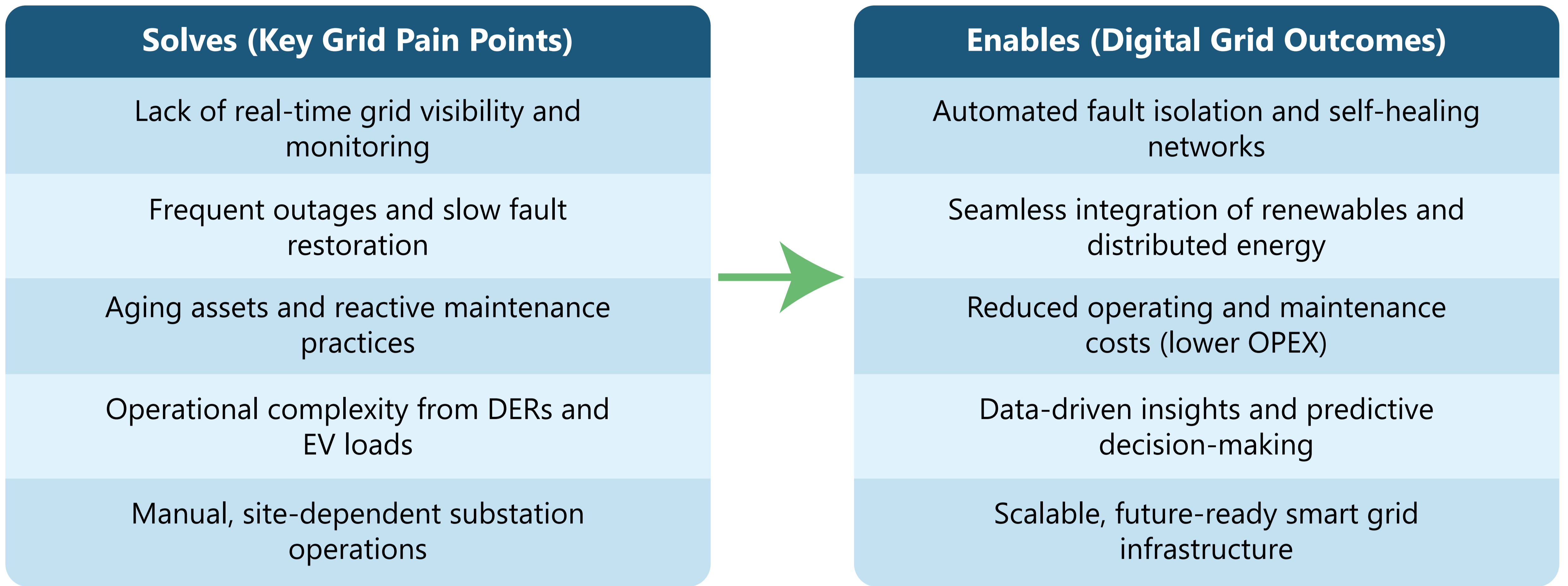
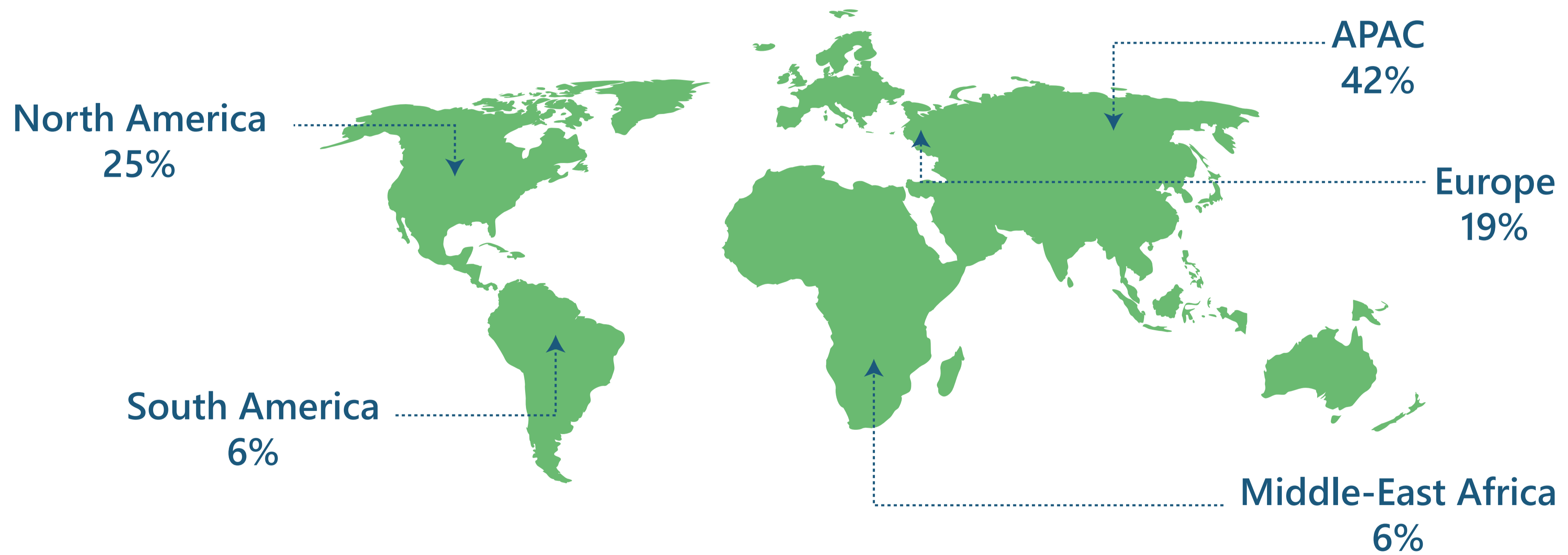


Substation Automation – The Digital Backbone of Grid Modernization

If digitalization is the brain of the modern grid, **substations are the control nodes where data becomes action**. Without automated substations, everything else—DERs, EV charging, renewables, flexibility—remains partially blind and reactive.



The global substation automation market is estimated to reach close to 10 BUSD by the end of 2025, where Europe, North America, and APAC accounted for the majority of the market share in 2025, while the markets in South America and the Middle East & Africa remain comparatively smaller in terms of annual market size.



Conventional technology (hardwired systems) with IEC 61850 at station level is still prevalent currently. However, the trend is slowly moving towards digitalization (the system that includes IEC 61850-9-2 process bus). By the end of this decade, there will be a more mature market of fully digital substations. Virtualization is in its early stages (pilot phases) and is expected to take over a decade to reach full market maturity.

Pre-2025 (Hardware Based)

2025-2020 (IEC 61850 Based Automation)

2020-2035 (Emerging & Expanding)

Conventional System	Digital System	Virtual System
Analog Control Panels	Scada and DCS System	Cloud-based control
Wired PLCs & Relays	Networked PLCs	AI & Machine Learning
Field Instruments	Smart Sensors	Virtual Monitoring