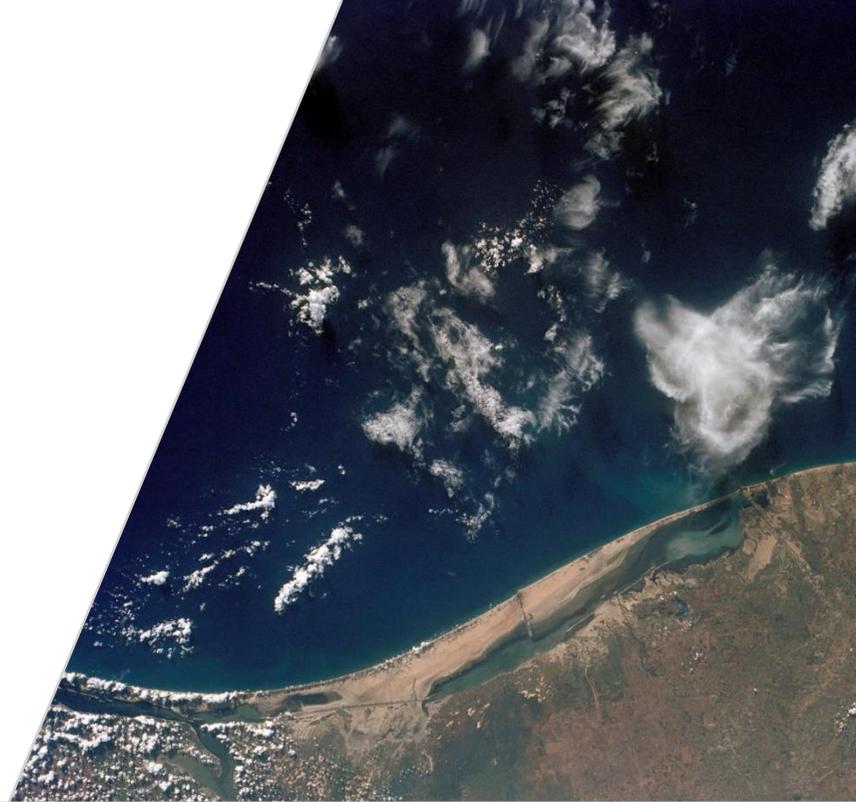


# Decarbonization on Supply & Demand Sides

G20 CSWG Session 6: The Role of Renewable  
Energy in Addressing Climate Change

Miho Kurosaki

February 15, 2019



BloombergNEF

# Sharing global and local knowledge

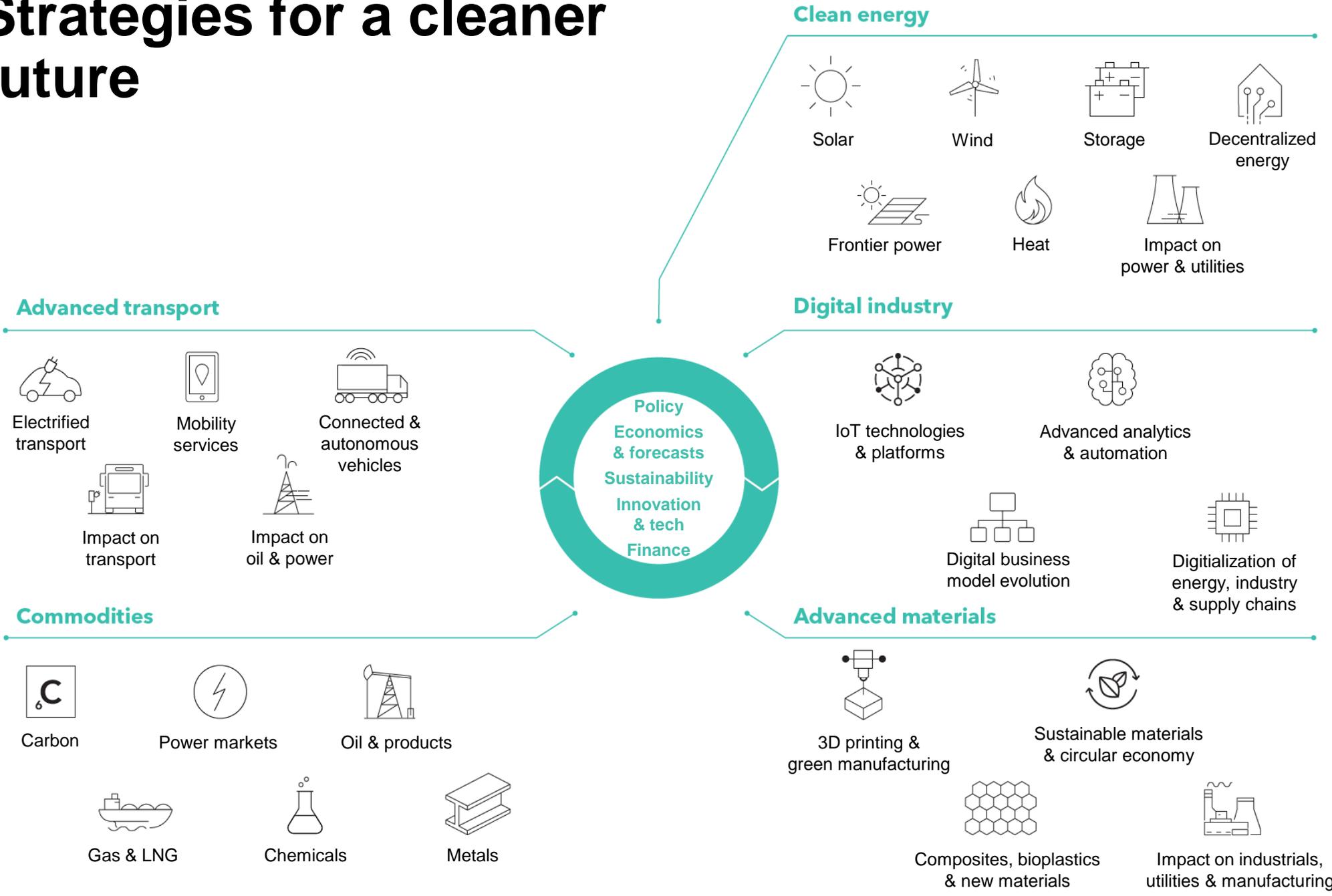
**250**

BNEF professionals in  
17 locations\*

\* Part of the Bloomberg LP with  
19,000 employees in 176  
locations.



