

# Composites in energy, transport, and manufacturing

Drivers for change in all three industries

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# Connecting the dots for the future of industry

## Commodities



Carbon



Power markets



Oil & products



Gas & LNG



Chemicals



Metals

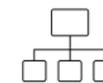
## Digital industry



IoT technologies & platforms



Advanced analytics & automation



Digital business model evolution



Digitalization of energy, industry & supply chains

## Advanced transport



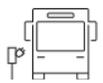
Electrified transport



Mobility services



Connected & autonomous vehicles

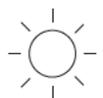


Impact on transport



Impact on oil & power

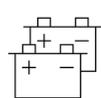
## Clean energy



Solar



Wind



Storage



Decentralized energy



Frontier power



Heat



Impact on power & utilities

## Advanced materials



3D printing & green manufacturing



Sustainable materials & circular economy



Composites, bioplastics & new materials



Impact on industrials, utilities & manufacturing

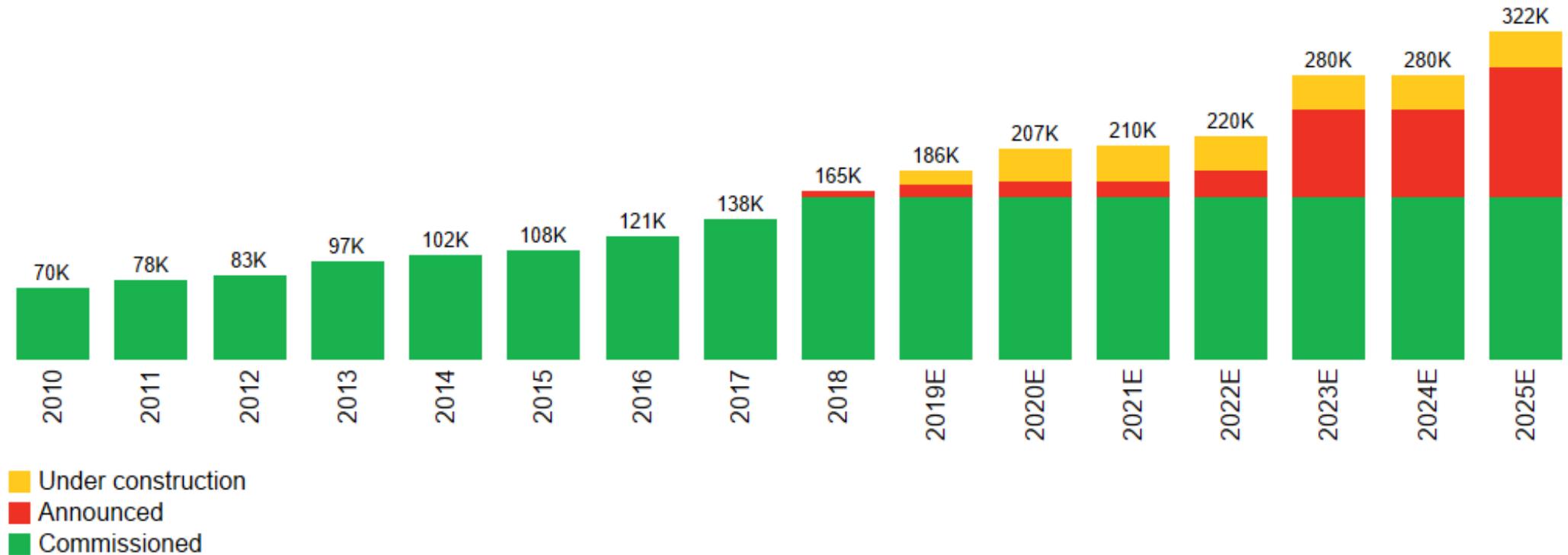


# State of the carbon fiber industry

Capacity, pricing, demand

# Where is all of this capacity going to go?

Overview of carbon fiber production capacity (metric ton)



