High-voltage substation refurbishment
1 Worldwide experience
Siemens – global references of high-voltage substations

~ 75 years
experience

100+ countries
served

8000+ projects
completed
Focus areas for substation refurbishments

1. Concept
2. Replacement
3. Upgrade
4. Footprint
5. Outage planning
6. Installation and commissioning
7. Design options
Concept

Evaluation and concept planning

- Network calculation
- Site evaluation
- Definition of:
  - Network outage stages
  - Refurbishment concepts
  - Refurbishment sequences
### Scope of works varies

- Switchgear, control and protection
- Structure design
- Foundations
- Civil works and station service
- Cabling systems
Upgrade

Modification of key components to the actual system requirements

- Extension and retrofit of switchgears
- Upgrade of transformers
- Installation of new gantries

Extension of switchgears

New gantry

Upgrade transformers
Footprint

Plot size and topology provide boundary conditions ...

... but can offer potential depending on

- Switchgear technology
- HSE Regulations
- Environmental aspects

Use of air-insulated busbar
Space saving: 70%

Use of gas-insulated busbar
Space saving: 90%
Outage planning

Prerequisites

- Required availability
- Execution time of modification works
- Permitted down time

Consider temporary operation, e.g.

- Bypass
- Portable substations
Installation and commissioning

Think about

- Work under life condition
- Continues load flow
- Local system integration test
- SCADA testing
- Cyber security
Design options

3 Major Options

- Replace with Air-insulted Switchgear
- Replace with Gas-insulated Switchgear
- Replace with Mixed-technology Switchgear

Replacement by AIS

Replacement by MTS

Replacement by GIS
Do you have individual questions or want to schedule an appointment for a personal consultation?

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