# Strategies for a cleaner future



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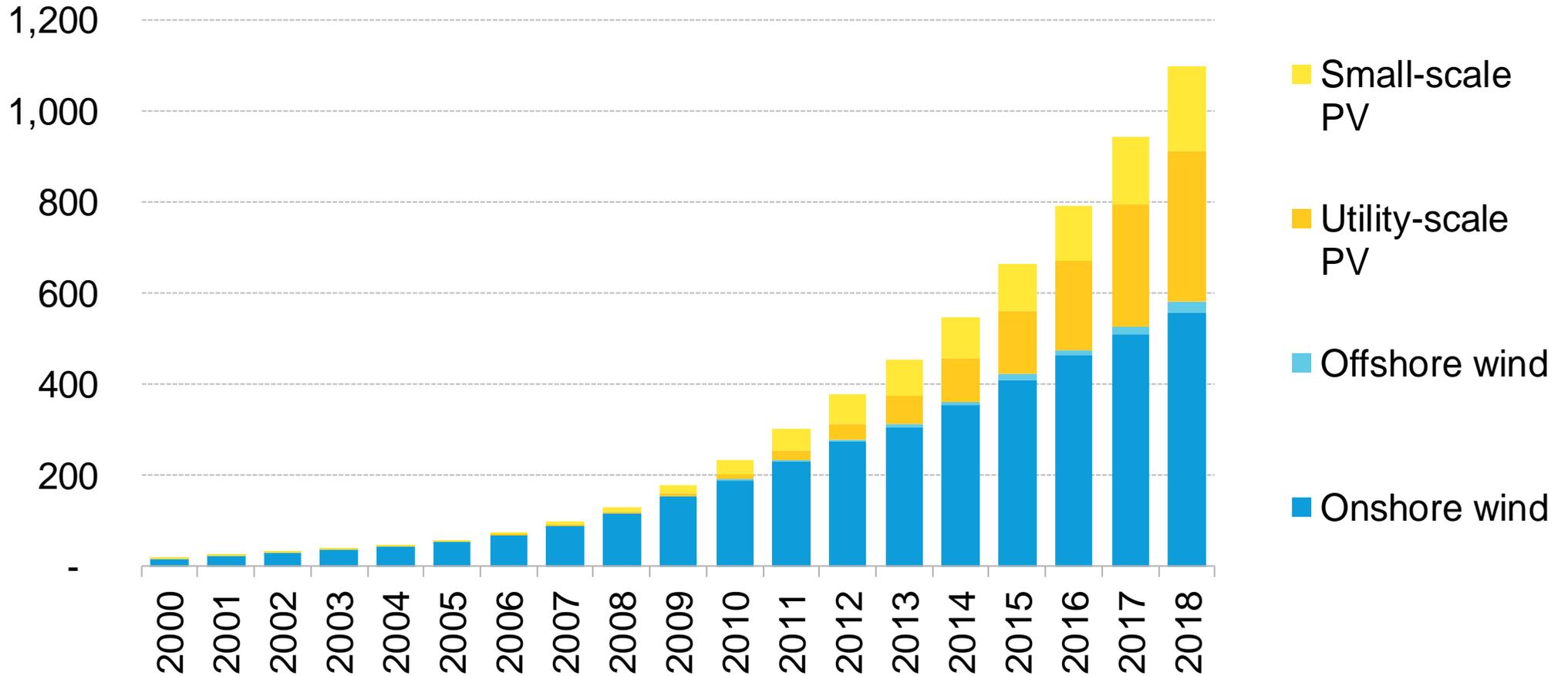
# Decarbonization on the supply side

