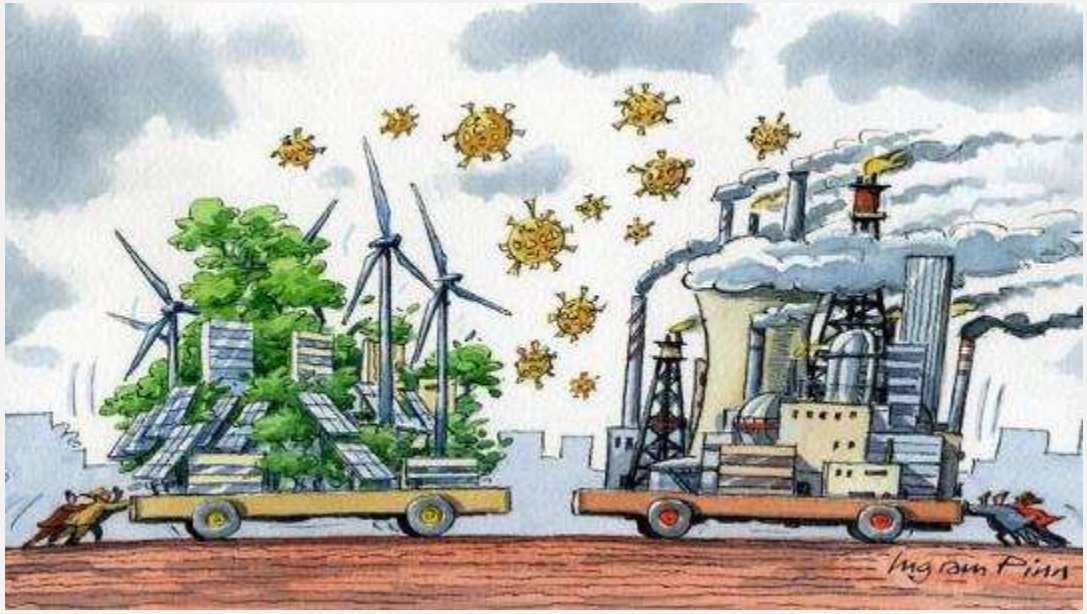


Financial Times UK

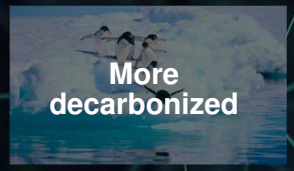
Major trends in the Utilities industry

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

Confidential Property of Schneider Electric

Life Is On Schneider Electric

Power industry is facing unprecedented changes



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

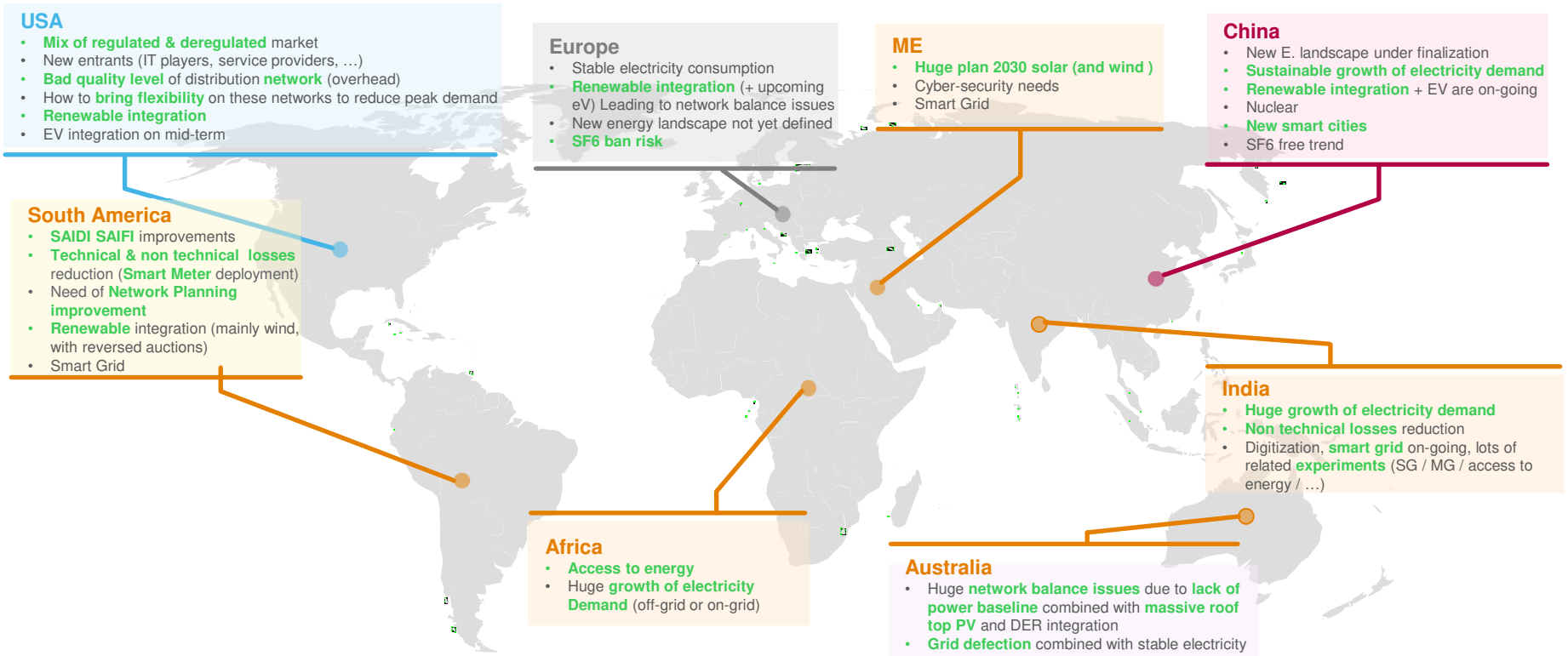
Maximize DER rate while maintaining a grid balance and avoiding massive CapEx investments

