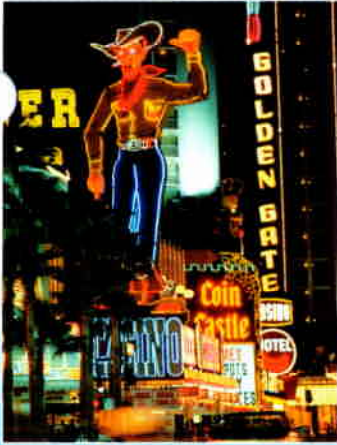


Gas-insulated HV substations in fast-growing metropolitan areas

The Bellagio project



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ABB

The Bellagio project

Optimized energy supply for an expanding city

Las Vegas – world-known gamblers' paradise, glimmering oasis in the middle of Nevada's desert. New casinos springing up at an incredible pace from the parched ground, fueling the rapid growth of the city.

Right on Las Vegas Boulevard, amongst established casinos like the Caesar's Palace, Mirage and Treasure Island, the Mirage Resorts Group set a new benchmark, even for Las Vegas' exclusive standards – arguably the Bellagio is one of the most spectacular hotels of the world. 2500 bedrooms of previously

exquisite collection of modern arts at the Bellagio. Works by van Gogh, Monet, Renoir, Cezanne, Picasso and Matisse make the Bellagio an unique experience for gamblers and art lovers alike.

Behind this overwhelming display of elegance and sophistication, the Bellagio's management is faced with the need to provide the entire complex with an extremely reliable, yet cost-efficient power supply.

The trend towards gas-insulated technology

While conventional outdoor installations were widely preferred in the past due to their lower initial costs, the numerous benefits of gas-insulated switchgear (GIS) have in recent years caused a shift towards GIS technology.

GIS – maintenance-free and reliable

Among the many advantages of gas-insulated systems are their higher reliability and improved safety, both aspects being particularly important under the extreme environmental conditions prevailing in Las Vegas. GIS is able to handle frequent sandstorms and extreme temperature fluctuations with significantly less maintenance.



All live parts in ABB-GIS systems are hermetically sealed in an aluminium enclosure and are thus effectively protected against harmful environmental influences such as dust, dirt or rodents.

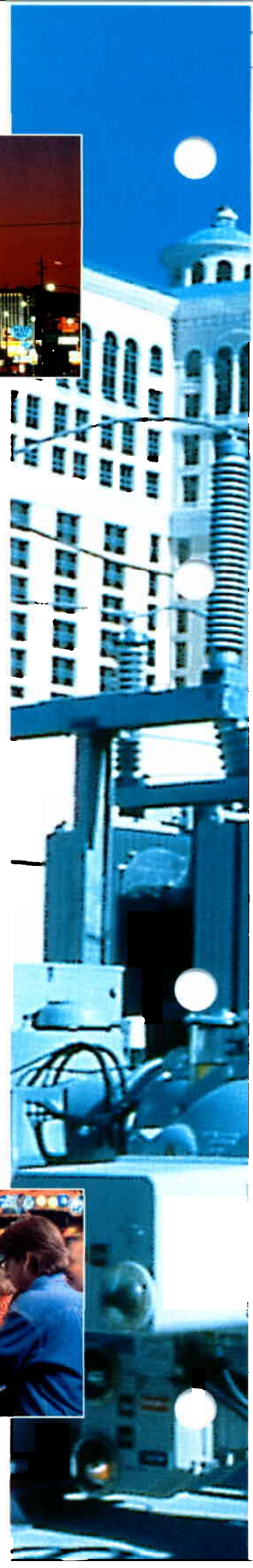
GIS – flexible and space saving

The compact design reduces the space requirements to only 10 % of that needed for conventional outdoor substations, giving planners an enormous freedom in choosing suitable sites and optimizing substation layouts. Power can be brought efficiently close to the consumer without any aesthetic sacrifice.