Source: BloombergNEF

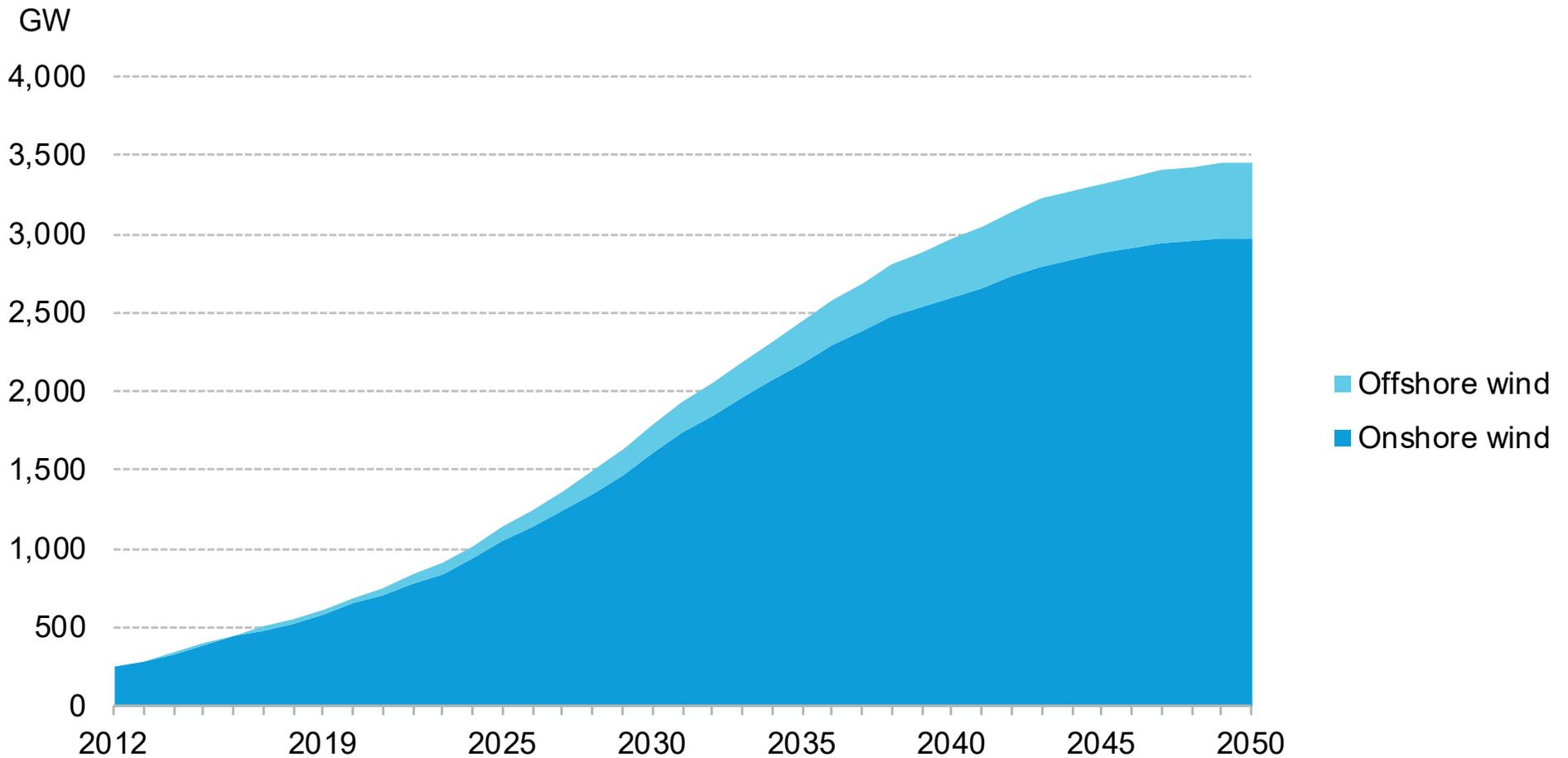
# Wind becomes the new leader

Larger turbines require stronger materials

Wind becomes the new leader

# Installed wind capacity will grow five-fold in the next 30 years

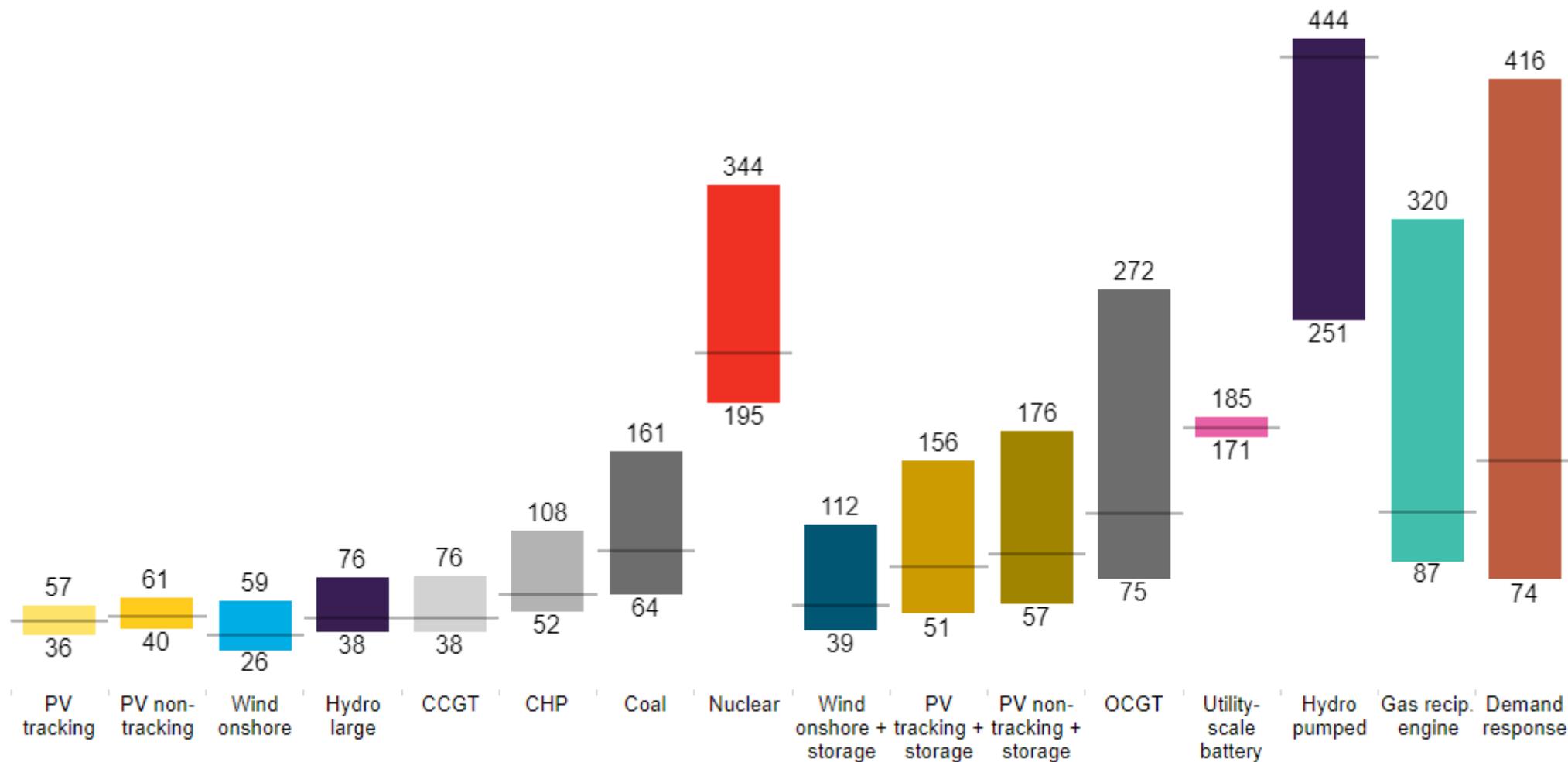
## Global cumulative installed capacity



Source: BloombergNEF

