

The Siemens logo is displayed in a bold, teal, sans-serif font. It is positioned in the upper left corner of the image, within a white rectangular area that has a thin horizontal line below it. The background of the entire page is a 3D rendering of an industrial power plant or refinery. In the foreground, there is a large, grey, modular power distribution unit (the 'E-House') with multiple compartments and cooling fans, situated on a concrete pad. To the left of the E-House are several green trees. In the background, there is a large industrial facility with tall distillation columns, piping, and storage tanks, situated on a grassy hill. Beyond the hill is a body of water with a ship, and in the far distance, there are mountains under a clear blue sky.

SIEMENS

Totally Integrated Power – E-House

E-House for power supply solutions

Fast and reliable plug-and-play power distribution

www.siemens.com/e-house



Totally Integrated Power (TIP) – We bring power to the point.

Our products, systems, and solutions for low- and medium-voltage make power distribution efficient, reliable, and safe – in cities, infrastructure, buildings, and industrial plants. They can be linked to industrial and building automation, and are rounded out by comprehensive support throughout the entire lifecycle.

As part of the Totally Integrated Power concept, E-Houses embody the motto "we bring power to the point". With E-Houses, Siemens offers plug-and-play power supply solutions from planning and engineering to installation and commissioning. Siemens E-Houses are one option to implement a sustainable and flexible power supply solution that is furthermore fast and easy to install.



Plug-and-play power distribution

E-Houses are the optimal approach to install electrical power and control equipment for a fast and reliable power supply. An E-House is a pre-fabricated electrical building, fully equipped with products from our comprehensive portfolio of medium-voltage switchgear, low-voltage switchboards, busbar trunking systems, and auxiliary equipment. It is completely developed, manufactured, assembled and pre-tested at the factory, then connected and put into operation on site. If size allows, the E-House is shipped fully-assembled as a single unit. Larger E-Houses are split into individual sections for shipping and joining on site.

Industry needs a reliable and efficient power supply as well as flexible solutions that can be adapted to individual requirements. E-Houses are fast and easy to install, and can be used as an interim solution. They are easy to upgrade, and use available space optimally. This makes them the most suitable option for a broad range of applications: in restricted spaces, as temporary power supply, or for distribution grid extension.

E-Houses can also be used for plant balancing of fossil and renewable energy, as reliable power supply for critical processes, for grid coupling, as well as for the grid connection of electrical energy storage systems. For all these applications you will benefit from the advantages offered by Siemens E-House solutions.

Benefits

- **Cost-effective**
The purchase of an E-House spares you from dealing with planning, controlling and complex civil works, as well as with crafts on site and construction risks.
- **Fast-to-install**
An E-House arrives at your site ready for "plug, commission and play". This really speeds up your lead time.
- **Flexible**
You can choose from several E-House types according to your application requirements, and equip them with exactly the products you need.



A true alternative to site-built substations

Application areas

- Oil and Gas
- Metals and Mining
- Chemicals
- Infrastructure
- Network Operators

Proven in the field

E-Houses are employed in various industries. The oil and gas industry, for example, has relied on E-Houses for many years. Today, they are used ever more frequently for the installation of equipment in other industries such as mining, metals, in the chemical industry, by utilities, and in infrastructure facilities such as data centers, ports, etc.

A conventional site-built power substation is often too expensive or time-consuming for many projects. In other cases, the project schedule or the actual space does not allow for site-built construction, and sometimes building permits for conventional buildings are not available. E-Houses are the ideal solution in all these cases. They can be installed in very little time, thus reducing interferences with other activities, and they can be easily adapted to virtually any situation and application, e.g., for an upgrade or relocation.



Low- and medium-voltage equipment in an E-House



Module of an E-House equipped with LV and MV equipment



Suitable for any project and application

There are various types of E-Houses available to suit any application requirement. A standard E-House consists of one module on a pre-cast foundation, whereas a mobile substation is an E-House module on wheels or support that can be relocated with its foundation. Multi-modular E-Houses are also available. They consist of several modules that are placed on a foundation, either on top of or next to each other. This enables transportation of large Houses, and ensures optimal use of available space.

E-Houses can be installed on raised platforms to protect them from flooding, and to enable the installation of cable tray and bus duct systems under the E-House without excavation.

Tailor-made to individual requirements

E-Houses provide the solution for all individual project requirements regarding Environment, Health and Safety (EHS) conditions. An especially resistant housing protects the switchgear and switchboards from harsh environment. Power skids are a special kind of compact and mobile E-Houses, especially used for relocation, e.g., in coal mines, caves, etc.