The small dimensions of GIS also offer the flexibility to integrate the overall design concept, both of new and existing facilities. This makes GIS the perfect solution for new ventures and expansions alike.



unknown luxury and a 2-acre artificial laguna with 1500 dancing fountains, embedded in the idyllic atmosphere of a quaint Northern Italian village, are the framework for an





GIS – an investment in the future

Compact switchgear technology allows best site location

From an urban planning point of view, GIS installations are particularly attractive due to their compact-size construction.

Conventional outdoor substations are usually erected on the outside of towns. But as cities grow, they may soon find themselves surrounded by commercial or residential buildings. All of sudden substations occupy prime real estate, of which 90 % could be used for other, more profitable purposes if the switchgear would be a GIS design.

GIS – an economic solution

Apart from the long-term cost benefits due to its compact size, GIS technology also ensures a significantly longer service life. Maintenance is reduced to a minimum, and with a mean time between major failures of 1000 service years per bay ABB-GIS also sets new standards in terms of reliability.

This aspect is particularly important in applications where power failures would entail high consequential costs. Any unplanned service interruption entails cost – whether it is an industrial process or at a casino resort in Las Vegas.

The entire GIS concept is thus consistently geared towards reducing total cost of ownership.



One possibility to connect GIS and transformer:
outdoor-immersed bushing

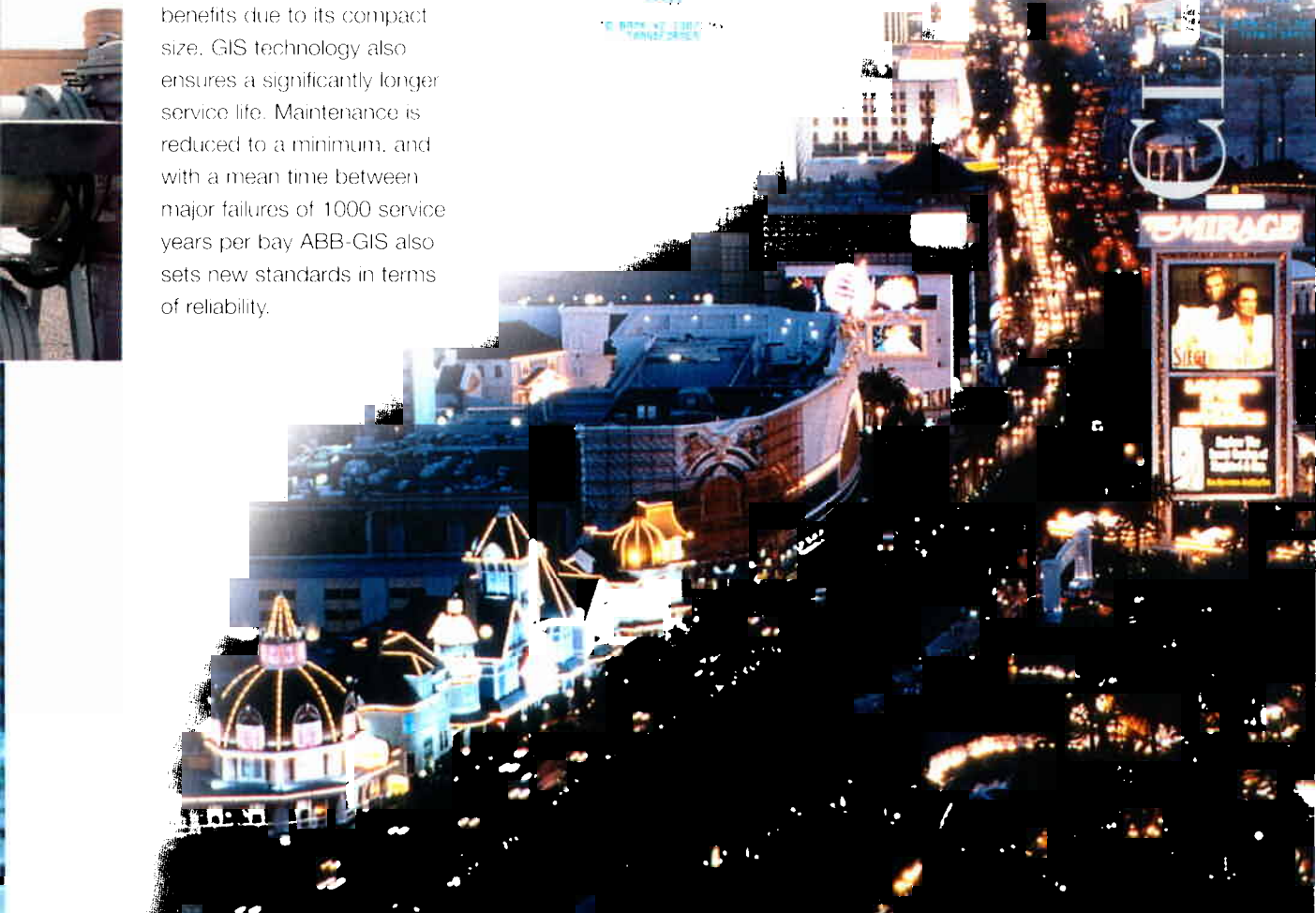


ABB ensures reliable power supply for the gigantic hotel

Modular GIS enables to create a tailor-made system solution

The substation owner Atlandia Design and the local utility Nevada Power Company opted for ABB's gas-insulated technology to ensure adequate power supply for the world-famous hotel, the Bellagio.

ABB's scope of supply included a 138-kV ELK-04 substation in an H-configuration, two 138/12-kV transformers, each rated at 15 MVA, a 12-kV switchgear line-up, a 12-kV capacitor bank, and the associated protection scheme for the high- and medium-voltage switchgear.