Technology, economics and policy

# Wind and solar are at terawatt scale

## Global wind and solar installations

Cumulative GW



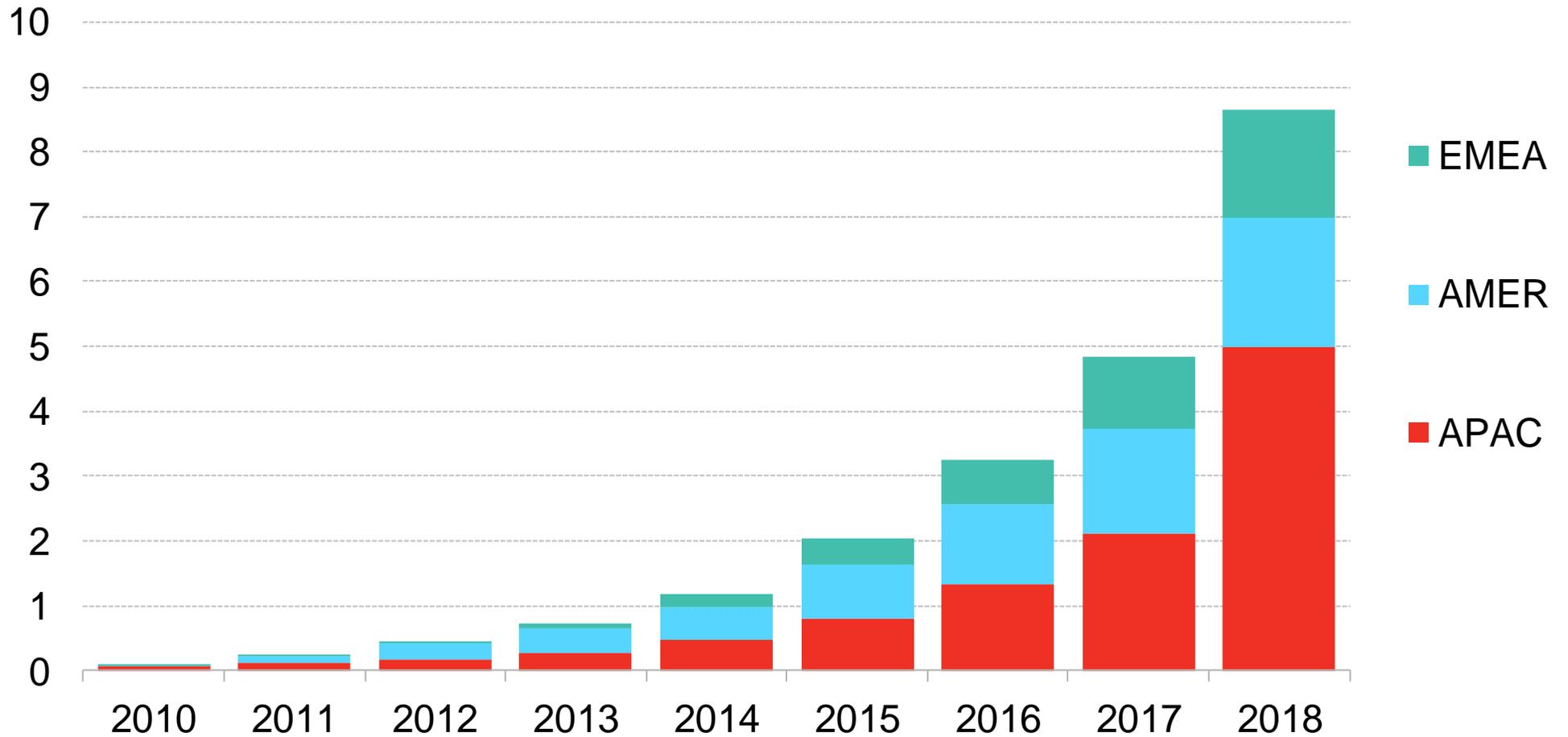
Source: BloombergNEF

# Storage is also accelerating



## Global energy storage installations

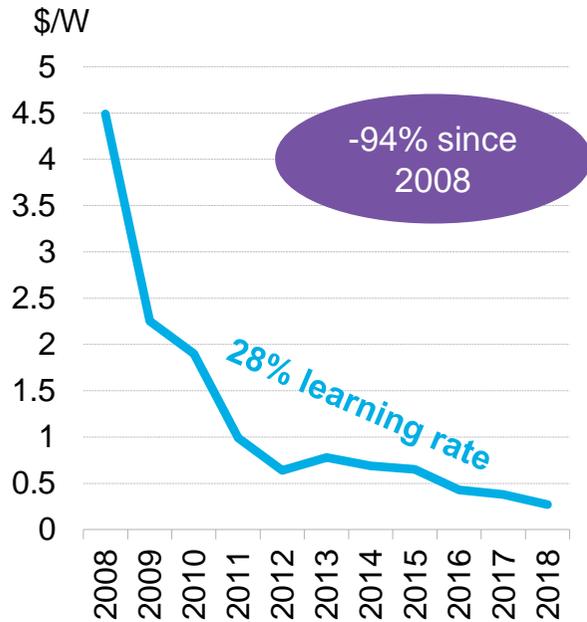
Cumulative GW



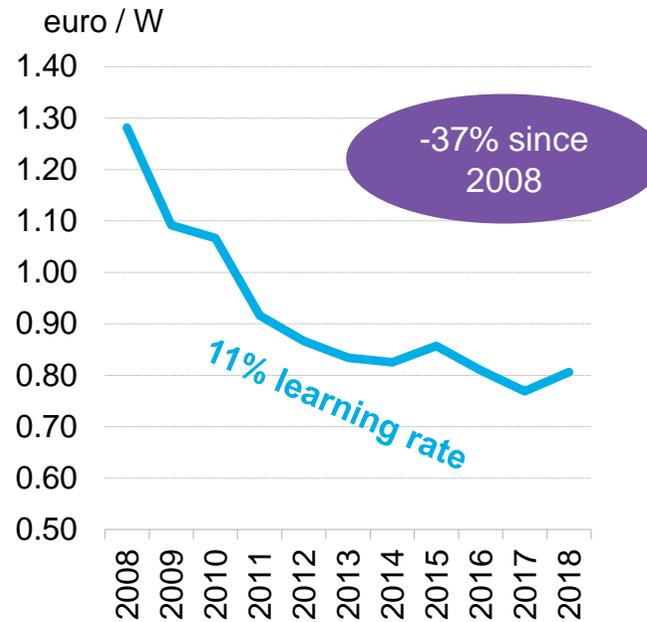
Source: BloombergNEF

# Transitions driven by technology

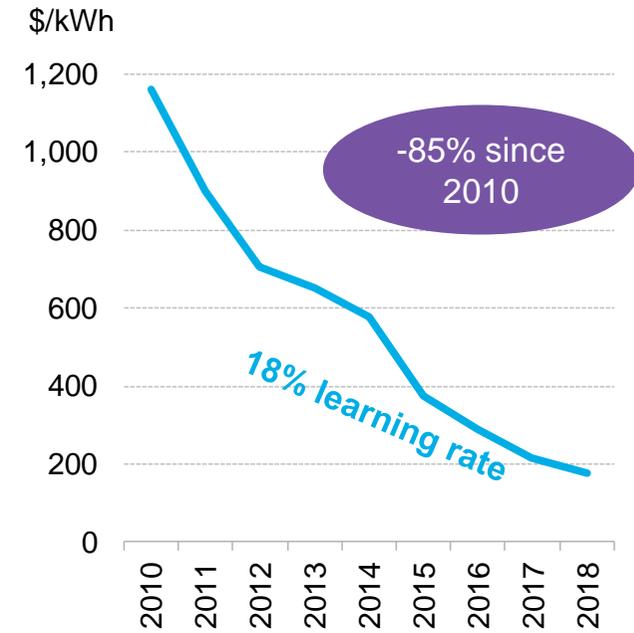
## Solar PV module prices



## Onshore wind turbine prices



## Lithium-ion battery prices

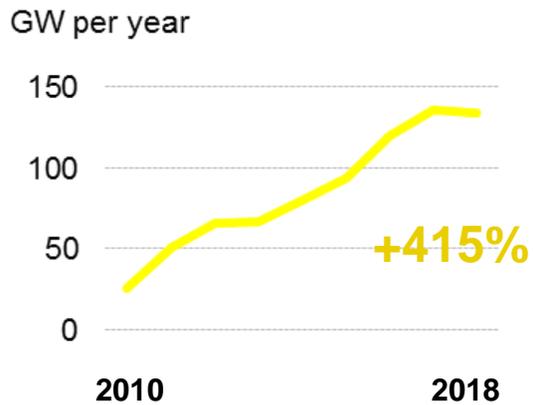


Source: BloombergNEF.

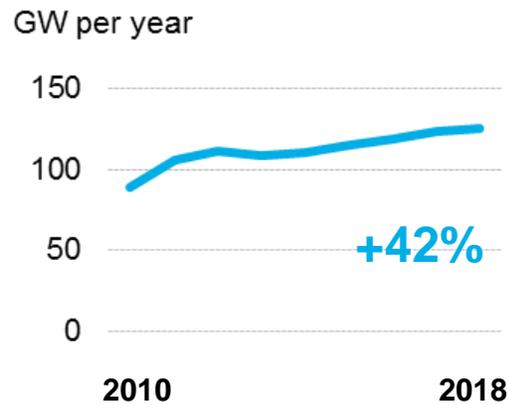
# ... thanks to a rapid scale-up in manufacturing capacity...