In power generation, leverage digitization to lower TCO, extract value out of grid data to the benefit of the consumer, and mitigate cyber risks

© 2019 Schneider Electric, All Rights Reserved

Life Is On | Schneider Electric

Utility trends differ from one area to another…



USA
- **Mix of regulated & deregulated** market
- New entrants (IT players, service providers, …)
- **Bad quality level** of distribution **network** (overhead)
- How to **bring flexibility** on these networks to reduce peak demand
- **Renewable integration**
- EV integration on mid-term

Europe
- Stable electricity consumption
- **Renewable integration** (+ upcoming eV) Leading to network balance issues
- New energy landscape not yet defined
- **SF6 ban risk**

ME
- **Huge plan 2030 solar (and wind)**
- Cyber-security needs
- Smart Grid

China
- New E. landscape under finalization
- **Sustainable growth of electricity demand**
- **Renewable integration** + EV are on-going
- Nuclear
- **New smart cities**
- SF6 free trend

South America
- **SAIDI SAIFI** improvements
- **Technical & non technical losses** reduction (**Smart Meter** deployment)
- Need of **Network Planning improvement**
- **Renewable** integration (mainly wind, with reversed auctions)
- Smart Grid

India
- **Huge growth of electricity demand**
- **Non technical losses** reduction
- Digitization, **smart grid** on-going, lots of related **experiments** (SG / MG / access to energy / …)

Africa
- **Access to energy**
- Huge **growth of electricity Demand** (off-grid or on-grid)

Australia
- Huge **network balance issues** due to **lack of power baseline** combined with **massive roof top PV** and DER integration
- **Grid defection** combined with stable electricity consumption
- long distance and **overhead network issues**
- Micro grid and Smart Grid

Life Is On Schneider Electric

6 major trends and challenges impacting distribution utilities

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

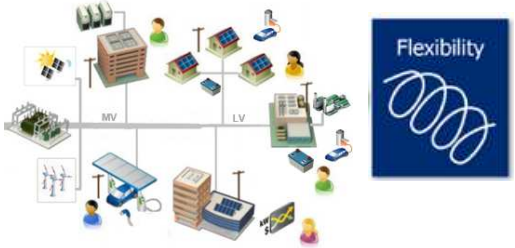
- **Changing regulation & policy**

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

- **More active customers**

Prosumers, communities, microgrids…
…

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



Impact on planning and operations: new regulation and practices

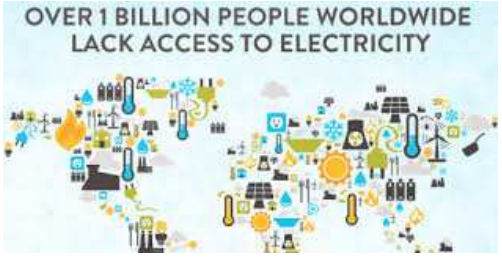
- **Digital transformation**

Readiness, ability to transform ?

