

Tornando o Smart Grid Realidade

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S&C ELECTRIC

- Fundada em 1911
 - >100 anos de serviço no setor elétrico
- Especialistas em manobra, controle e proteção em alta e média tensão
- Companhia privada com operação em cinco países



1909 Um incêndio e um fusível

- Um incêndio gerado por uma falha no sistema de proteção na Estação de Geração de Energia da Fisk Street motivou o pensamento criativos de dois engenheiros da Commonwealth Edison Company. Eles inventaram um fusível líquido com mola carregada em tetracloreto de carbono e o chamaram de fusível líquido de potência da S&C.



Edmund O. Schweitzer era o engenheiro chefe de teste da concessionária.



Nicholas J. Conrad era um dos engenheiros de partida de geradores.



Conrad (na extrema esquerda) na estação Fisk com outros engenheiros da Commonwealth Edison. O legendário Charles Steinmetz da General Electric aparece de terno claro ao centro.



S&C ELECTRIC – Unidades USA



S&C Chicago, Illinois, USA



Alameda, California, USA



Milwaukee, Wisconsin, USA

S&C ELECTRIC – Operações Internacionais



S&C ELECTRIC – Laboratório de Alta Tensão

- *Laboratório de teste de curto-circuito com potência de 1700 MVA (maior potência nos EUA)*

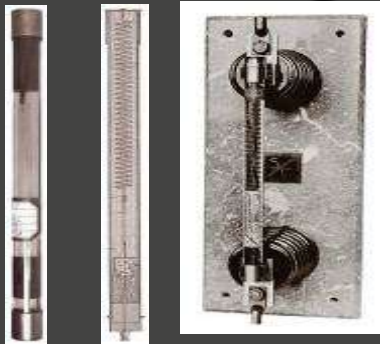
S&C's Advanced Technology Center



S&C ELECTRIC – Linha de Produtos



S&C ELECTRIC – Um Século de Inovação Tecnológica



Liquid Power Fuses



Series 2000 Circuit Switcher



TripSaver 2-Shot Recloser



IntelliRupter PulseCloser



Community Energy Storage



FaultTamer Fuse

IntelliTEAM



IT SG Automates: Scada-Mate + 5800 / Vista / IntelliRupter / CES

Rede Convencional vs Smart Grid



Cases - Smart Grid Applications



Campina Grande - PB

- 12 Automated Points – 16.000 Consumers
- Performance: 90% percent of consumers reconnected on 2,47 min.
- It saved 16% DEC and 19 % FEC

Belo Horizonte - MG

- 103 automated points
- Type: **Underground Grid** – 50 consumers per point (Around 5.150 Consumers)
- 1150 consumers reconnected in 6s.

São Paulo

- Type: Underground Grid
- 78 automated Points

Curitiba - PR

- Neighborhood (Bigurriho / Parque Barigui / Boqueirão) Next Step: Alto da Gloria
- 15 points (10.000 Consumers)
- several actuations, one of them the system was reconnected on 40 sec (August, 14, 2014).

Florianópolis

- 40 automated points in Florianopolis -
- 10 installed and other 30 on installation process

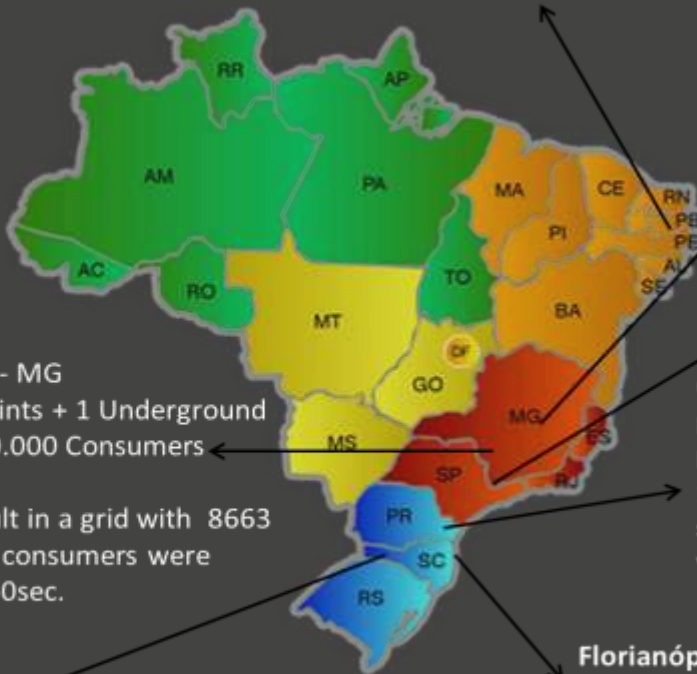
Poços de Caldas - MG

- 18 Automated Points + 1 Underground
- Approximately 40.000 Consumers

- Performance: Fault in a grid with 8663 consumers, 2456 consumers were reconnected on 50sec.