E-Houses can be designed for high snow loads as well as high wind speeds, and for use in seismic zones. Fire resistant exterior walls to protect switchgear from external transformer failure are also available. Since they are delivered pre-fabricated and pre-tested, projects using E-Houses suffer from fewer delays and construction risks caused by weather than projects using conventional masonry buildings, for example.

Benefits

- **Modular design**
Various E-House types allow for tailor-made solutions that can easily be expanded or moved to another location.
- **Improves Environment, Health and Safety (EHS) performance**
The pre-fabricated modules enable reducing manpower on site, thus improving the EHS performance.
- **Fewer construction risks**
Since E-Houses arrive fully-equipped and pre-tested, there is no risk of delay due to weather conditions, for example.



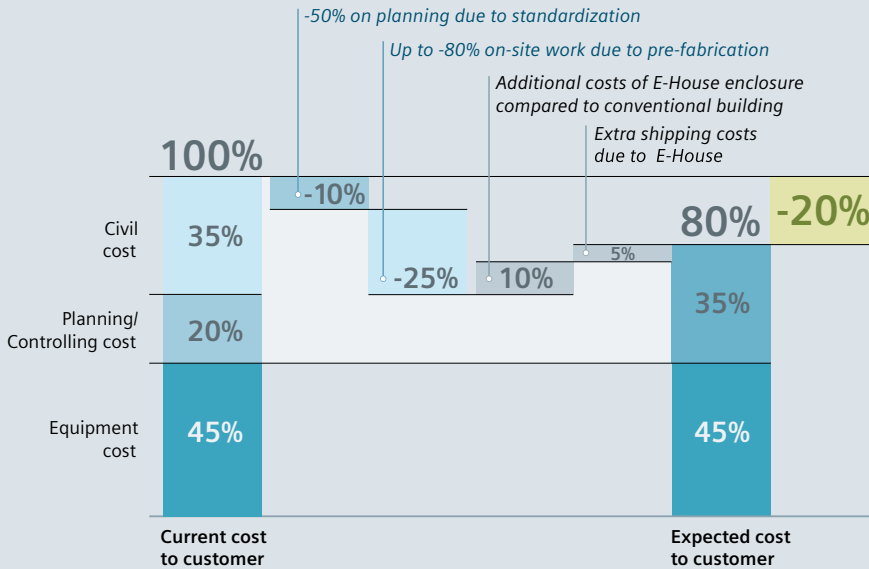
Mobile substation



Power skid E-Houses

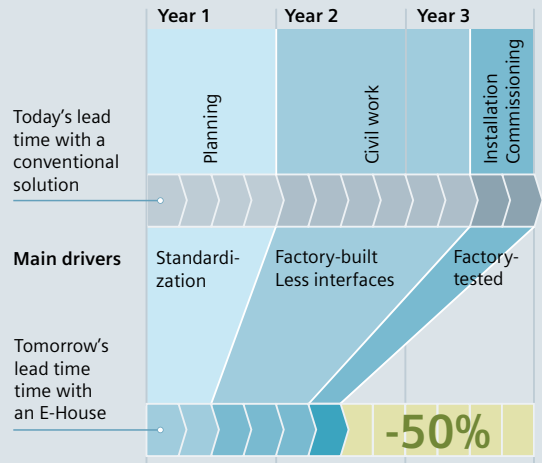
Cost saving potential up to 20%

Expected cost reduction for typical projects with E-Houses



Reduced lead time up to 50%

Scenario simulation with a conventional solution and an E-House



A cost-effective solution

E-Houses are standardized solutions with a cost saving potential of up to 20%

- Reduced cost in planning
- Reduced manpower on-site through pre-fabrication
- Reduced civil work on site
- Reduced construction risks
- Flexible and space saving design
- Possible interim solution and relocation

A time-efficient solution

E-Houses are fast and easy to install: reduced lead time of up to 50%

- Reduced civil works due to pre-fabrication and pre-testing
- Reduced installation time through "plug commission & play"
- Reduced construction delays (e.g., due to weather)
- Minimum interference with other on-site activities
- Reduced time in planning thanks to modular design
- Reduced time in planning in case a construction permit is not required

Saves time and money

Flexible and cost-effective

E-Houses are standardized solutions that bear a substantial saving potential. Their modular design increases flexibility while reducing the footprint for the pre-fabricated electrical building. Planning costs alone can be cut in half by exploiting the potential of standardization. Further savings can be achieved because the equipment is already manufactured, assembled and pre-tested before shipping. This sums up to a total of 20% of the total costs of ownership (TCO) when compared to conventional power distribution solutions.