# And competitive pricing with other technologies

Current LCOE range (\$/MWh, nominal) - United States, 2019 H2



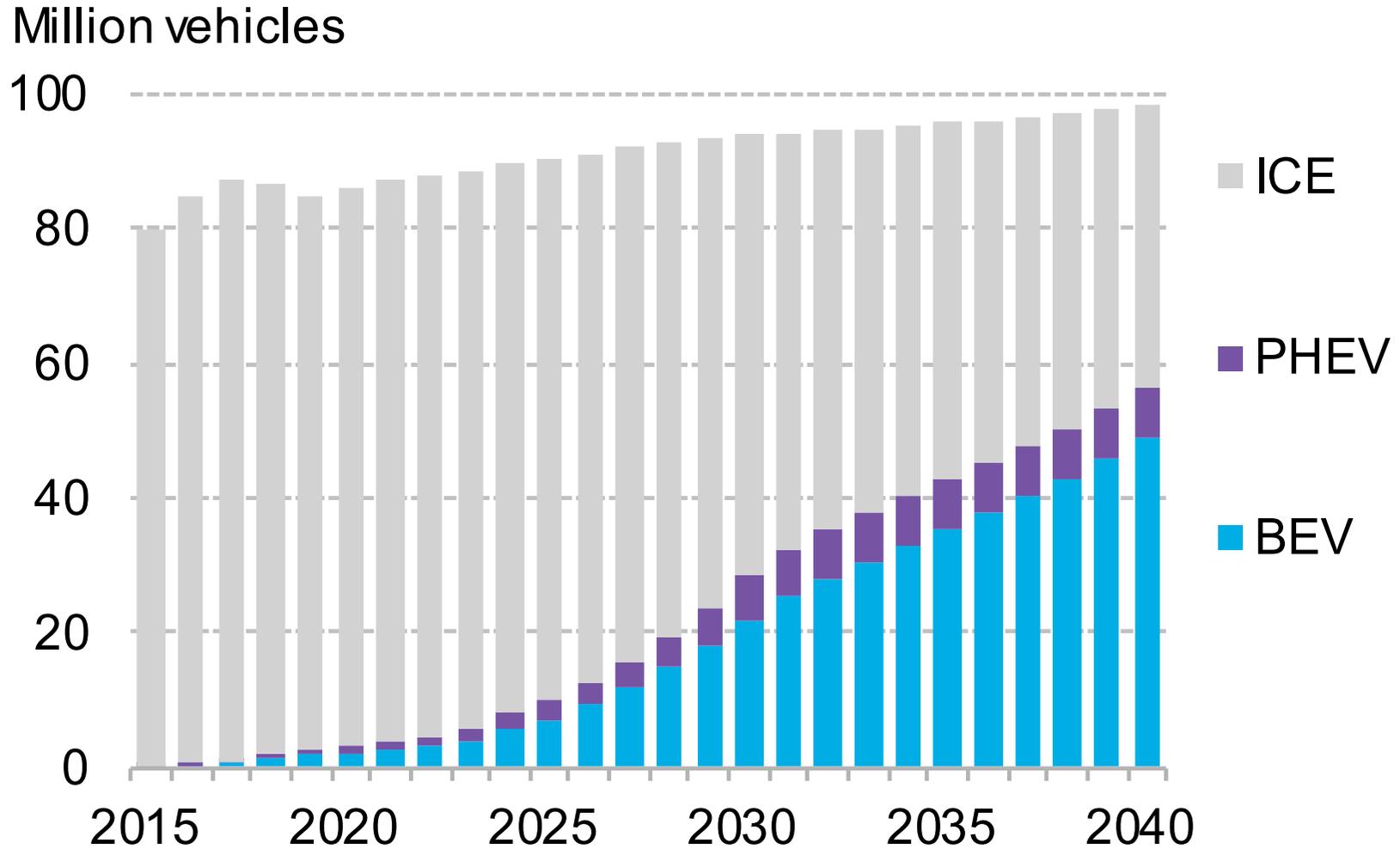
Source: BloombergNEF

# Automotive demand relies on China, EVs

The hardest vehicles to electrify need to get  
lighter

# EV sales will increase out to 2040

## Global long-term passenger vehicle sales by drivetrain



Source: BloombergNEF

# Buses and commercial vehicles are key to composite demand



Protterra electric bus – lightweight carbon fiber frame



Yutong electric bus – fiberglass panels

Source: Protterra, Yutong

# 3D printing opens up new applications

Automation and less material waste can  
lower the cost of composite parts

# 3D printing investment is rising

Disclosed VCPE funding (\$m)