Chapecó - SC

- 21 automated points installed in Chapecó -SC



CELPE (IntelliTeam® II) Self-healing system on Distribution System (Recife/PE - Brasil)



- Located on a highly important area in Recife – Beach of Praia da Boa Viagem
- High-density load
- About 100,000 people in about 738 hectares
- Self-healing system with 6 feeders totalizing 26,154 residential and commercial customers



ENERGISA - (IntelliTeam® SG) Self-healing system on Distribution System (João Pessoa/PB - Brasil)

- Deployed in the city of João Pessoa/PB
- (12) IntelliTeam® SG points enabling self-healing for Cooper reclosers
- Included all services since Radio Survey thru installation in the field as well as comissioning and tests;



ATIVAS DataCenter (IntelliTeam® II) Self-healing system to improve reliability – Belo Horizonte/MG



- Located in a highly important customer in Belo Horizonte – ATIVAS (Managed Service Provide)
- About 5,000 people and industries
- Self-healing system with 2 feeders

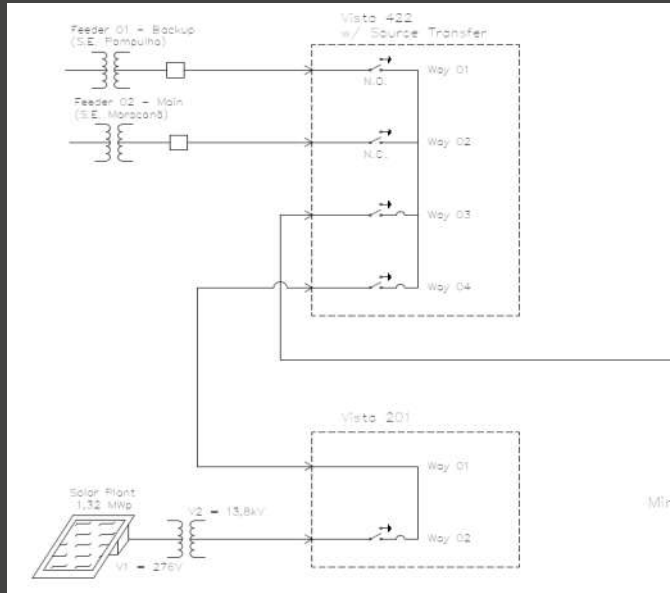


CEMIG – Switchgears with auto-transfer protecting critical loads (CAMG in Belo Horizonte/MG – Brasil)

- (27) Switchgears spread out in the different floors of the Administration Center of the government of Minas Gerais State (15,000 people)



CEMIG – Underground Switchgear for the protection of the Mineirão Stadium in Belo Horizonte/MG - Brasil