## Annual manufacturing capacity

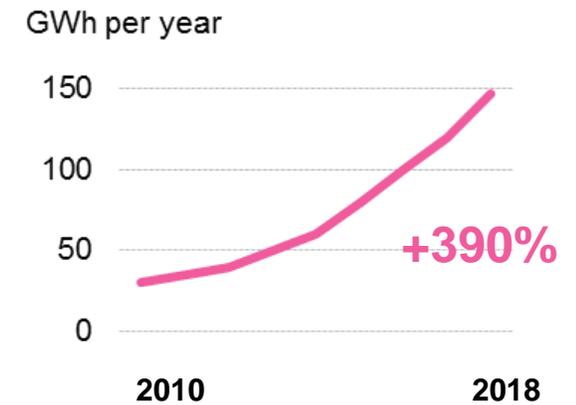
### Solar PV Cells



### Wind Turbines



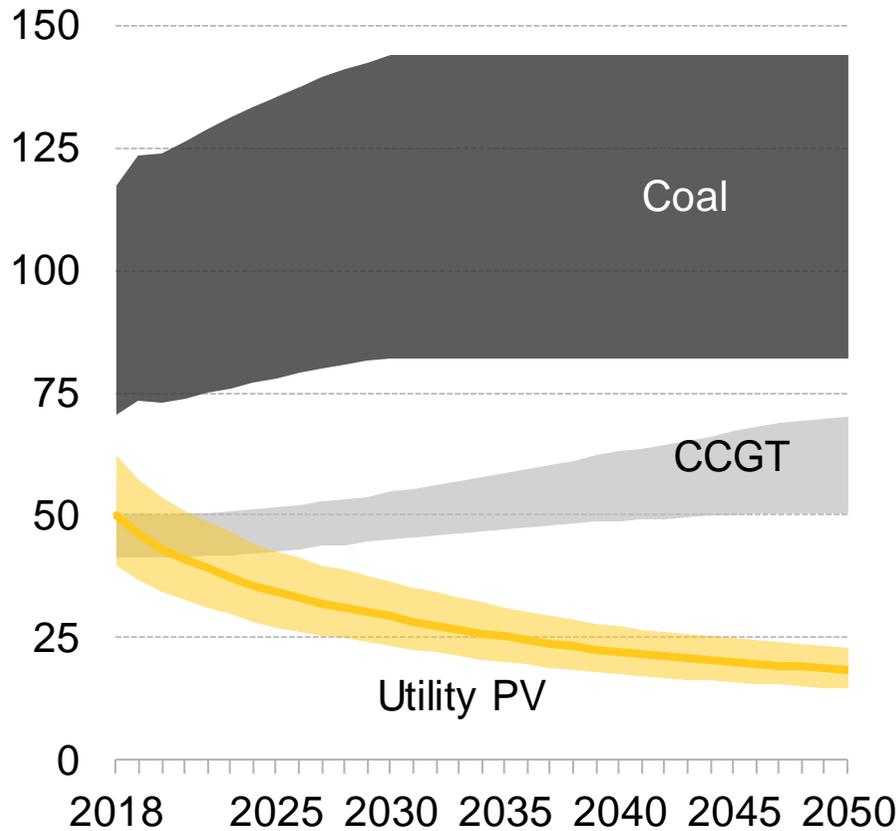
### Li Battery Cells



# Transitions characterized by tipping points

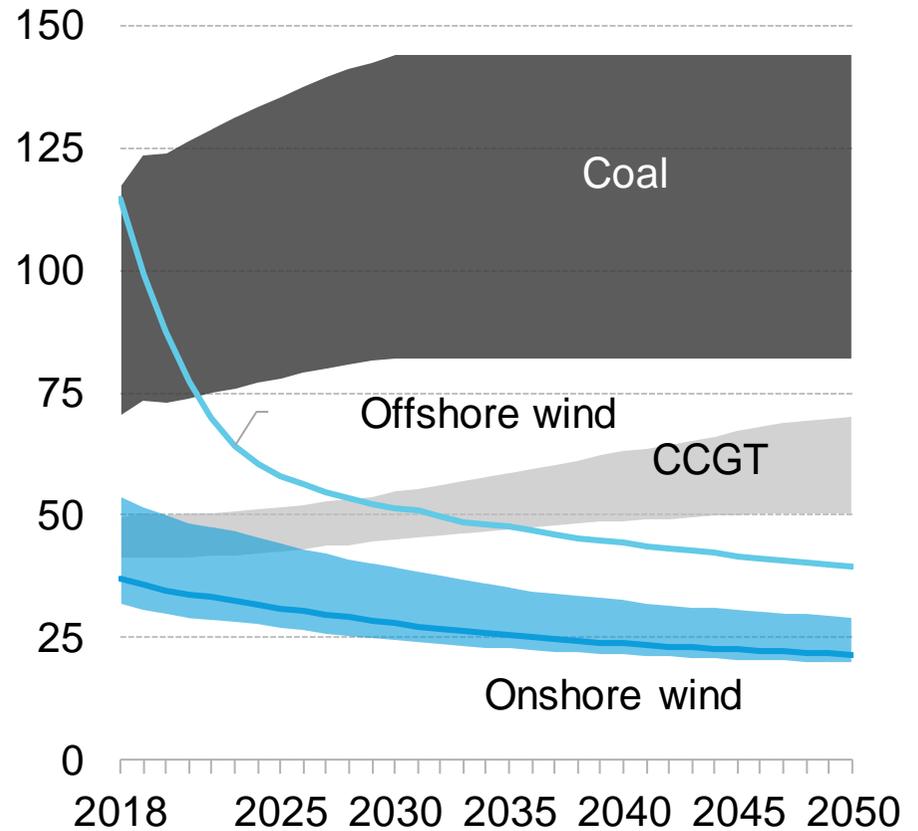
## Solar costs vs. coal & gas

\$/MWh (2017 real)



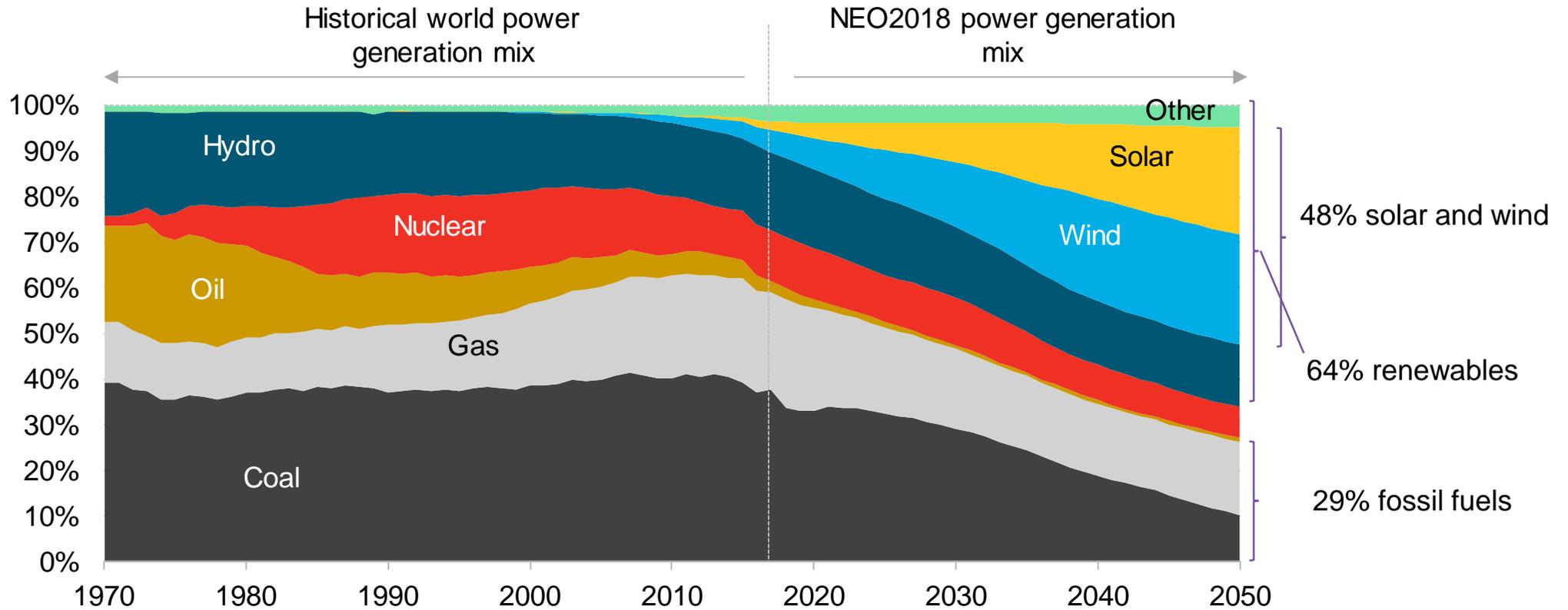
## Wind costs vs. coal & gas

\$/MWh (2017 real)



Source: BloombergNEF Note: Levelized cost of electricity (solar, wind, gas, coal) calculations are for utility-scale assets in the U.S. and exclude incentives such as the ITC and the PTC. Utility PV assumes tracking. EV price is for a medium segment vehicle in the U.S