- **Improve operational efficiency**

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

- **Access to energy**



Enabled by multiple channels, including utilities

Life Is On | Schneider Electric

Decentralization, DER acceleration: impact on utilities

Life Is On Schneider Electric

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/

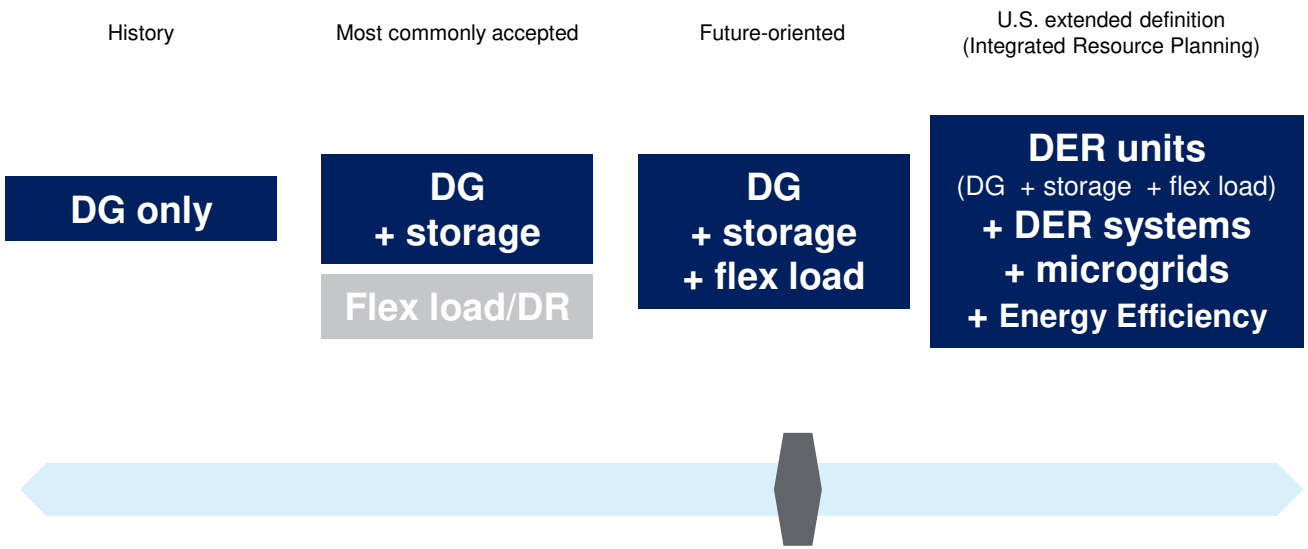
“Distributed Energy Resources: Why we don’t have consensus on the definition of DER”

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

Life Is On Schneider Electric

Various flavours of DER (Distributed Energy Resources) definition

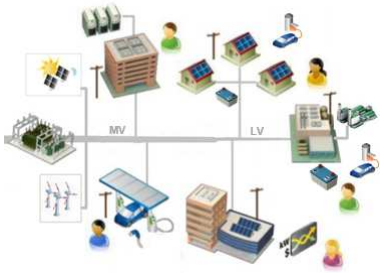
Depends on market design and culture – Let's be flexible…



Life Is On Schneider Electric

Decentralization, DER acceleration: impact on utilities

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



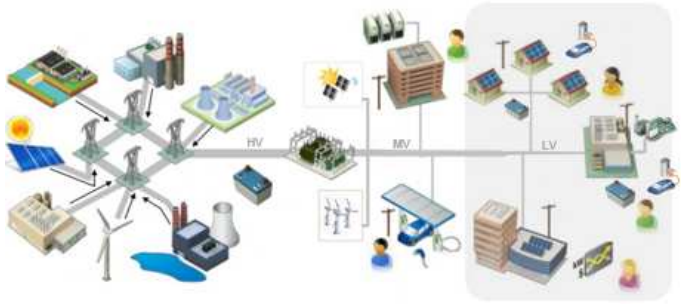
2019 DER penetration

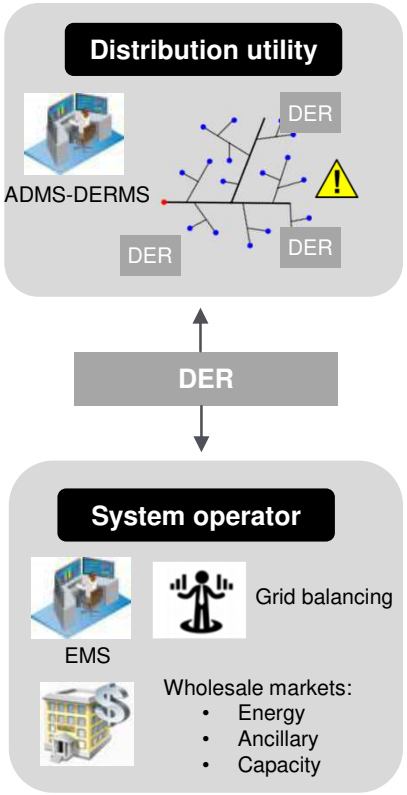
DER

	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**

Life Is On Schneider Electric

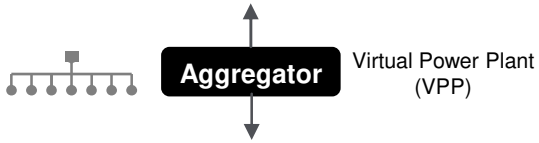
2 sub-topics: DER network integration vs market integration