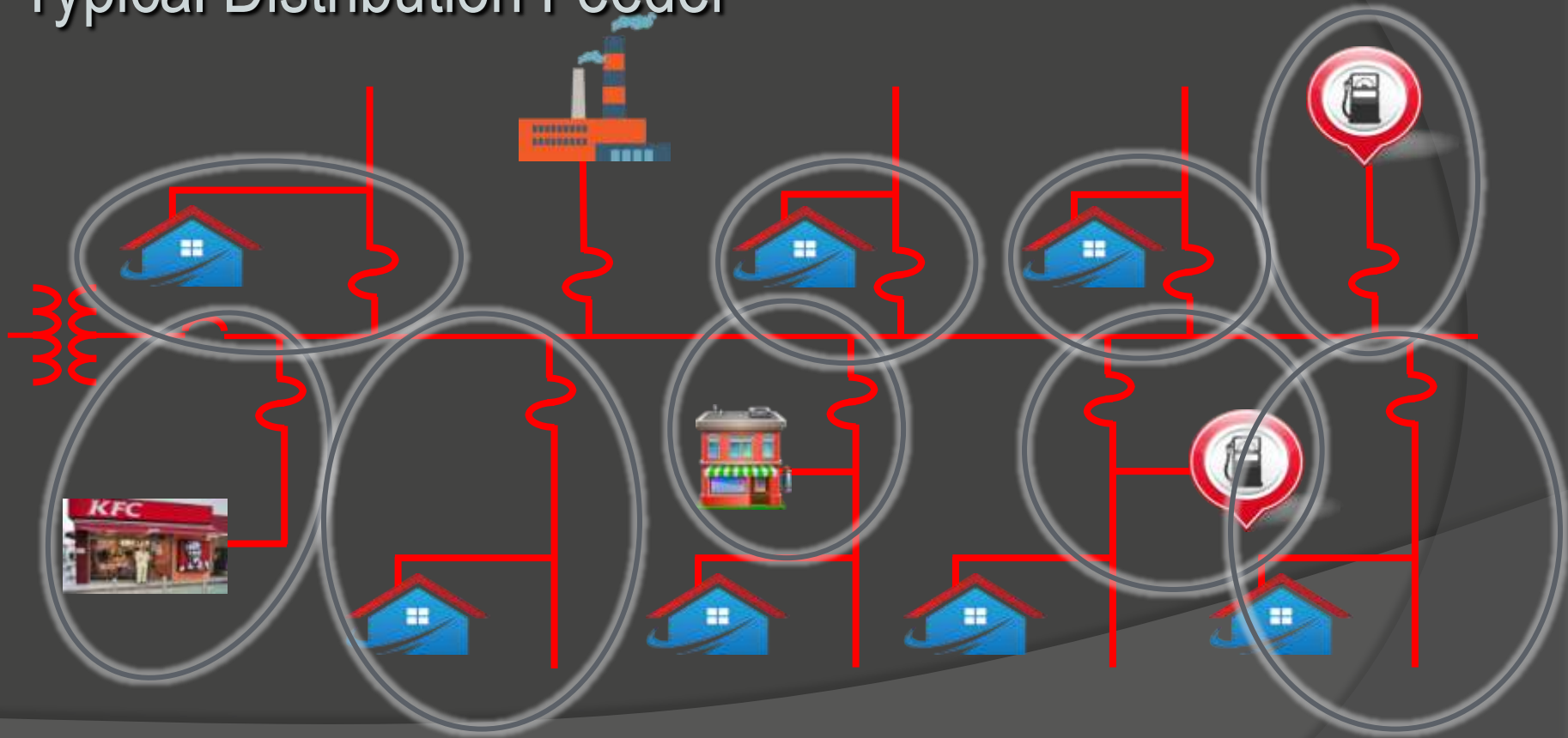
ELETROPAUO - Underground Switchgear for the protection of the Itaquerão Stadium in São Paulo/SP



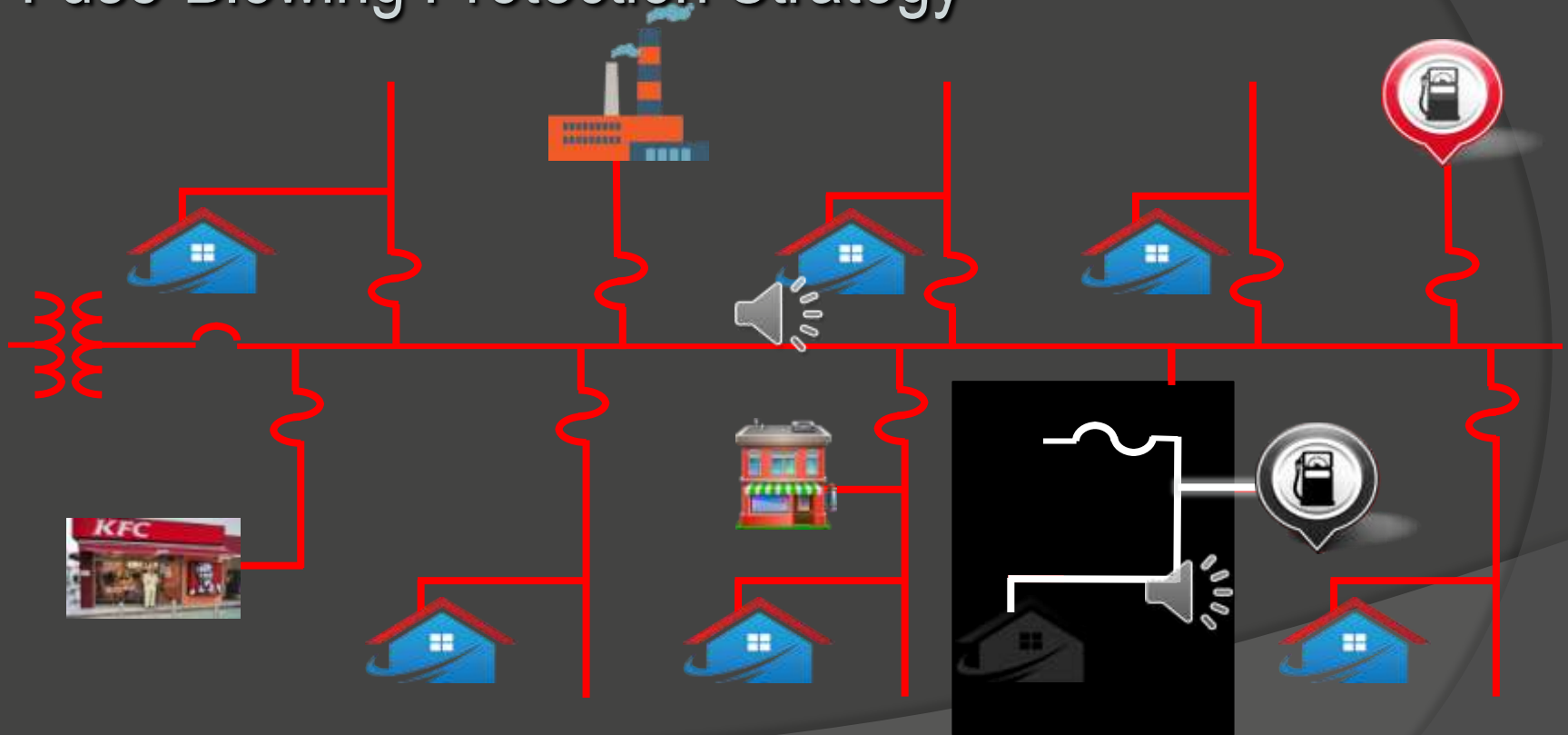
Estratégia de Proteção com Religadores Laterais



