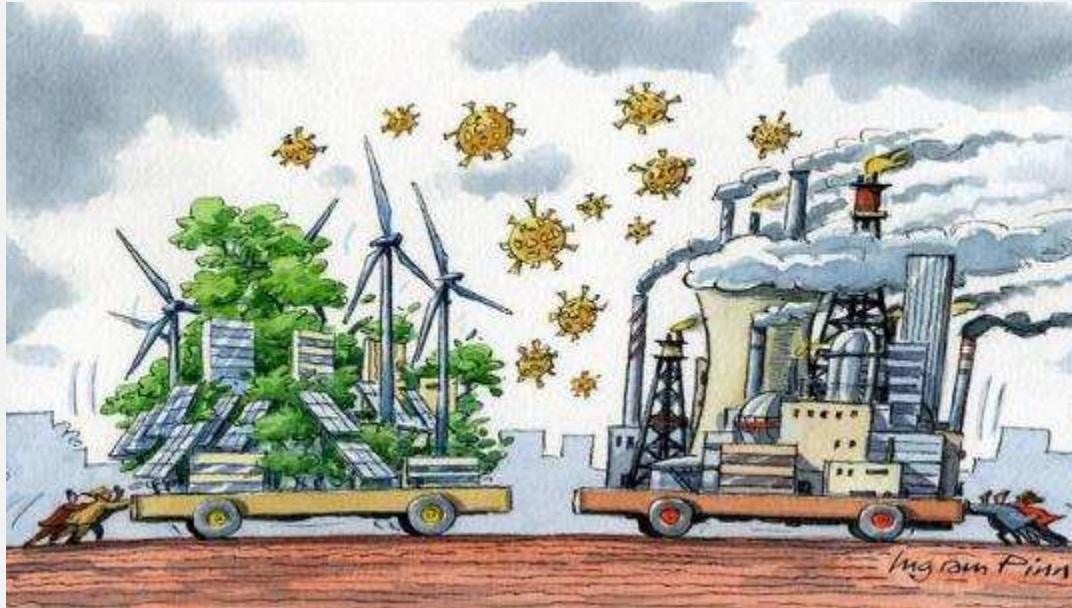




Financial Times UK

Major trends in the Utilities industry

Jean-Philippe El Khoury
Head of Sales, Smart Grid East Asia, Schneider Electric

Confidential Property of Schneider Electric

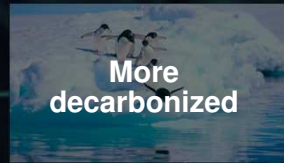
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Power industry is facing unprecedented changes