Employing an E-House allows you to reduce planning, construction and on-site installation work. This reduces the manpower required for the project, cuts costs, and helps to keep the project on schedule.

Fast and easy to install

E-Houses are fast and easy to install. Compared to a conventional site-built construction, the overall lead time related to an E-House is reduced up to 50%, since the work required after delivery is reduced to installing, commissioning and operating the pre-fabricated and pre-tested systems.

Power substations for the oil and gas, mining, metal and chemical industries, among others, often need to withstand harsh environmental conditions. With an E-House solution, delays resulting from hazardous weather are no longer an issue.



Tailor-made design



Engineering and manufacturing

From the overall electrical design to the structural and mechanical analysis as well as the manufacturing or procurement of walls, roof and floor panels of your E-House, Siemens covers all the requirements and interfaces along the value chain.

Electrical design

Starting with the electrical layout and the equipment list, an integrated solution is custom-tailored to your application and environmental conditions on site. It is perfectly fitted with low-and medium-voltage switchgear, variable frequency drives, dry-type transformers, control and protection panel boards, SCADA and energy automation systems, relay panels, and busbar trunking systems from our comprehensive portfolio. Additionally, E-Houses are often equipped with batteries, instrumentation, uninterruptible power supply (UPS), and a wide range of auxiliary equipment.

Structural and mechanical design

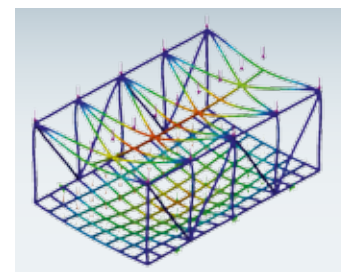
The most widely used design of an E-House is based on self-framing, interlocking wall and roof panels that are installed on a structural steel base. The choice of wall, roof and floor panels depends on the specific project requirements, such as environmental conditions, standards to be met, and weight of the equipment to be installed. The structural and mechanical analyses are performed on calculations as well as on simulations in 3D CAD tools. Further steps during the design process include planning of HVAC* access doors and ex-proofed battery rooms with separate ventilation, for example. This ensures maximum personnel and equipment safety.

Everything from a single source

You will benefit from our solution expertise that covers the entire process from planning to manufacturing or procurement, and up to installation and testing of the equipment. Your Siemens partner will make sure all your project requirements are met and implemented to your needs.