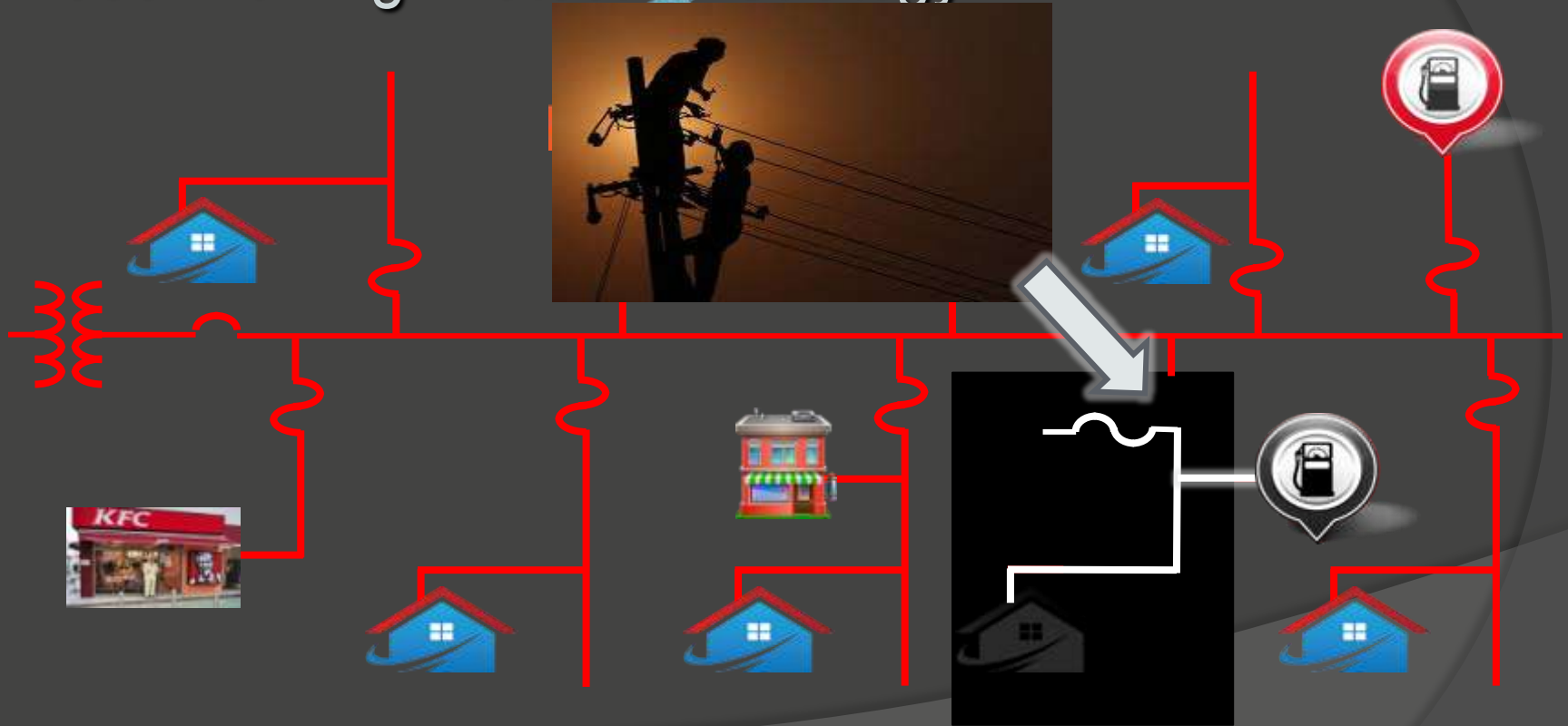
Typical Distribution Feeder



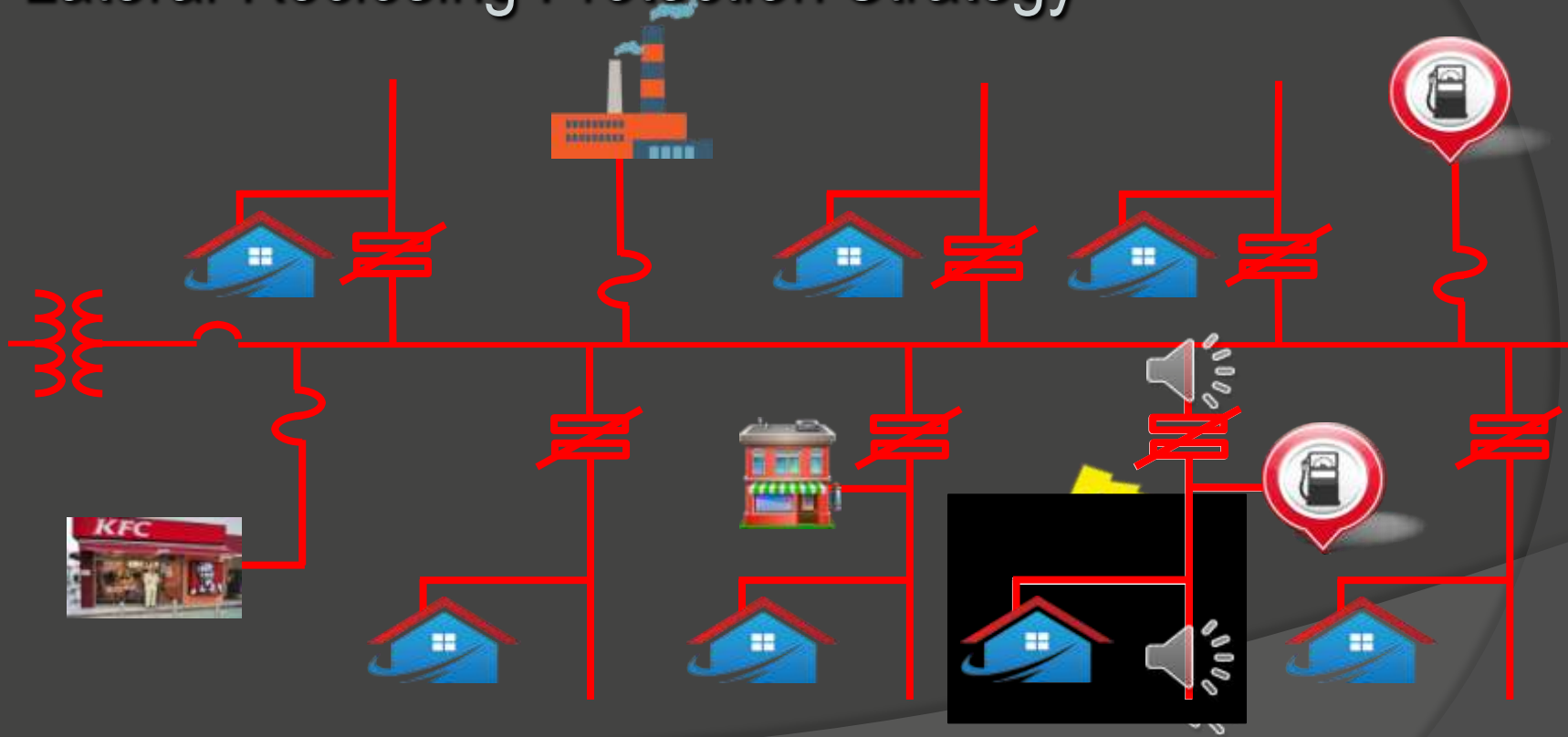
Fuse-Blowing Protection Strategy