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

Life Is On Schneider Electric

Operational constraints with DER for distribution utilities

DER can exceed network limits and cause risks to system security

Due to DG with engine (CHP…) on 12 KV class networks

Some cases of excessive MV fault level (kA)

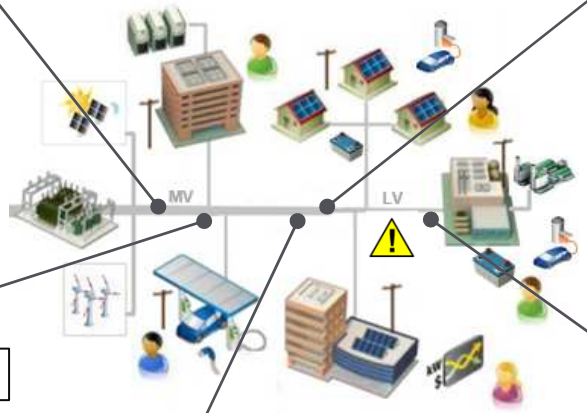
Resiliency issues, high cost to serve (Australia, California…)

Offgrid alternatives for remote customers using DER ?

Congestion (overcurrent)

Some cases of reverse power flows

Transmission network



Protection system and fault indicators

Grid code (DG Fault Ride Through)
Dynamic protection settings
…/…

Deteriorating power quality

Harmonics, ficker, transients due to inverters

Reactive power control

Coordination with transmission

Voltage out of compliance at end of line (under- or over-voltage)

Fluctuations due to solar PV

+ impact on technical losses

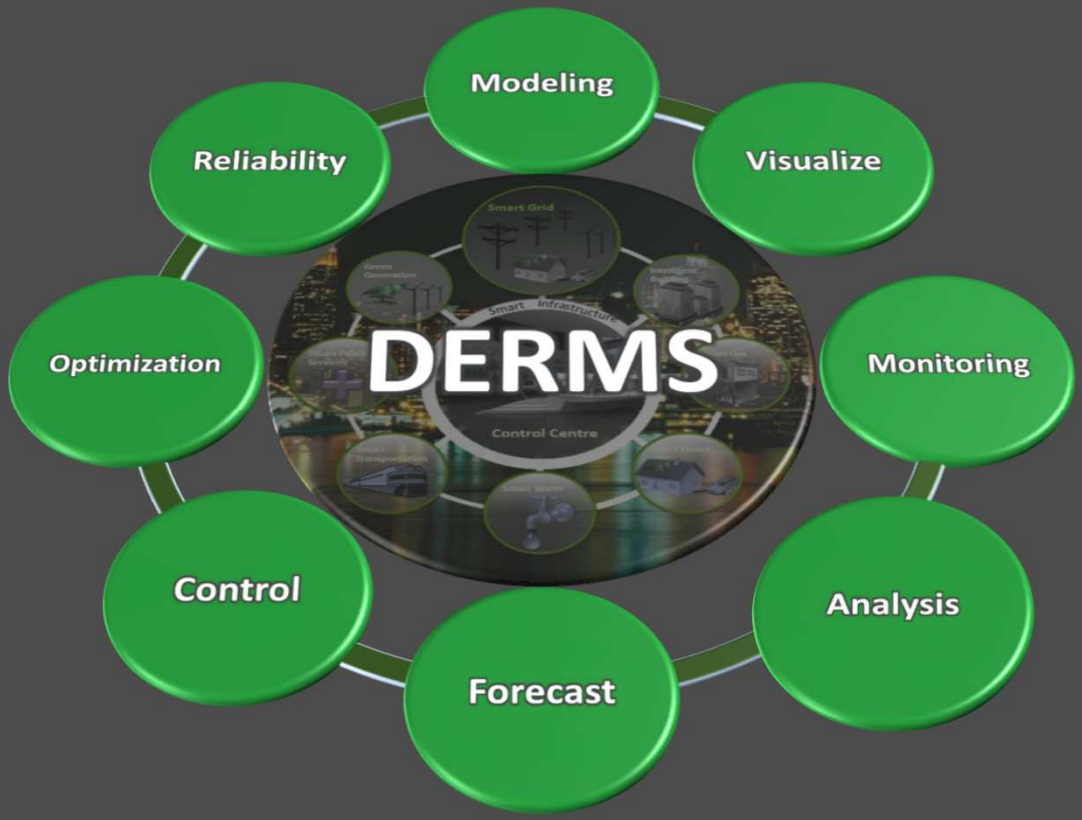
Increased field level instrumentation (sensors, automation):
VR, OLTC, capa, PQ mon., FRTU, DER controls/RTU, FPI , protection, smart switchgear…

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
…/…

Life Is On Schneider Electric

DSO management of DER

Providing grid flexibility with distributed energy resources



Life Is On Schneider Electric


Life Is On
Schneider
Electric