

## Study Committee A3 Transmission and Distribution Equipment Paper 10875\_2022

### Integrated Disconnecter on Generator Circuit Breakers for environmental and footprint optimization

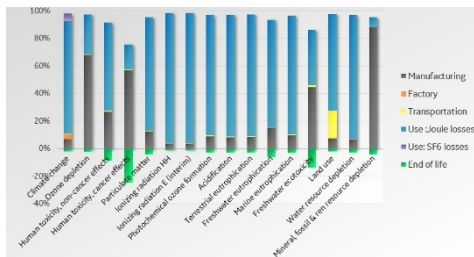
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GE Grid Solutions

#### Motivation

- GCB architecture has evolved from stand-alone equipment connected by portions of busbars to fully integrated solutions.
- The choice of architecture has direct impact on the environmental impact of the Power Plants.
- New architectures allow for optimal reduction of footprint and environmental impact.

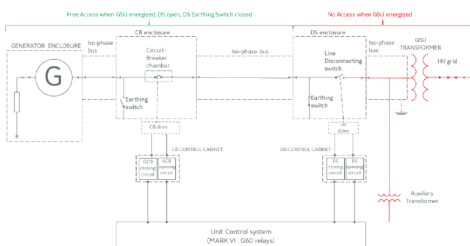
#### Typical Life Cycle Analysis of GCB



- Use phase is the most impacting, **Joule's losses representing most of it.**

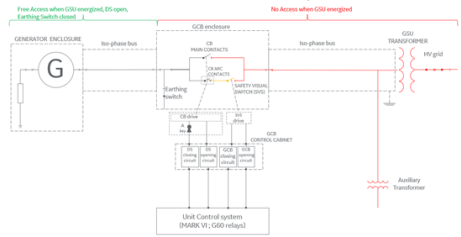
#### Stand-alone architecture

- Allows access to the circuit breaker for maintenance without de-energizing the transformer because CB and DS are in separate enclosures.
- Needed for circuit breakers that require frequent maintenance.
- More expensive and less effective solution from environmental point of view.

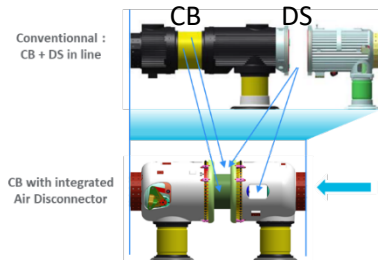


#### GCB with Integrated Air Disconnecter

- In New equipment, Disconnecter and main contact function of the CB are merged to one set of contacts in air.
- No need of intrusive maintenance for main contacts as available in the air. Reduced risk of SF<sub>6</sub> spill.



- Could represent **30% savings** on the length of the system compared to in-line Disconnecter architecture.
- Higher savings can be expected compared to stand-alone architectures.



- Gives maximum efficiency for current carrying capability without loss of performance if SF<sub>6</sub> leak.
- Reduces the amount of SF<sub>6</sub> and raw materials.

Material	Reduction Integrated DS vs In-line DS+ CB architecture
SF <sub>6</sub>	-58%
Aluminium	-26%
Steel	-35%
Copper	-50%
Plastics & Resins	None

#### Conclusion

- Choice of GCB architecture has direct impact on environmental footprint of the power plant.
- Modern architectures allow for maximum efficiency: **High compactness and low Joule heat losses**  
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