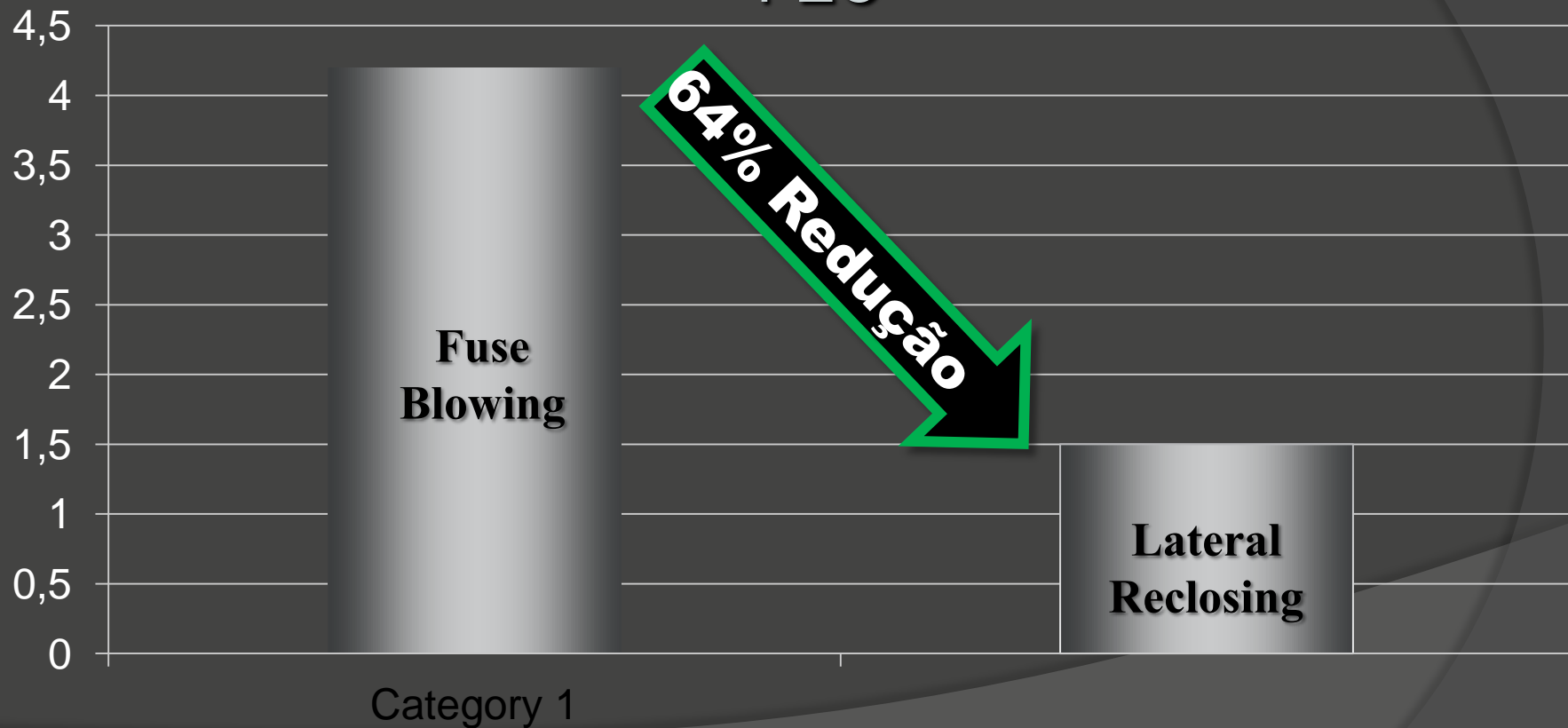
Fuse-Blowing Protection Strategy



Lateral-Reclosing Protection Strategy



FEC











