

# Clean Energy Investment Trends, 2017

2017, challenging the highs of 2015

Abraham Louw

January 16, 2018



**Bloomberg  
New Energy Finance**

# Solar Boom In China Boost Global Investment in 2017

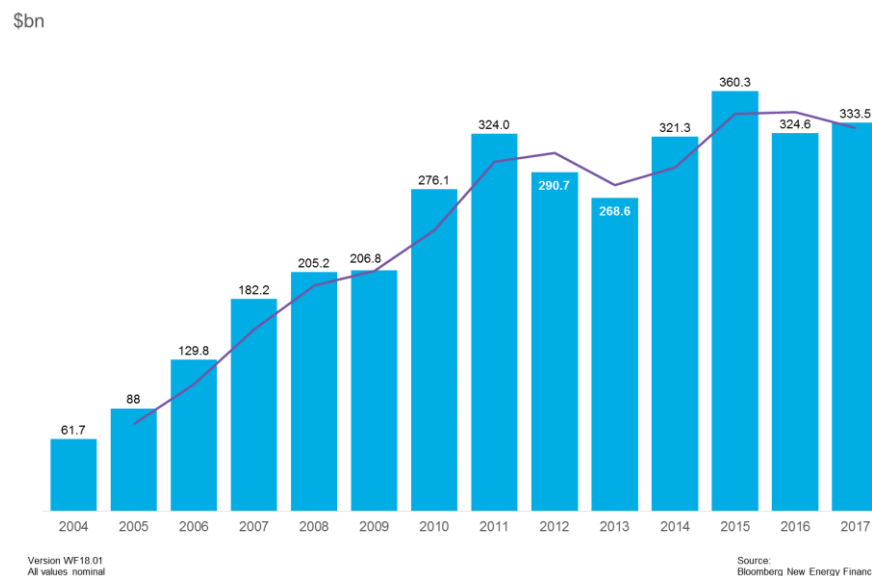
Global clean energy investment was \$333.5 billion in 2017, up 3% from 2016 and the second highest annual figure ever. The 2017 investment figure is all the more remarkable considering the falling capital costs for the leading technology – solar.

- Typical utility-scale photovoltaic systems were about 25% cheaper per megawatt in 2017 than they were two years earlier yet solar investment globally increased 18% year on year to \$160.8 billion in 2017
- A boom in solar pushed Chinese investment to a record \$132.6 billion in 2017. China accounted for 40% of the global clean energy investment in 2017
- The next biggest investing country was the U.S., at \$56.9 billion, up 1% on 2016 despite the less friendly tone towards renewables adopted by the Trump administration
- Mexico and Australia saw 2017 investment levels at an all-time high of \$6.2 billion and \$9 billion respectively
- While solar technologies were the biggest recipients of investment in 2017, the biggest deals were in offshore wind. Orsted said it had reached 'final investment decision' on the 1.4GW Hornsea 2 project in the U.K. North Sea, estimated at \$4.8 billion. There were also 13 Chinese offshore wind projects financed with total capacity of 3.7GW, and an estimated investment of \$10.8 billion