More
electric



More
decarbonized



More
decentralized



More
digitized

Trends

60% overall electricity demand increase in 2050 as compared to 2020

86% of power generation investments will be in zero-carbon fuels until 2040

12% of capacity from DG by 2025

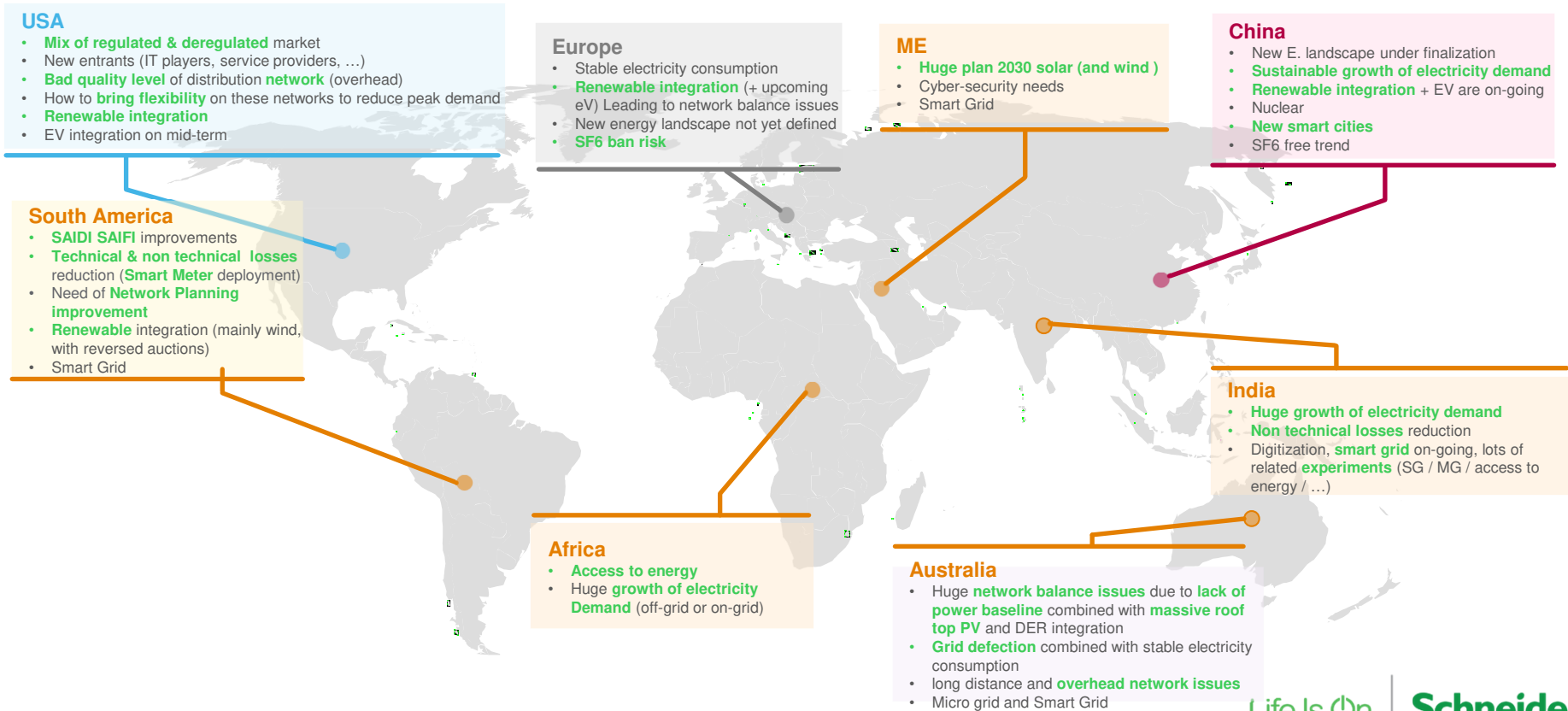
65% of DG investments in distributed PV

10x higher increase in connected devices than in connected people by 2020

Challenges

- ▶ Support growing electricity demand while decarbonizing electricity generation to avoid catastrophic climate change
- ▶ Maximize renewable power injection while managing the variability of solar and wind energy resources
- ▶ Maximize DER rate while maintaining a grid balance and avoiding massive CapEx investments
- ▶ In power generation, leverage digitization to lower TCO, extract value out of grid data to the benefit of the consumer, and mitigate cyber risks

Utility trends differ from one area to another...



6 major trends and challenges impacting distribution utilities

Regulatory uncertainties, business model adaptation, technology adoption: growing complexity ahead

- **Changing regulation & policy**



Regulatory impact on investment strategy, revenue model, risk management ?

- **Digital transformation**



Readiness, ability to transform ?

- **More active customers**



Prosumers, communities, microgrids...

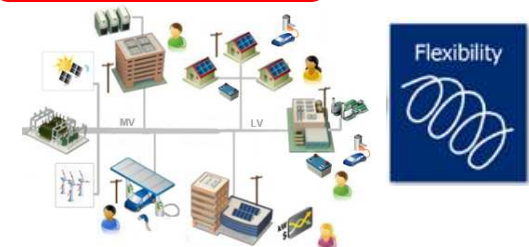
...

- **Improve operational efficiency**



Reliability (SAIDI...), losses, customer satisfaction, investment, OPEX, affordability...

- **(Distributed Energy Resources) DER integration**



Impact on planning and operations: new regulation and practices

- **Access to energy**



Enabled by multiple channels, including utilities

Life Is On | Schneider Electric

Decentralization, DER acceleration: impact on utilities

DER definition: no consensus !

“Energy’s worst acronym – why is DER a hot topic?”

<https://www.energynetworks.com.au/news/energy-insider/energys-worst-acronym-why-is-der-a-hot-topic/>

“Defining DERs: Does it matter that we all seem to have slightly different definitions?”