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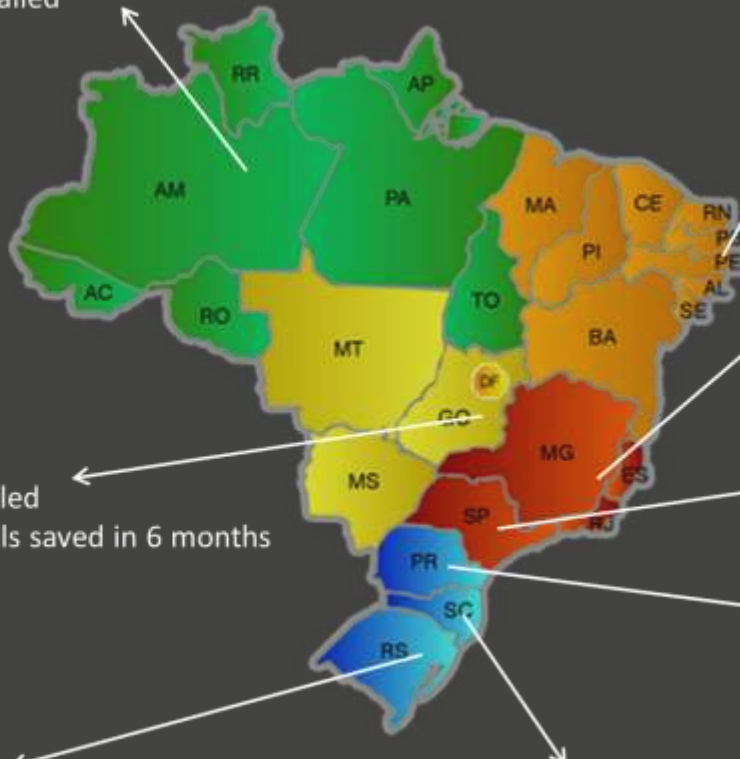
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Eletrobrás Amazonas - AM