600

500

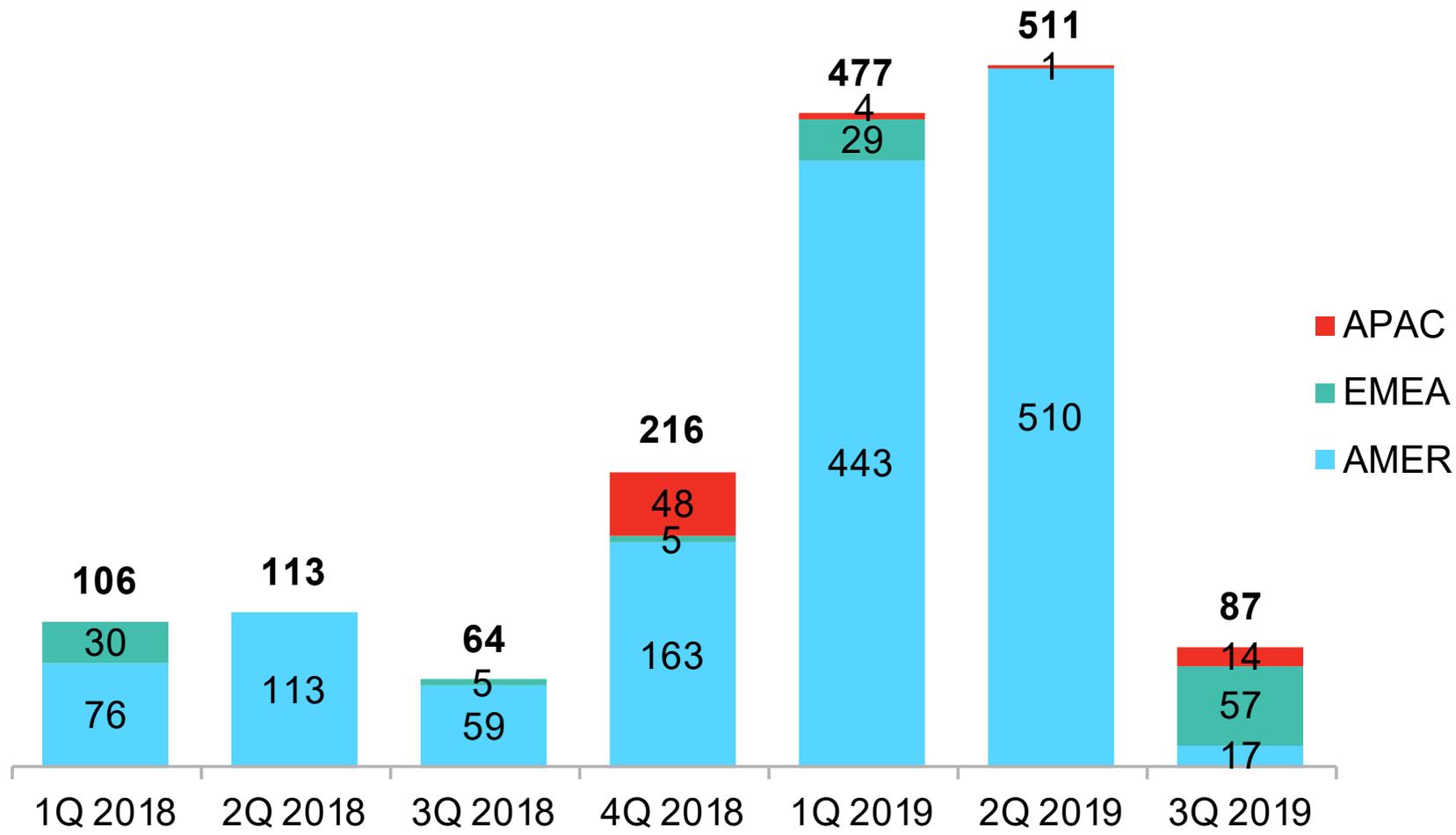
400

300

200

100

0



Source: BloombergNEF, CB Insights



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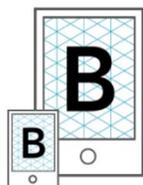
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