**\$333.5 bn** Global clean energy investment in 2017

**40%** China's share in global clean energy investment

## Global New Investment in Clean Energy



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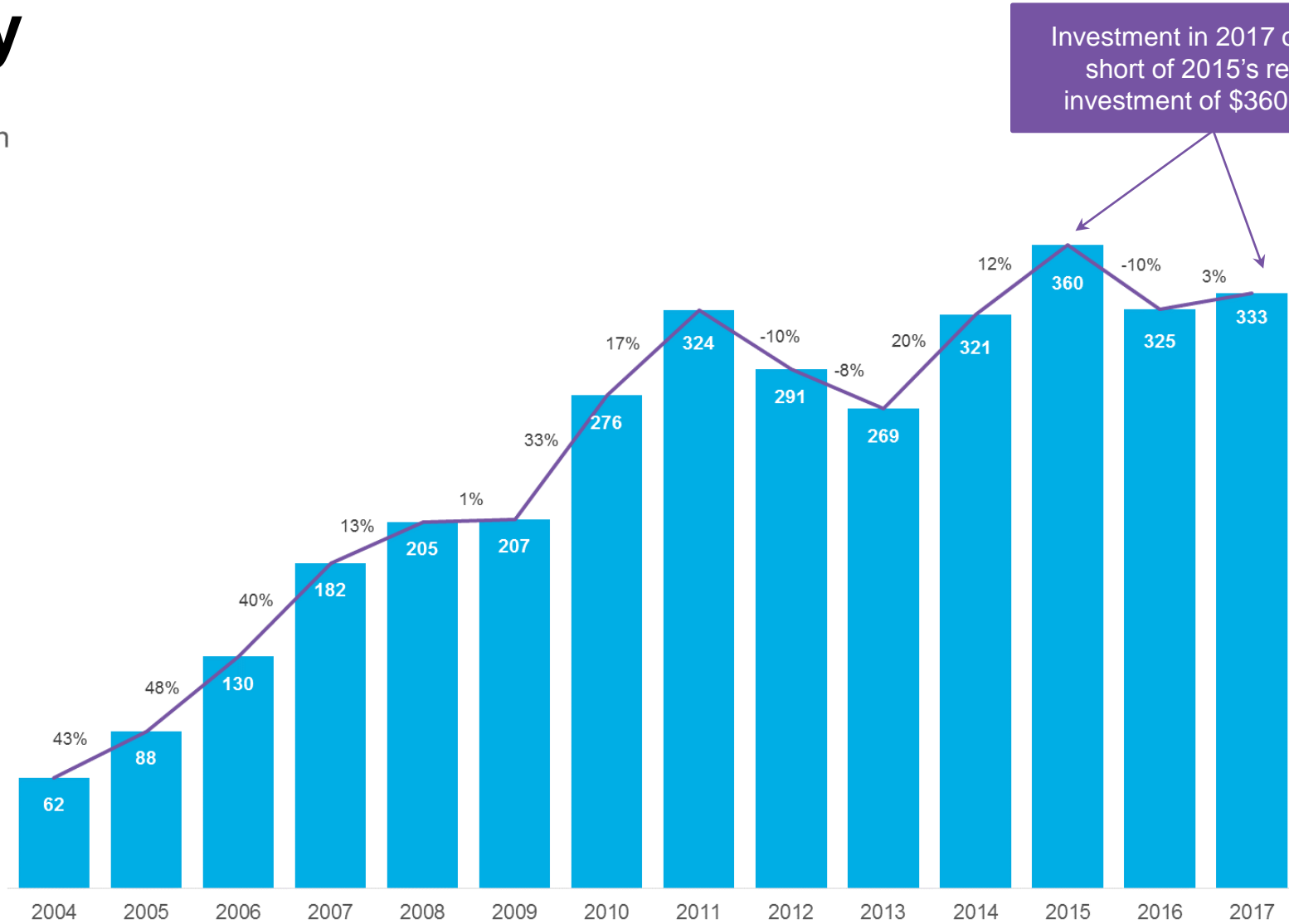
# Annual Trends, New Investment