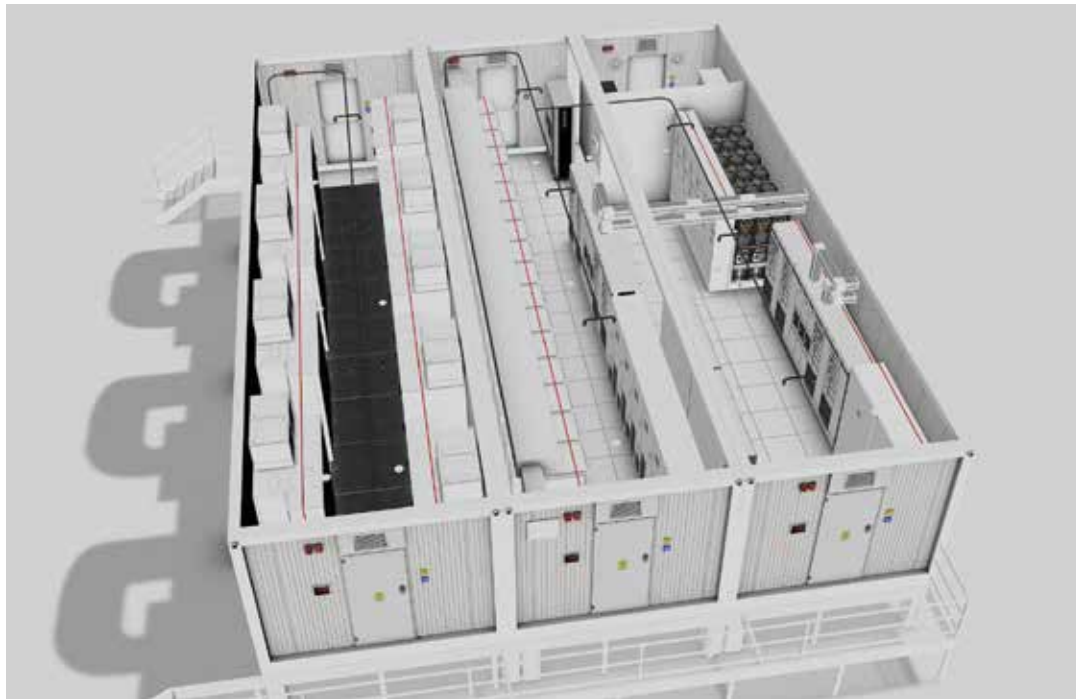


Structural and mechanical analysis are based on calculations as well as on simulations in 3D CAD tools



Load calculation in order to ensure the structural integrity of the E-House

*Heating, Ventilation, Air Conditioning



Comprehensive solution

Benefits

- **High versatility**
Siemens offers a comprehensive portfolio of products and services that can be accommodated in an E-House solution.
- **Space saving design**
Our standardized products fitted in an E-House solution require less space than conventional substations.
- **Optimized operation**
Integrated products, systems and solutions help our customers optimize their power supply solution.
- **Global standards and services**
As an international supplier, Siemens provides for global availability of its products and systems.

Integrated design fitted to our portfolio

Siemens E-Houses are fitted with a wide range of power equipment that ensures a high degree of functionality and reliability. It includes low- and medium-voltage switchgear, low-voltage power distribution boards up to 1kV, low- and medium-voltage motor control centers (MCC) and main distribution centers (MDB), variable frequency drives (VFD), dry-type transformers, control and protection panel boards, Programmable Logic Controller (PLC), relay panels, instrumentation, busbar trunking systems, pressure relief, arc exhaust ducts, batteries, and uninterruptible power supply (UPS).

Auxiliary equipment for safe operation

There is a wide range of auxiliary equipment you can choose according to your EHS* requirements, standards and regulations. To ensure safe operation, E-Houses are equipped with fire and

smoke detection systems, fire fighting systems, emergency exits, and access control. A heating, ventilation and air conditioning system (HVAC) for smooth operation at high ambient air temperatures can be installed on the roof, inside or outside of any E-House. Air filtration, gas detection and pressurization systems can be added for hazardous areas, for example.

Additionally we implement lighting and earthing systems, sockets, distribution boards, cable trays, electrical metallic tubing, and plug accessories. With Siemens E-Houses, you will benefit from a complete and integrated solution.



Main equipment of an E-House

Gas-insulated medium-voltage switchgear for IEC and ANSI standards*



Air-insulated medium-voltage switchgear (IEC)*



Low-voltage switchboards SIVACON S8 (IEC)*



SIVACON S8

Low-voltage busbar trunking systems SIVACON 8PS (IEC)*



System BD01
System BD2
System LD
System LR
System LI

*Overview of our portfolio with IEC systems. Further systems are also available with ANSI standards.



Application examples

At a glance:

- In the last 3-4 years approx. 150 power distribution E-Houses have been installed and commissioned all over the world by Siemens
- In 20 countries
- With more than 300 modules

E-House for oil & gas in Qatar

One of the world's largest GTL projects executed by Shell includes the development of the largest previously untapped gas field in the world, as well as its transport and processing systems. Projects in the oil & gas industry require profound industry expertise, which made Shell opt for a Siemens E-House that was delivered in 3 modules on a pre-cast foundation. It supplies power reliably to the site as well as to the accommodations for all the employees in accordance with the high requirements on environment, health and safety.

E-Houses for seaport in Mozambique

The new deepwater seaport in Nacala-Velha in Mozambique relies on low- and medium-voltage switchgear by Siemens to electrify the coal mines in the mountainous Tete region. The equipment is contained in pre-fabricated E-Houses delivered to the CLN (Corredor Logístico Integrado Nacala) joint venture as a plug-and-play solution. The 5 E-Houses were shipped from Germany to Mozambique within schedule as individual modules. The advantage of E-Houses is that they are transported to the installation site fully equipped and pre-tested, where they can be quickly put into operation.

