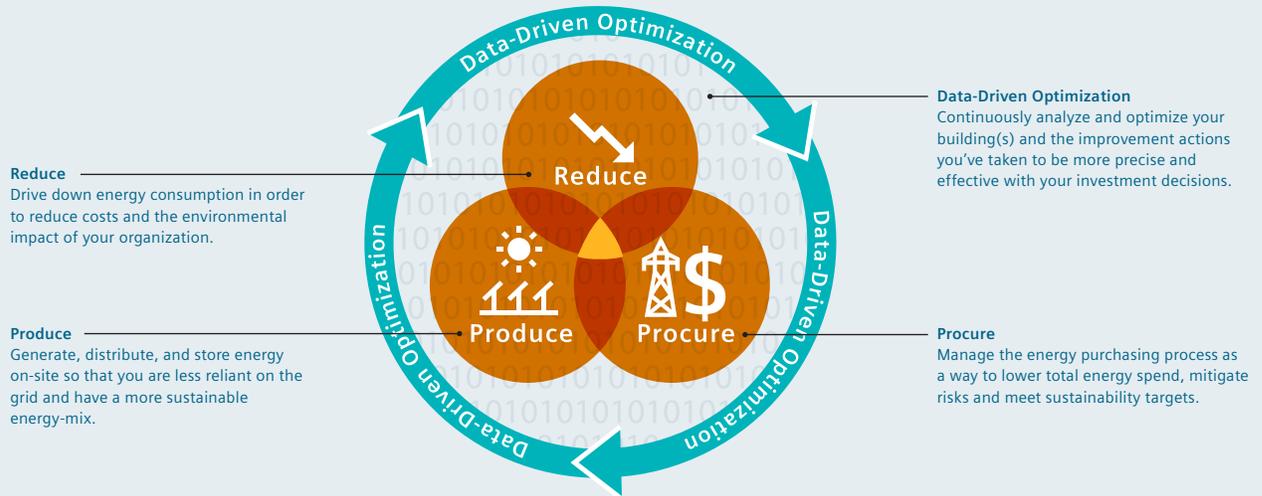
long-term plan that's aligned with your institution's goals. This supports confident decision-making and, most importantly, significant cost savings.

With a Total Energy Management approach, you can combine the benefits of on-site solutions with other building-level management strategies to create additional value for your institution. For example, on-site generation, storage, and management allow you to participate in demand response programs with your local utility – earning cash reimbursements for reducing energy taken from the grid in peak periods – without impacting your operations.

Siemens energy experts are equipped to help you take a Total Energy Management approach to your energy portfolio. Through this process you can better maximize the value of your on-site energy solutions so that you're reducing your energy spend and achieving sustainability targets.



Total Energy Management is where best practices intersect



Energy engineering expertise

When it's time to implement a customized, engineered solution, we provide support at every stage. Our mission is simple: provide solutions that enable you to implement, run, and optimize an on-site energy system that meets institutional goals. We bring to the table expertise from across the energy spectrum to make this happen. The process begins with conceptual design and technology selection and includes project feasibility studies; project design, construction and commissioning; and service and performance.

For all projects, we use on-staff energy modeling experts to match demand and supply needs and provide ongoing optimization based on factors like cost and weather conditions. And we work with you to ensure smart integration of new and existing assets.

We provide flexible service options based on your specific needs and capabilities. Services are designed to support the entire project lifecycle – including upgrades and condition monitoring – to optimize performance and maximize success.

A technology partner

You can trust Siemens experts to be at your side providing guidance and direction that encompass the entire on-site energy solution – from generation, to storage, to control.

Wesleyan University, Middletown, CT

After experiencing severe power and heating system outages during Hurricane Sandy, Wesleyan University implemented an on-site power generation system that saves an average \$1,000 a day in gas and electricity charges. The combined heat and power (CHP) system was installed in the university's athletic center. The 676kW microgrid provides steam to the campus and keeps the athletic center's pool and ice rink in action. It not only increases energy efficiency, it provides assurance of secure power supply for the campus and community.

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The information in this document contains general descriptions of technical options available, which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract. The document contains a general product overview. Availability can vary by country. For detailed product information, please contact the company office or authorized partners.

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