# 50% wind and solar generation by 2050

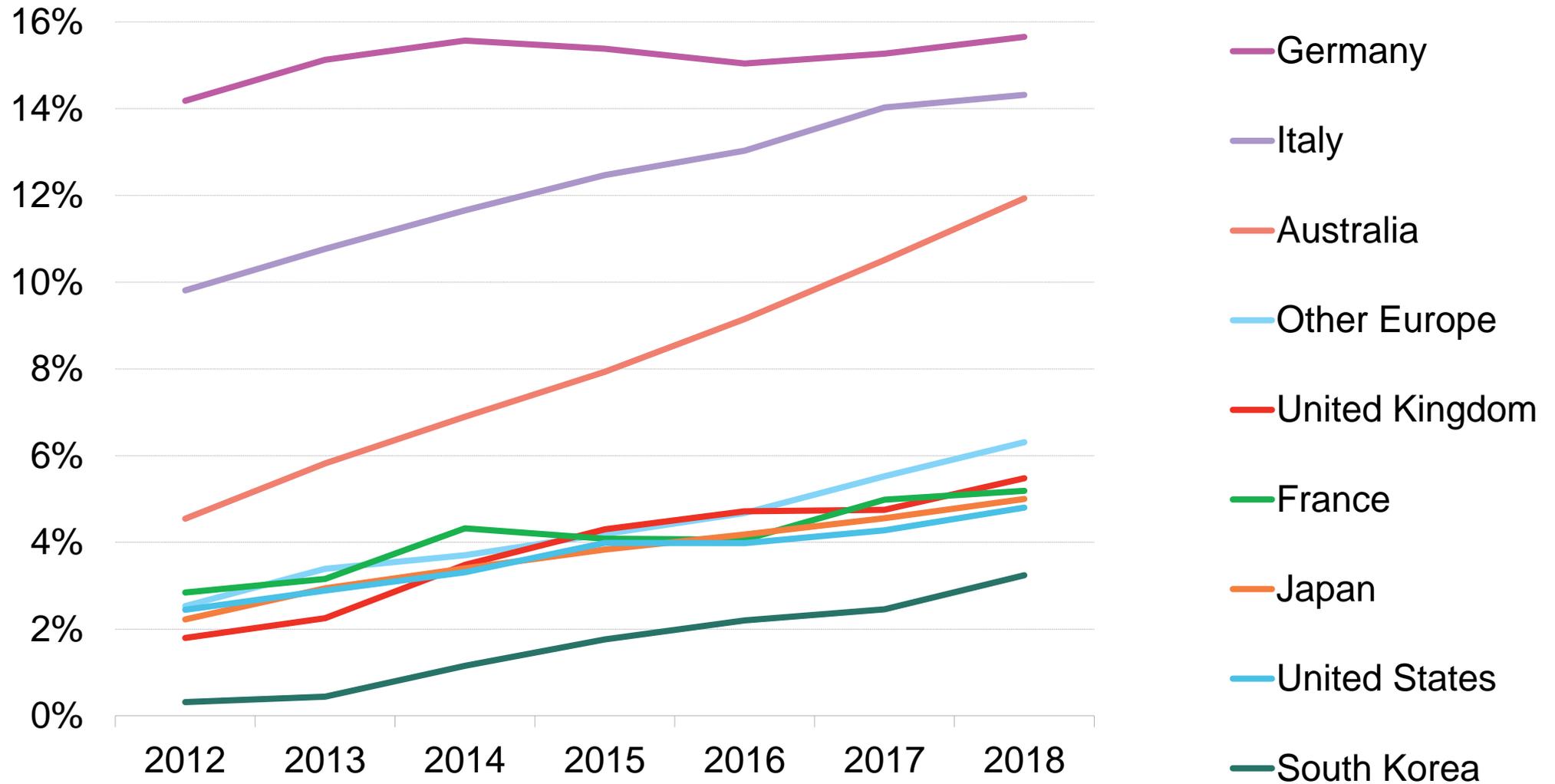


Source: BloombergNEF, IEA

# Decarbonization on the demand side

Corporations and customers

# Power is decentralizing – consumer choice

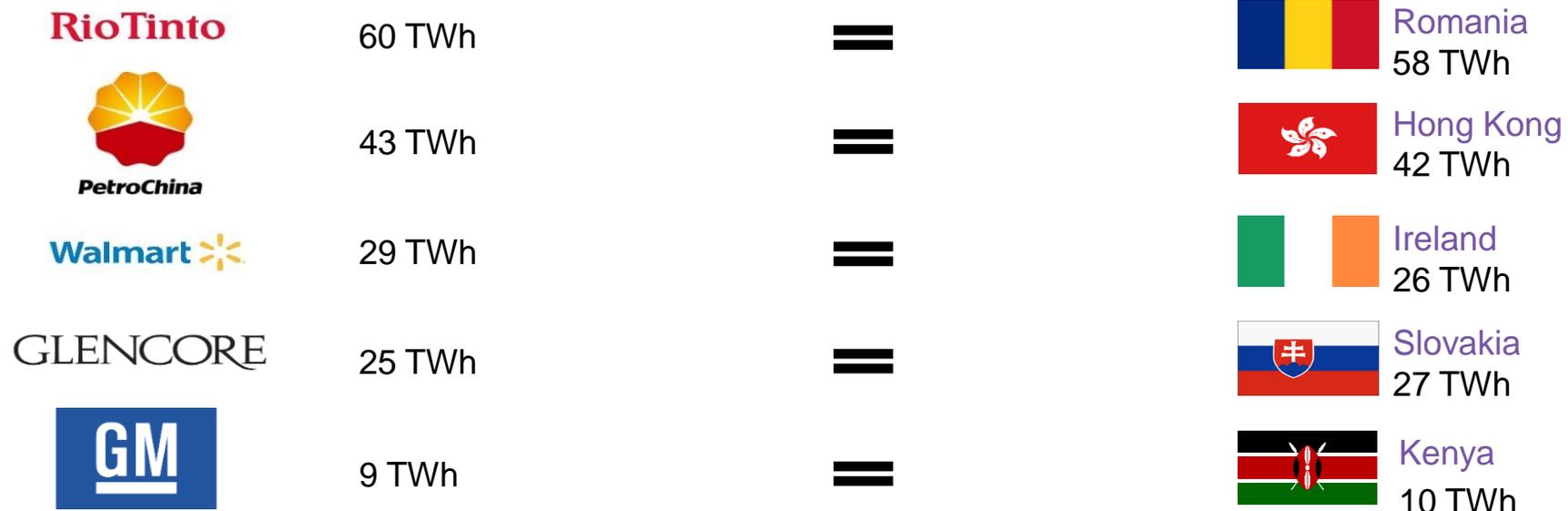


Source: BloombergNEF

# Large companies have country-sized electricity demand

The world's largest corporations have country-sized electricity demand. A good strategy on how to procure reliable, low-cost and low-carbon electricity is critical to their business operations and profitability.

## Annual electricity consumption



Source: BloombergNEF, Bloomberg Terminal Note: 2016 for all companies

# The RE100: pledging for 100% renewable energy use

**RE 100**

[ABOUT RE100](#)

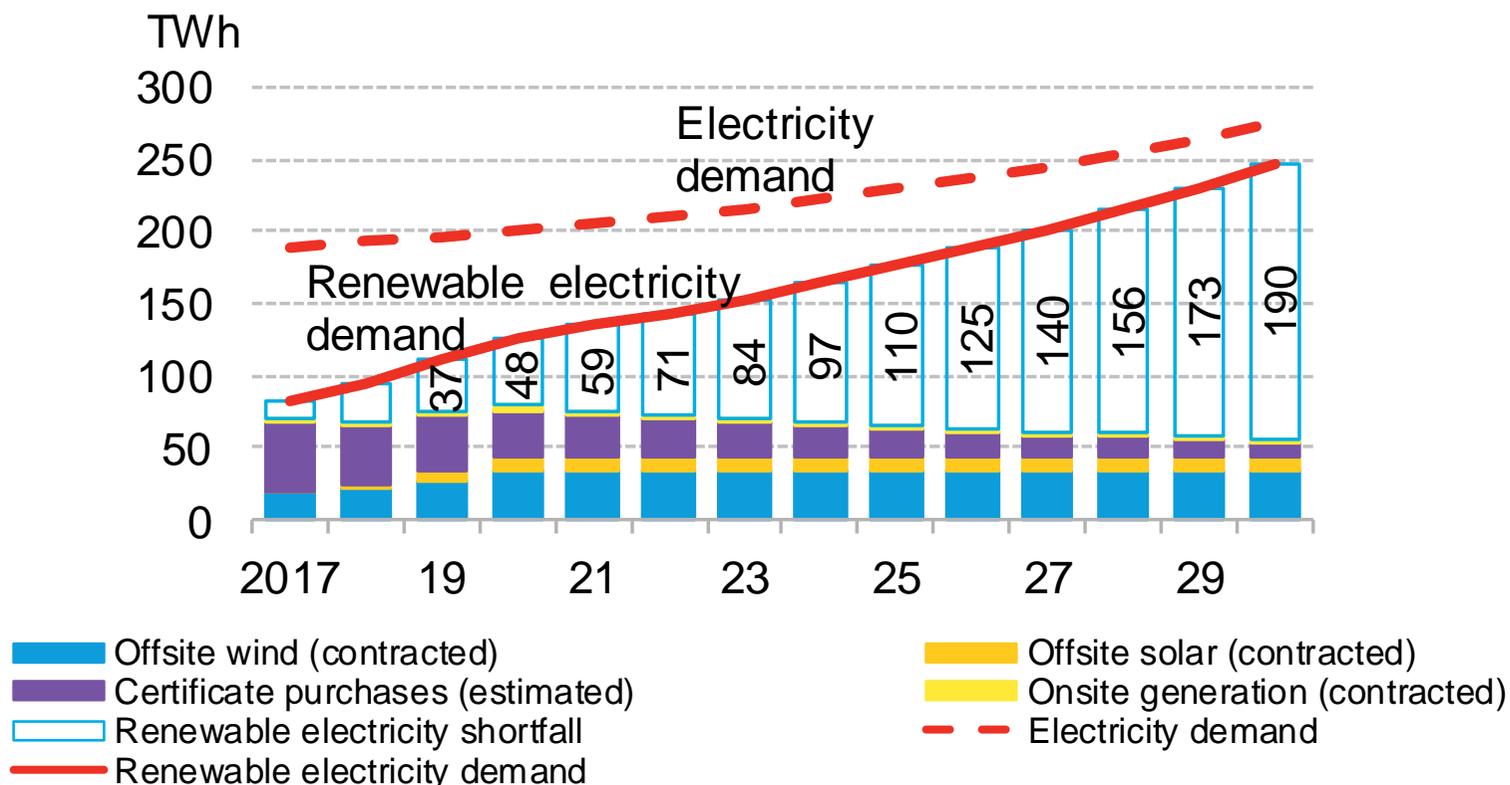
[PARTNERS](#)