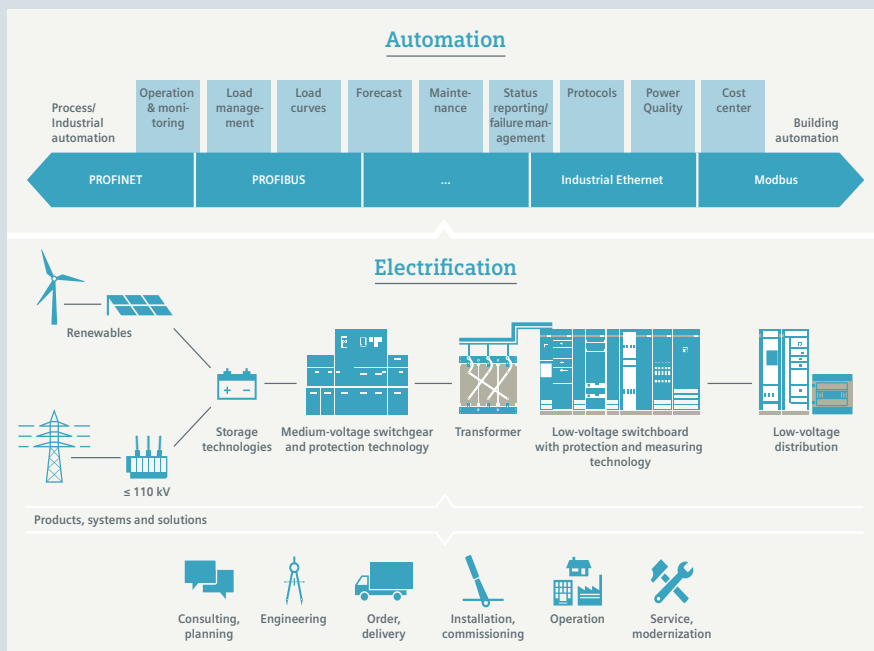
The E-Houses are protected against coal dust by overpressure, and against the salty sea air by special offshore coatings according to the local environment requirements.

E-House for copper mine in Peru

Siemens supplied the Constancia copper mine with a complete solution for the medium- and low-voltage power supply including 12 E-Houses. They are equipped with a customized power distribution system, pre-assembled in individual modules and pre-tested prior to transport. Thanks to our broad portfolio, the customer can rely on Siemens as a single interface for the entire project, from power supply to automation and drives.

Hydroelectric power plant in Colombia

For the access to the power plant of Sogamoso Hydroelectric in Colombia, the power supplier ISAGEN awarded the construction of tunnels to the ICT II SAS Group. Time of execution and versatility of design persuaded the customer to award a contract for 16 E-Houses in 20 containers, as well as 6 skid-mounted E-Houses, to Siemens Colombia. Siemens delivered a complete solution from design, engineering, manufacturing and testing to transport and commissioning.



One-stop solution

Everything for a future-proof power supply

Nothing works without electricity, but everything works better with TIP: Planning and realizing electrification, and a consistent power supply – by integrating power distribution with industrial automation (TIA) and building solutions (TBS) – ensures that power is distributed reliably and efficiently wherever and whenever it is needed.

Competence over the entire lifecycle

Siemens is with its customers every step of the way through all phases of the project, from engineering to installation and commissioning. Reliable and competent local support is provided right from consulting and planning to after-sales service. Electrical and auxiliary equipment are globally sourced, and integrated in our E-Houses. Siemens production facilities and centers of competence can be found around the globe.

As a global player, we support the local creation of value, and guarantee a competent contact person is in close reach of every project. Siemens experts provide their expertise in project management, financial services, and life cycle management to make sure the project progresses as planned. Even after your project is completed and operation has started, you can count on Siemens for after sales services.

E-Houses offer more:

- **One-stop solution**
single interface and competence over the entire lifecycle.
- **Consistency**
Integrated design fitted to our comprehensive and consistent portfolio.
- **Safety**
Proven products and systems plus auxiliary equipment for safe operation.
- **Flexibility**
Modular design adapted to all requirements and extensions.
- **Cost-efficiency**
Reduction of planning and civil works, standardized space-saving solution, fast and easy to install.
- **Reliability**
State-of-the-art components, fully equipped and pre-tested plug-and-play solution.
- **Advanced technology**
Modern alternative to conventional site-built substations for an efficient power supply solution.

Siemens AG
Infrastructure & Cities Sector
Low and Medium Voltage
Medium Voltage & Systems
P. O. Box 3240
91050 Erlangen, Germany
www.siemens.com/e-house
E-mail: support.ic@siemens.com

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