Annual trends since 2004

# Global New Investment in Clean Energy

2004 – 2017

\$bn



Investment in 2017 only 7% short of 2015's record investment of \$360 billion

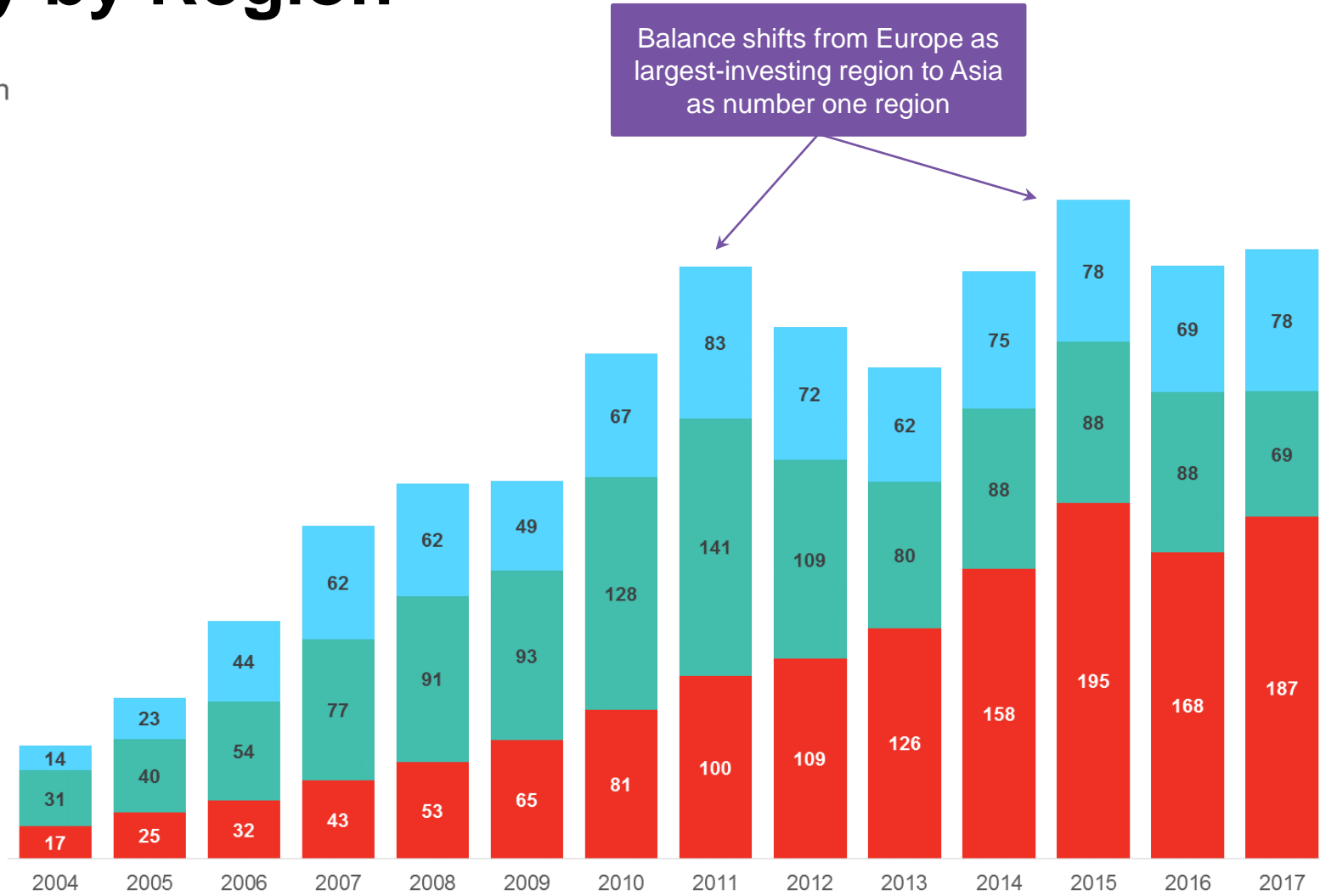
Version WF18.01  
All values nominal

Source:  
Bloomberg New Energy Finance

# Global New Investment in Clean Energy by Region

2004 – 2017

\$bn



Version WF18.01  
All values nominal