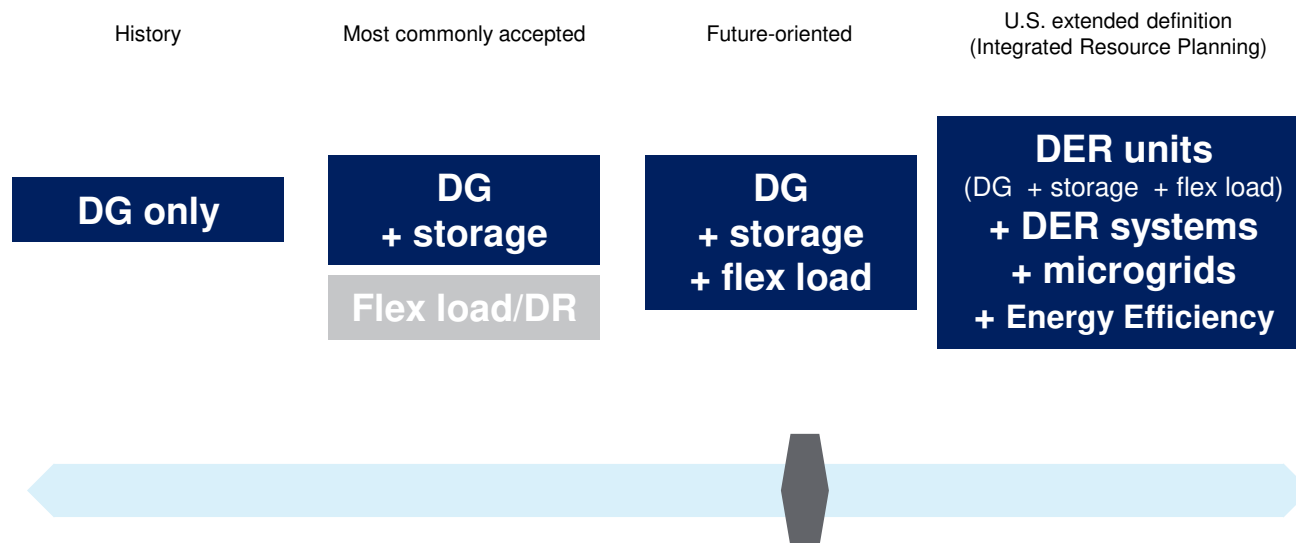
<https://www.cleanpower.com/2018/defining-ders-does-it-matter-definitions-vary/>

“Distributed Energy Resources: Why we don’t have consensus on the definition of DER”

<https://www.linkedin.com/pulse/distributed-energy-resources-why-we-dont-have-consensus-alain-malot/>

Various flavours of DER (Distributed Energy Resources) definition

Depends on market design and culture – Let's be flexible...

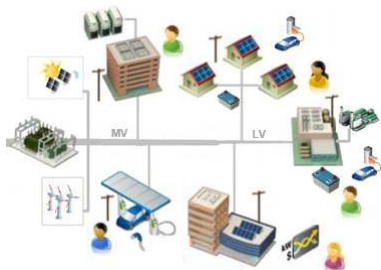


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Decentralization, DER acceleration: impact on utilities

EV, PV, wind to accelerate in « green » recovery period ?

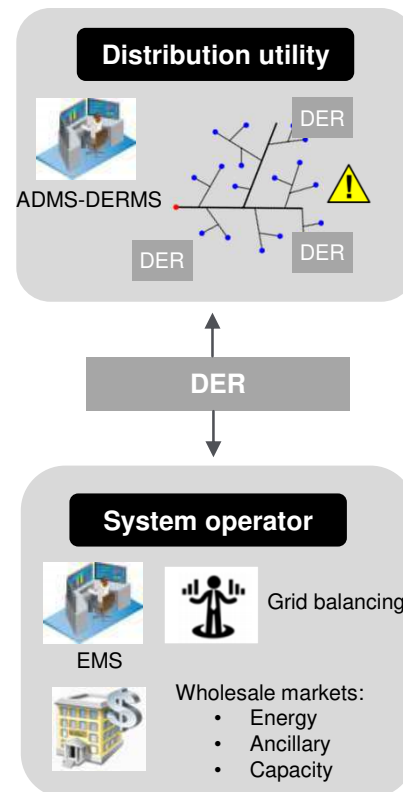
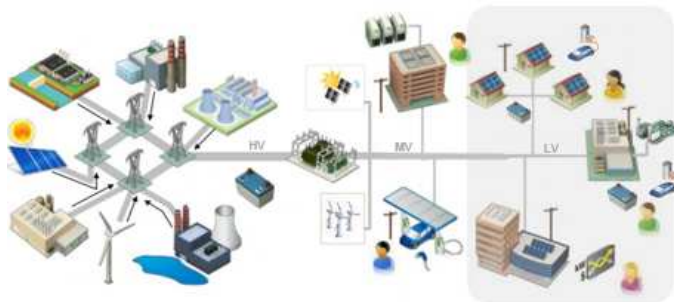