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RE100

The world's most influential companies, committed to 100% renewable power.

# Projected renewables shortfall for the RE100



Source: BloombergNEF, Bloomberg Terminal, The Climate Group, company sustainability reports. Note: Charts are for RE100 members that have disclosed electricity demand. Certificate purchases includes non-U.S. green tariff programs, and are assumed to step down 10% each year. Onsite generation and contracted wind and solar purchases are assumed to remain flat through 2030. Regional breakdown of shortfall estimated based on each company's share of revenue by region. See this report's [accompanying excel](#) for company-level data on the RE100.

# Supply chains will multiply corporate procurement effect

In addition to greening their own electricity consumption, many corporations are asking their suppliers to do the same. This will multiple and spread the impact of corporate renewable energy purchasing to new markets.



## Supplier List

February 2017

This list is our top 200 suppliers, including component providers and others representing at least 97% of procurement expenditures for materials, manufacturing, and assembly of our products worldwide in 2016.

Supplier Name	Address
3M Company	No. 235, Zhongyuan Road, Suzhou, Jiangsu, China
3M Company	5500 Oaza Osanagi, Higashine, Yamagata, Japan
3M Company	577 Keumeui-ri, Jangan-myon, Hwaseong, Gyeonggi-Do, South Korea
3M Company	No. 312, Section 1, Huan Dong Road, Sinshih Township, Tainan, Taiwan
3M Company	1400 State Docks Road, Decatur, Alabama, United States
3M Company	1400 Perimeter Road, Greenville, South Carolina, United States
3M Company	South Building, 915 Adams Street, Hutchinson, Minnesota, United States
3M Company	3406 East Pleasant Street, Knoxville, Iowa, United States
3M Company	1030 Lake Road, Medina, Ohio, United States
3M Company	1425 Stokke Parkway, Menomonie, Wisconsin, United States
AAC Technologies Holdings Inc.	No. 66, Yanghuxi Road, Wujin District, Changzhou, Jiangsu, China
AAC Technologies Holdings Inc.	No. 8, Fengqi Road, High Tech. Industry Development Area, Wujin District, Changzhou, Jiangsu, China
AAC Technologies Holdings Inc.	Building 5, 6th floor, Nanyou Tianan Industry Park, Dengliang Road, Nanshan District, Shenzhen, Guangdong, China