- 100 units sold
- 10 installed



CELPE - PE

- 23 units sold
- 3 installed
- 81 truck rolls saved in 2 years

Cataguazes - MG

- 10 units
- 107 truck rolls saved in 6 months (in just one unit evaluated)

CPFL - SP

- 3 units installed
- 16 truck rolls saved in 1 year

COCEL - PR

- 15 units sold
- Not installed yet

CELG - GO

- 3 units installed
- 140 truck rolls saved in 6 months

AES SUL - RS

- 3 units installed
- Results under analysis

CELESC - SC

- 8 units sold

Subestações Compactas



Subestações em áreas urbanas

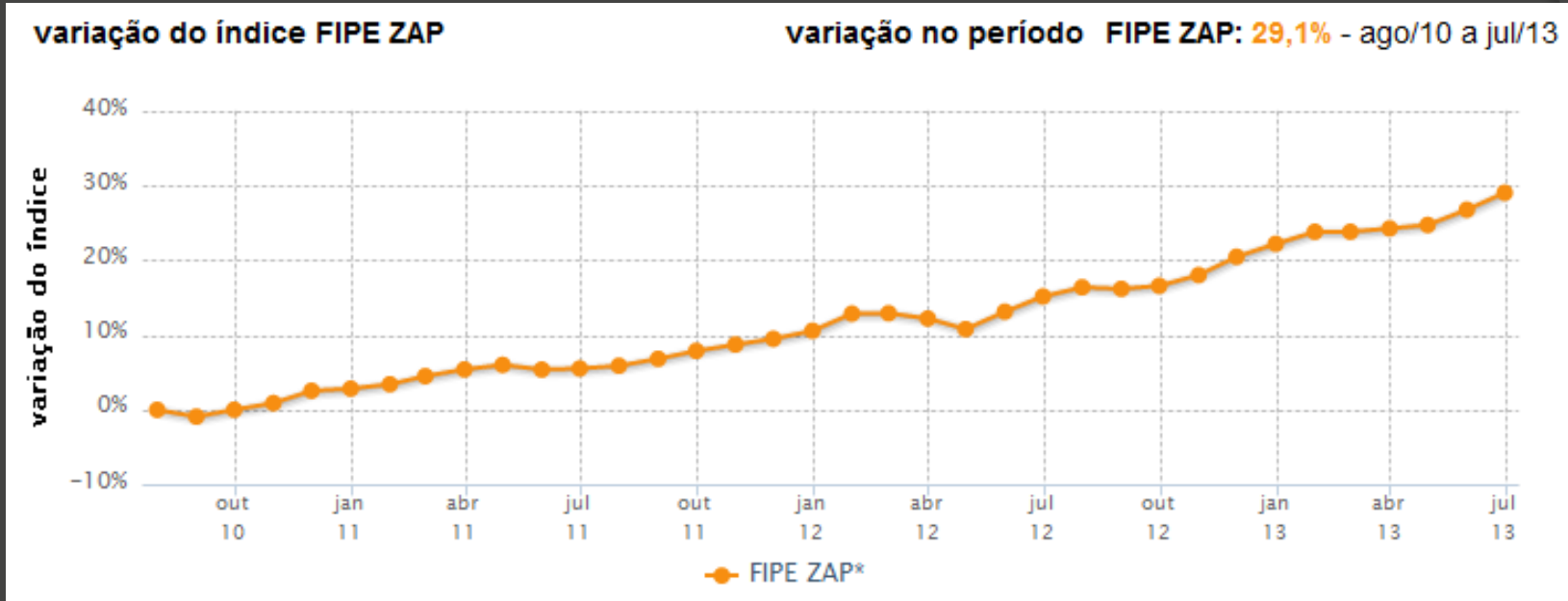
- Disponibilidade de Espaço Físico



Subestações na configuração atual ocupam grandes áreas

Subestações em áreas urbanas

- Custo atual de terrenos



Variação do custo de imóveis nos últimos três anos

SOLUÇÃO S&C GIS até 34,5 kV VISTA®

- Solução com **GIS até 34,5 kV Vista®**:

Redução significativa
no espaço físico
requerido



SOLUÇÃO S&C GIS até 34,5 kV VISTA®

- Instalações GIS 34,5 kV Vista® em subestações:



COPEL – Compact substations with SF6 GIS Vista®



- Compact substations with GIS units (34.5kV) to:
 - Reduce footprint
 - Improve safety
 - Reduce maintenance
 - Improve reliability
 - Improve aesthetics



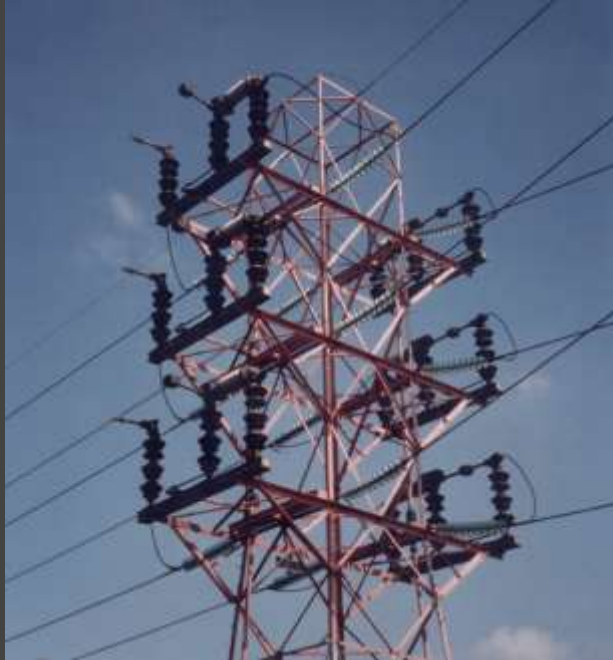
Outras Aplicações



ELEKTRO – Switching of 69kV Transmission line with load-break switches type Alduti-Rupter



ELETROPAULO, ELEKTRO, CPFL, CTEEP, BANDEIRANTE – 138kV Switching of Transmission lines – Special mounting arrangement



- More than (150) applications helping to improve the reliability in sub-transmission grids



CPFL – Transportable Trans-rupter® II to bypass existing circuit-breakers for maintenance



- Replaces the utilization of mobile substations (critical for other applications) to bypass circuit breakers during regular maintenance
- Can be easily mounted and moved from one substation to another



Cases - Underground Networks



CEMIG – Underground Vista® submersible switchgear with auto-transfer (State of Minas Gerais – Brasil)

- (456) Underground Vista® Switchgear for the retrofit of existing vaults in the cities of Belo Horizonte, Juiz de Fora, Monte claros, Uberlandia, Uberaba, São Joao del Rey, Diamantina, Itajuba , Varginha e Betim



CEMIG – Underground systems on very harsh environments



CEMIG – Applications of underground Vista® Switchgear in High-level condominiums



COPEL – Applications of underground Vista® Switchgear in Foz do Iguaçu / Maringá / Curitiba



CELESC - Applications of underground Vista® Switchgear in Coastal area



CELESC - Applications of underground Vista® Switchgear in Brasilia's Underground system



ELETROPAULO - Applications of underground Vista® Switchgear with submersible controls



DME - Applications of underground Vista® Switchgear in Poços de Caldas's Underground system



AMPLA - Applications of underground Vista® Switchgear in Petropolis's Underground system



CELPE - Applications of underground Vista® Switchgear in Olinda's Underground system



Cases - Energy Storage



Smart Grid Projects with Energy Storage



Project Name	Size, MW	Online Date	Unique Features
Presidio Station	4 MW	2010	Supports an entire town during outages and combines with Smart Grid distribution
Rock County Station	1 MW	2009	Integration with wind power to provide load leveling
East Busco Station	2 MW	2009	First integration of energy storage and Smart Grid distribution
Citizens Station	2 MW	2009	Up to 7 hours of supplemental power to increase system reliability
Balls Gap Station	2 MW	2009	Up to 7 hours of supplemental power to increase system reliability
Chemical Station	1 MW	2006	First system of its kind in United States and proved the use of energy storage in peak shaving to defer substation upgrades

Smart Grid Projects with Energy Storage



Project Name	Size, MW	Online Date	Unique Features
NEDO	1 MW	2011	Two battery types and solar integration
Vaca-Dixon	2 MW	2011	Integration with 10-MW solar plant
BC Hydro Golden and Field	2 MW (Total)	2012	Provide supplemental power to over 250 customers and avoid costs of new substation
Catalina Island	1 MW	2011	Supplement diesel generators in island community
Hitachi GST	4 MW	2012	Dual use as backup power system and peak shaving
Santa Rita Jail	2 MW	2011	Peak shaving and islanding scheme as part of overall Smart Grid implementation

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Obrigado!

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