DER

2019 DER penetration

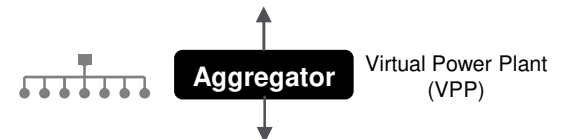
	Peak load GW	Total wind + solar	Distributed wind + solar	Distributed storage	Distr. CHP Cogeneration	Back-up generator	EV penetration	DER penetration
Germany	90 GW	~ 120 GW	~ 90 GW	Yes	~ 20 GW	~ 5 GW	~ 200 k	High
UK	55 GW	~ 35 GW	~ 20 GW	Yes	~ 6 GW	~ 8 GW	~ 200 k	Medium
France	100 GW	~ 23 GW	~ 21 GW	No	~ 4 GW	~ 5 GW	~ 200 k	Medium
Brazil	85 GW	< 10 GW	< 2GW	No	< 5 GW	~ 10 GW	Very low	Low
California	35 GW	31 GW	10 GW	Yes	~ 4 GW	~ 8 GW	~ 500 k	High

2 sub-topics: DER network integration vs market integration



DER network integration

New network planning strategies and tools :
increase DER hosting capacity at planning stage, avoid overspending in network reinforcement, solve operational congestion issues and enhance resilience