Furthermore, ABB performed all civil work such as laying the foundations, designing and installing the grounding system, and erecting the building for the protection and control equipment.

The Bellagio substation is tied to Nevada Power's network through two 138-kV XLPE-cable runs to "Decatur" and "Suzanne" stations.

Outdoor installation is made possible by the considerable design reserves provided by ABB's rugged ELK-04 GIS, which is connected to the transformer through outdoor bushings.

The local control cabinets for the 138-kV GIS, the protection panels and the 12-kV switchgear are installed inside a building, whereas the transformers have been placed outdoors.

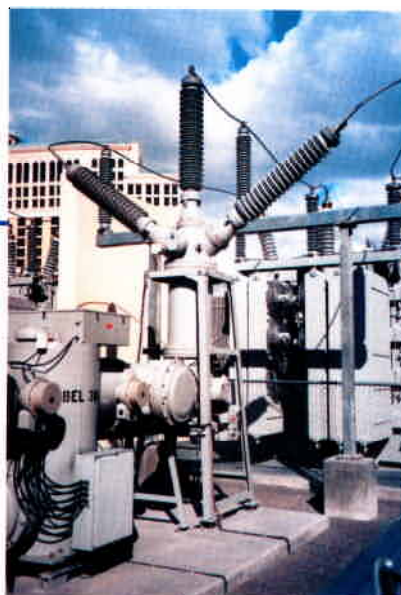
The complete substation including the transformers and the switchgear and control building could be installed on a mere 100 x 130 ft, or 1200 m².

Modular design enhances flexibility

The modular design of ABB-GIS greatly helped planners to find an optimized substation layout. The switchgear was delivered to site in form of pre-assembled and factory-tested bays, which allowed ABB to complete the assembly and commissioning within less than one month. The substation could therefore be handed over to Atlandia Design and Nevada Power right on schedule.

Millions of visitors from all over the world will enjoy the multiple fascinations of the Bellagio for years to come – powered by ABB-GIS.

Meanwhile, the next ABB-GIS is scheduled to be energized at Nevada Power's new Strip Substation in June 2000. Quality, reliability and flexibility displayed at the Bellagio were the key factors for Nevada Power to do repeat business with ABB.



Technical data:

H-connection with 3 circuit-breakers

Operating voltage	145 kV
Lightning impulse withstand voltage	650 kV
Power-frequency withstand voltage	310 kV
Operating frequency	60 Hz
Continuous current	2000 A
Breaking current	40 kA
Short-circuit duration	3 s



Field-proven cable connection to Nevada Power's network



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