

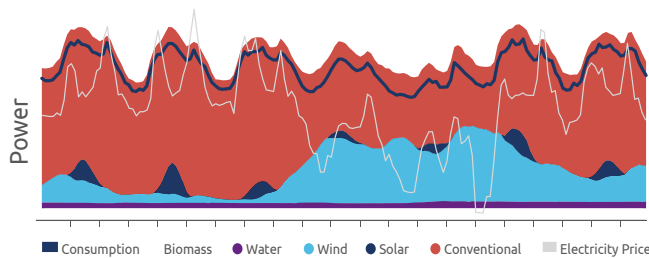


Energy System Simulation

Today's design and operation of modern energy systems experience fundamental challenges in a world of growing complexity, interaction and digitalization. Our services and products will guide you through demanding tasks for modernization, optimization and extension of existing energy systems or the perfect design of new energy systems. Based on our simulation services, your solutions will always be one step ahead of your challenges.

Your Challenge is our Passion

As experts in power and energy system simulation at different scales we feel strongly obliged to help our customers to design and operate complex systems in an optimal way. In a world of energy that is in constant change, we understand your challenges resulting from structural changes such as increased amounts of renewable energy that lead to tightened requirements for dynamic system operation.



▲ *Impact on conventional power plant scheduling and electricity price due to volatile feed-in of renewables in Germany*

As our customers operate under changing market conditions, our services will help to find solutions for establishing and continuing successful business models in the energy sector. Based on a deep understanding of energy systems that can be obtained by using our custom tailored digital simulation environment of your industrial process you will be enabled to improve your position and easily cope with issues such as:

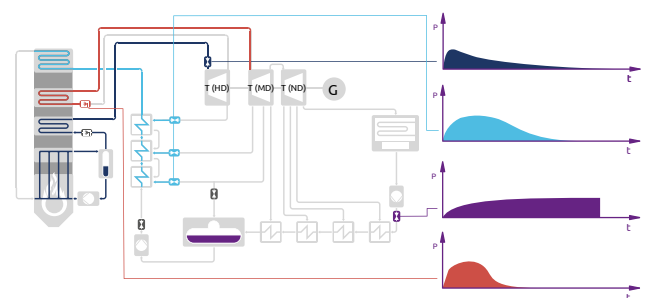
- Efficiency optimization
- Reliability of production and maintenance
- Handling cyber crime
- Cost effectiveness of modernization
- Emission regulations

Reference Projects

With more than 10 years of experience in the field of energy system simulations we cooperate with industries ranging from local utility companies to globally operating business. Driven by our passion to simulate power and energy systems, our experts are in close contact with developers of various world leading simulation tools, keeping you informed on the latest developments. The results of our energy simulations have led to adaptations and modernization in various thermal power plants such as:

- Gas-fired combined-cycle plants
- Hard-coal and lignite-fired plants
- Biomass and incineration plants
- Combustion engine power plants

Optimizations include increased efficiency, improved reliability due to control system adaptations as well as improved ability to provide ancillary services. In addition we provide expertise in fields such as simulation of district heating systems, sector coupling and integration of energy storage solutions and hybridization.



▲ *Schematic of internal storage potentials of a coal-fired power plant*



Applicability of our Methods

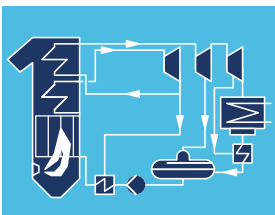


Multiple Unit Systems

Our simulation based solutions comprise complex energy systems including larger regions with multiple generation units and numerous consumers.

Our expertise includes electrical as well as thermal and fuel based applications. Working on a larger energy system level,

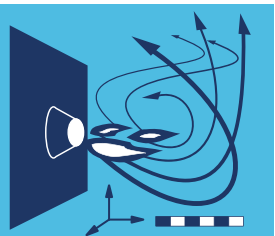
mixed integer or deterministic simulation approaches are used, providing you a deep insight into economic and environmental impact of operational regimes or design cases.



Single Unit Systems

Our services for specific units like large scale power plants or industrial processes range from fully physical based virtual test environments to very fast and efficient mathematical estimations. Depending on your challenge we are able to provide solutions for efficiency optimizations, improved system dynamics or higher system reliability.

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Integrated Components

Our high-resolution 3D-CFD simulations will give you the chance to gain access to the technical details of your system.

The combination of our expertise and the latest computational and software developments enables us to provide an insight and find solutions for challenges such as deposit and pollutant formation. We will help you to reduce emissions such as SO_x, NO_x, HC and Hg or increase your plants efficiency and reliability by reducing undesired deposits.

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Key Services

- Digitalization of energy systems, development of virtual test environments (»digital twin«).
- Control system optimization including parameter optimization and innovative control structure design.
- Energy efficiency improvements based on energy balances and exergy evaluations.
- Model based decision making for new investments and modernization projects.
- Evaluation of stress and life time calculation for thermal systems based on DIN EN 12952 or TRD 301.

Utilizing our innovative simulation approaches in your business can lead to a game changing factor for your success!



Your Benefits of our Simulation Approaches

Due to the development of computational power, we are able to model and simulate even highly complex energy systems on a fundamental physical basis. Using such a virtual environment offers numerous advantages for our customers in comparison to testing in field operation:

- Risk-free and cost-efficient testing of new components, operational modes or control architecture.
- Repeatable test-conditions without external disturbances and stochastic process variations.
- Easy access to all the process variables, even to those that can hardly be measured
- Comprehensive abilities for comparing and evaluating different approaches.

Are you interested in further information?

Feel free to contact our friendly experts.

Together we will find a solution for your challenges.



ENERGY SYSTEM SIMULATION

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