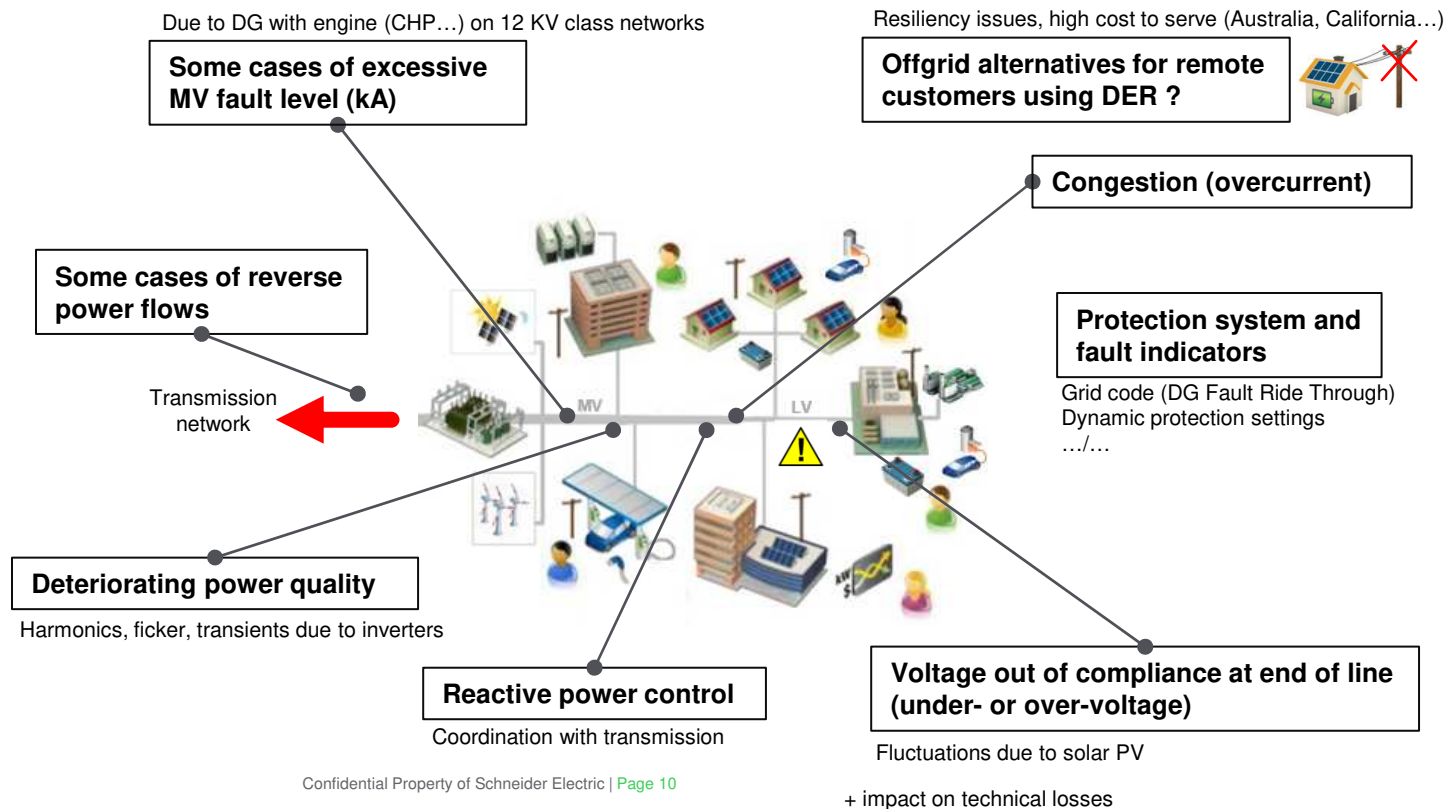


DER wholesale integration

Allow DER participation to grid balancing and wholesale markets

Operational constraints with DER for distribution utilities

DER can exceed network limits and cause risks to system security



Increased field level instrumentation (sensors, automation):
VR, OLTC, capa, PQ mon.,
FRTU, DER controls/RTU, FPI,
protection, smart switch...



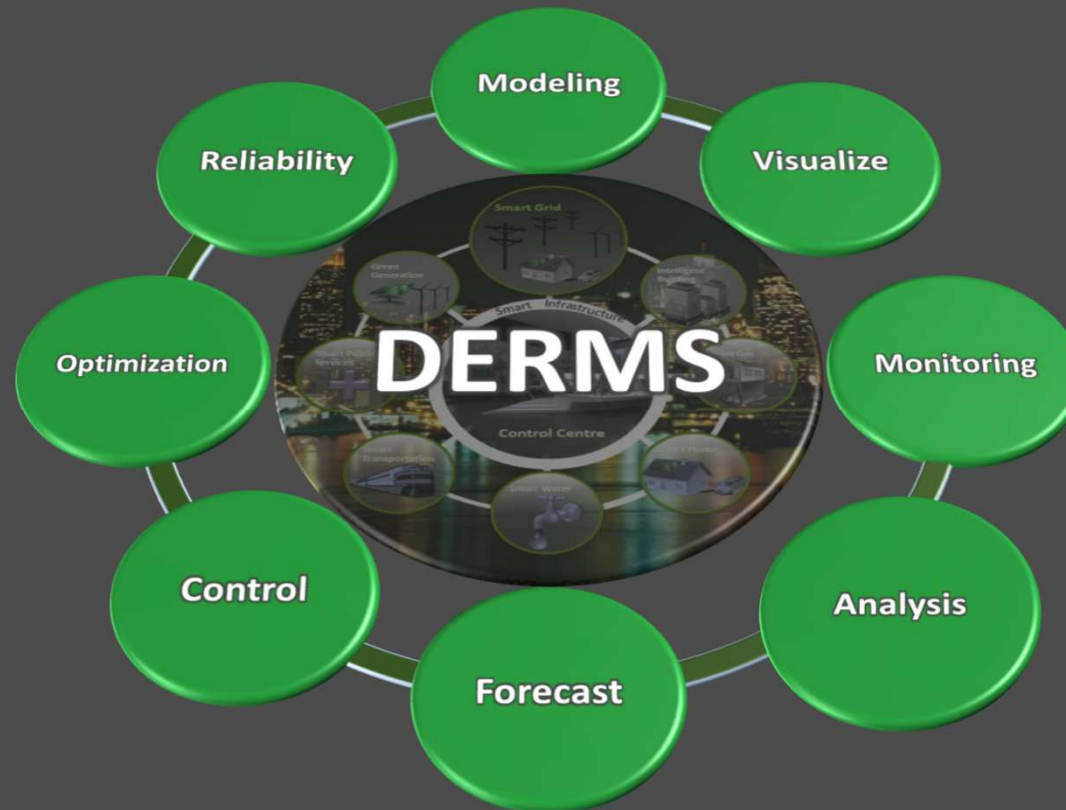
Control room (ADMS-DERMS)
More visibility via ADMS
Coordinated dispatch of DER
Coordinated volt-VAR control
On-line reconfiguration
Sync with AMI / smart metering
Coordination with transmission
.../...

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DSO management of DER

Providing grid flexibility with distributed energy resources



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