*Leading Apple suppliers are some of the largest companies in the world...*

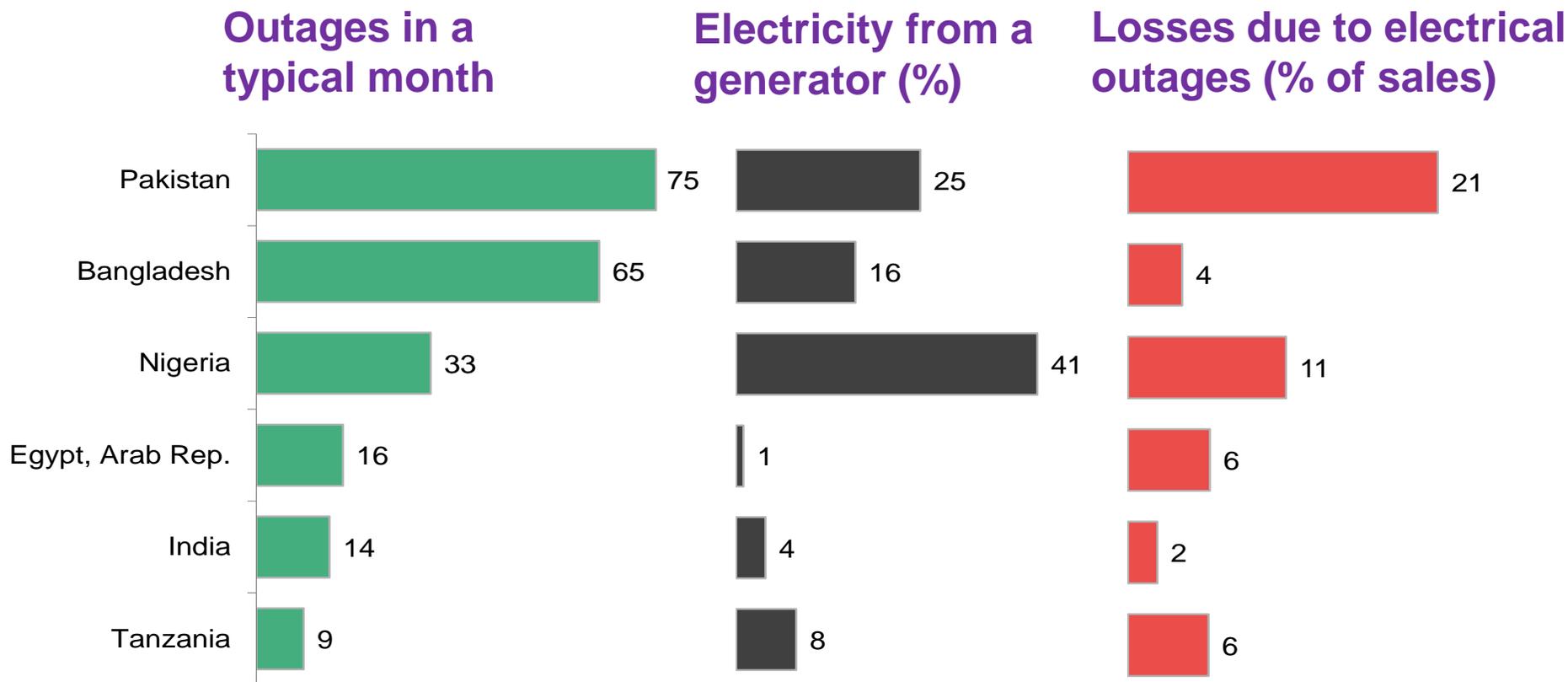
**SONY**



**FOXCONN**

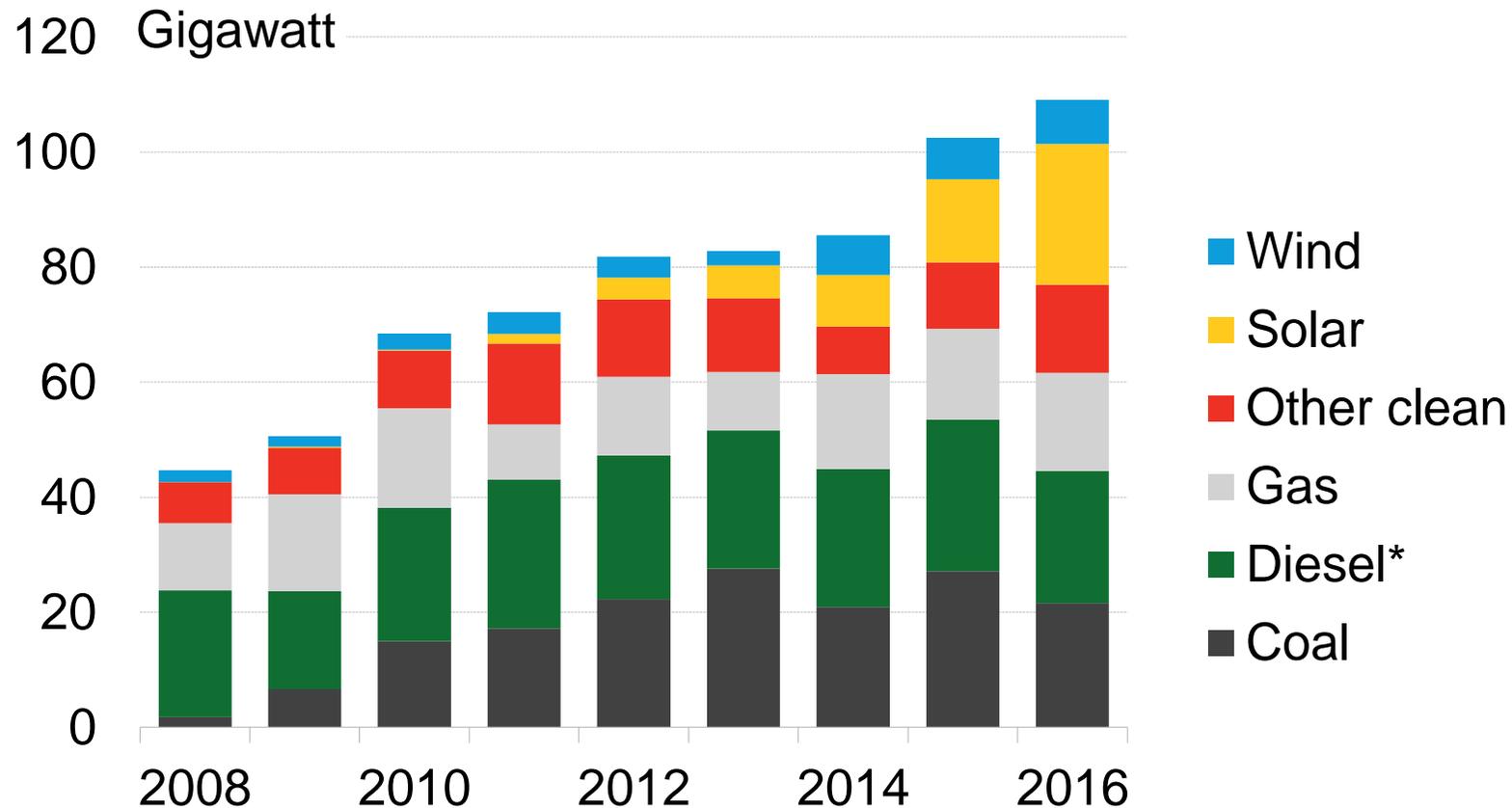


# Grids are less reliable in emerging markets



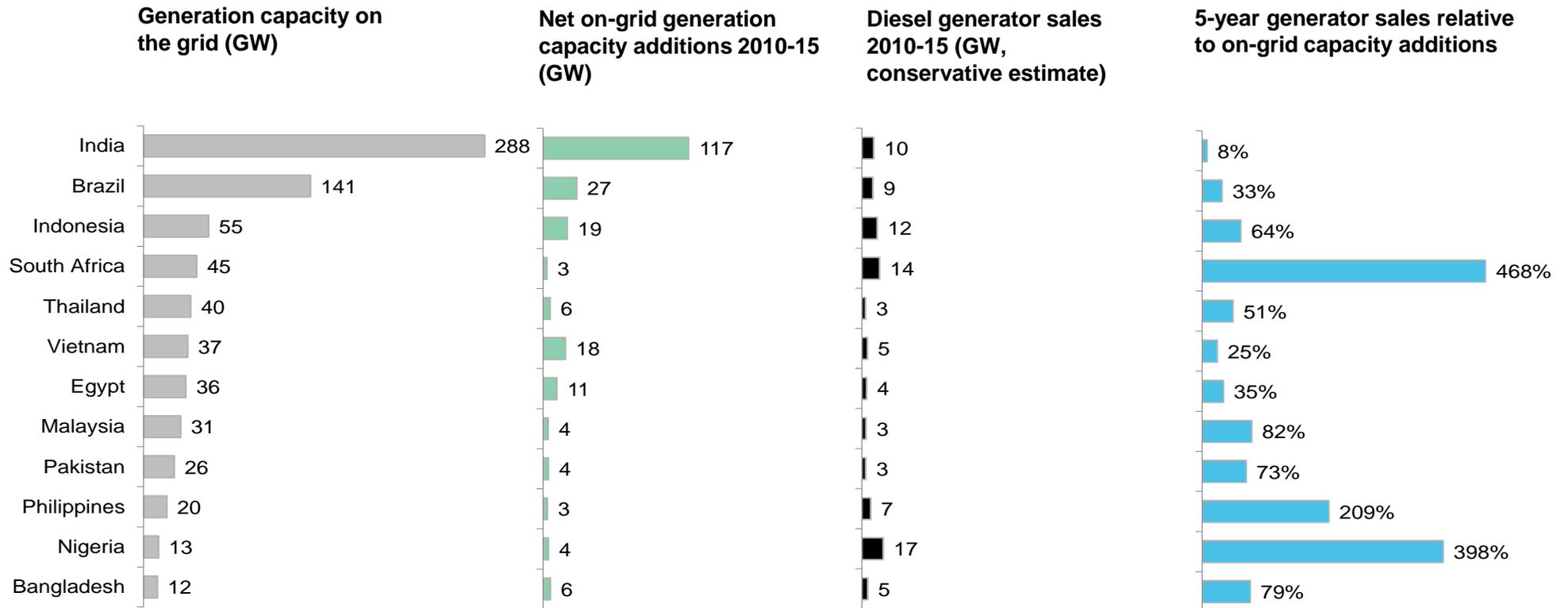
Source: World Bank

# Fossil fuels capacity added in non-OECD countries



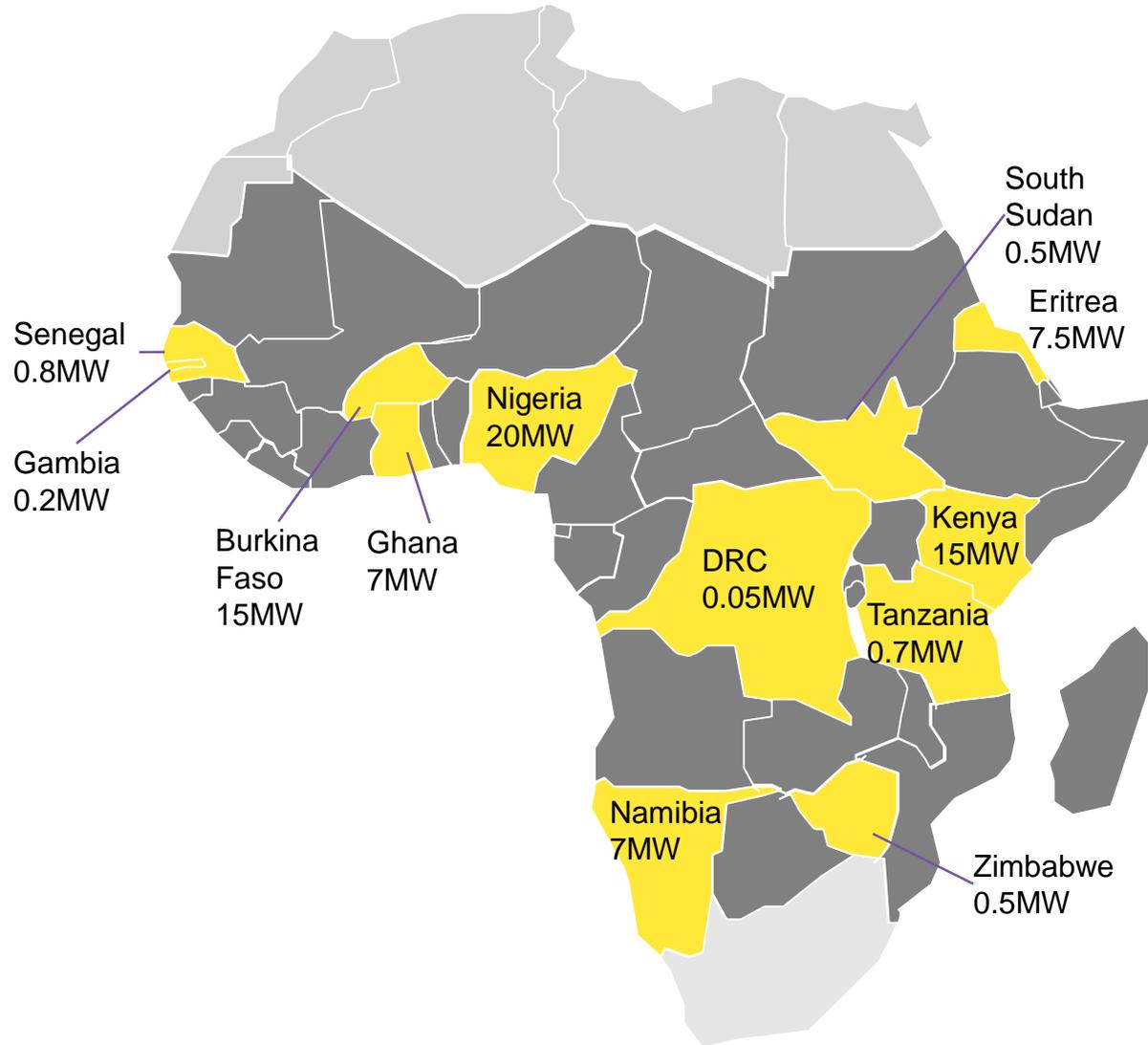
Source: Bloomberg New Energy Finance, PGS Consulting. \* Diesel capacity is estimated based on customs data

# Many emerging markets still rely heavily on diesel generators



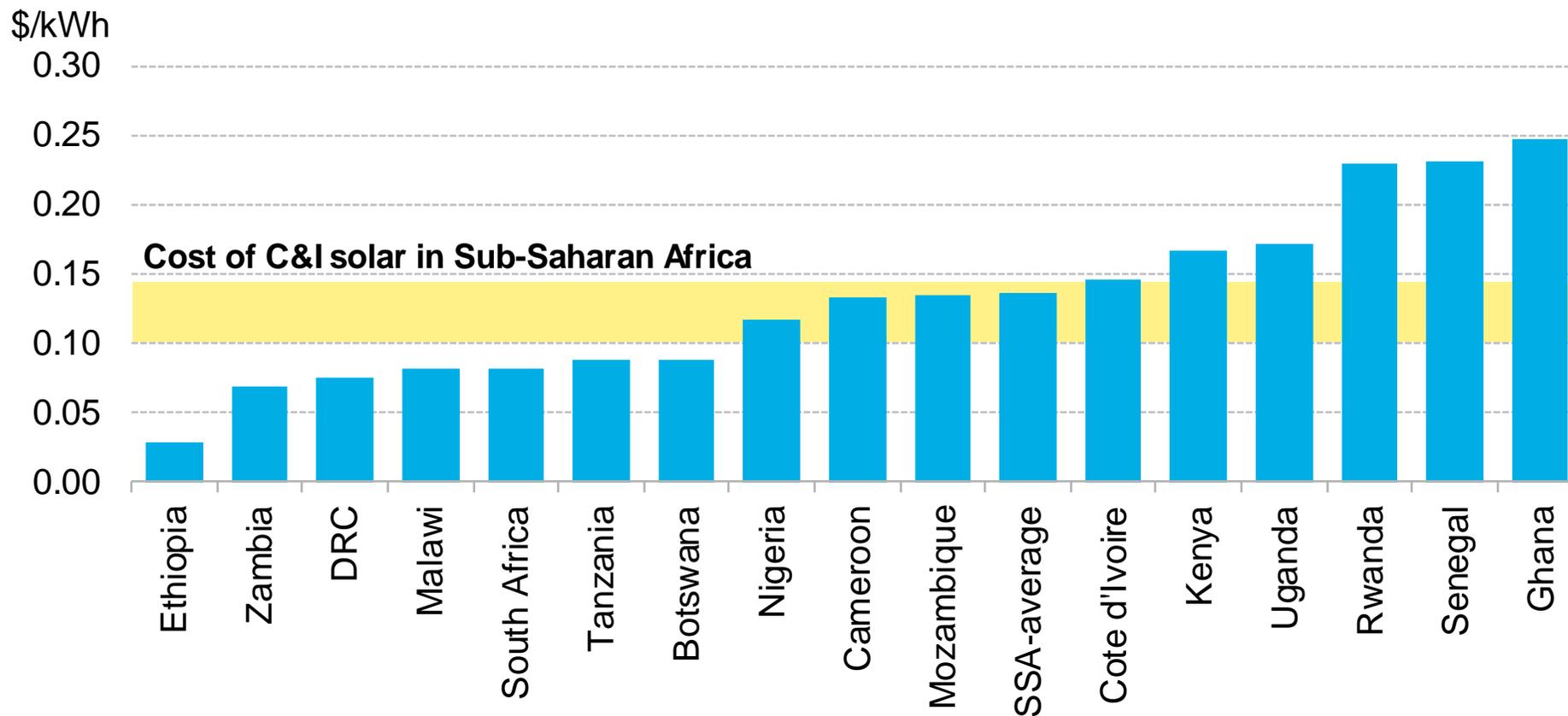
Source: Bloomberg New Energy Finance, PGS Consulting

# Countries with C&I solar projects in Sub-Saharan Africa



Source: BloombergNEF. Note: Countries colored in yellow indicate that there are known C&I solar projects plus installed capacity that developers reported to BNEF.

# Economics of solar vs commercial grid electricity tariffs



Source: BloombergNEF, Climatescope. Note: Tariffs for Ghana are as of April 2018. The others are as of 2017. The range of C&I solar cost estimates for Kenya, Ghana and Nigeria, and assumes a project starts operation in 2019.

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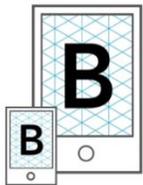
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