■ APAC ■ EMEA ■ AMER

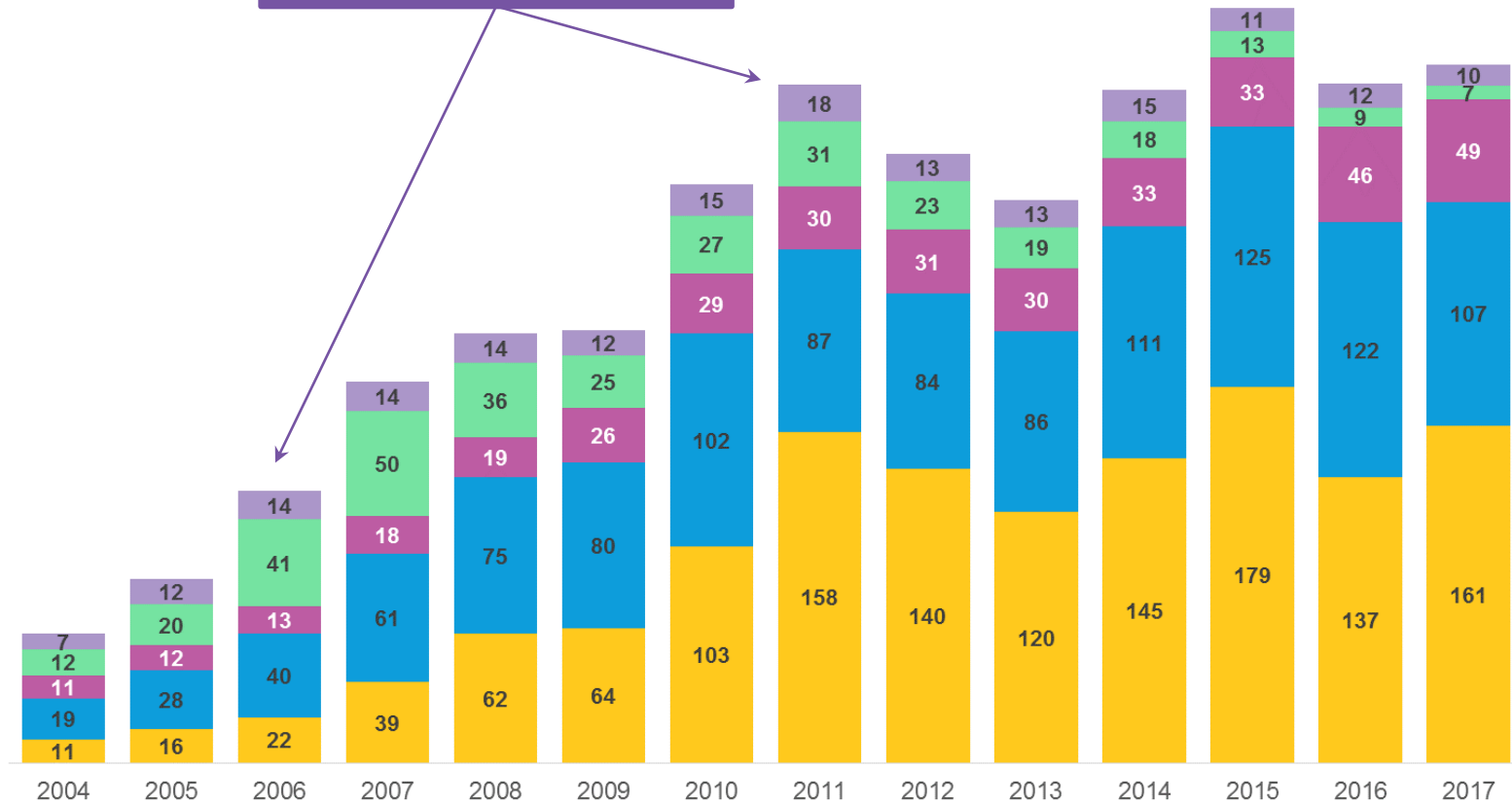
Source:  
Bloomberg New Energy Finance

# Global New Investment in Clean Energy by Sector

2004 – 2017

\$bn

Solar moves from third biggest sector in 2006, behind wind and biofuels, to the biggest sector in most quarters by 2011



Version WF18.01  
All values nominal

■ Solar ■ Wind ■ Energy smart technologies ■ Bioenergy ■ Other

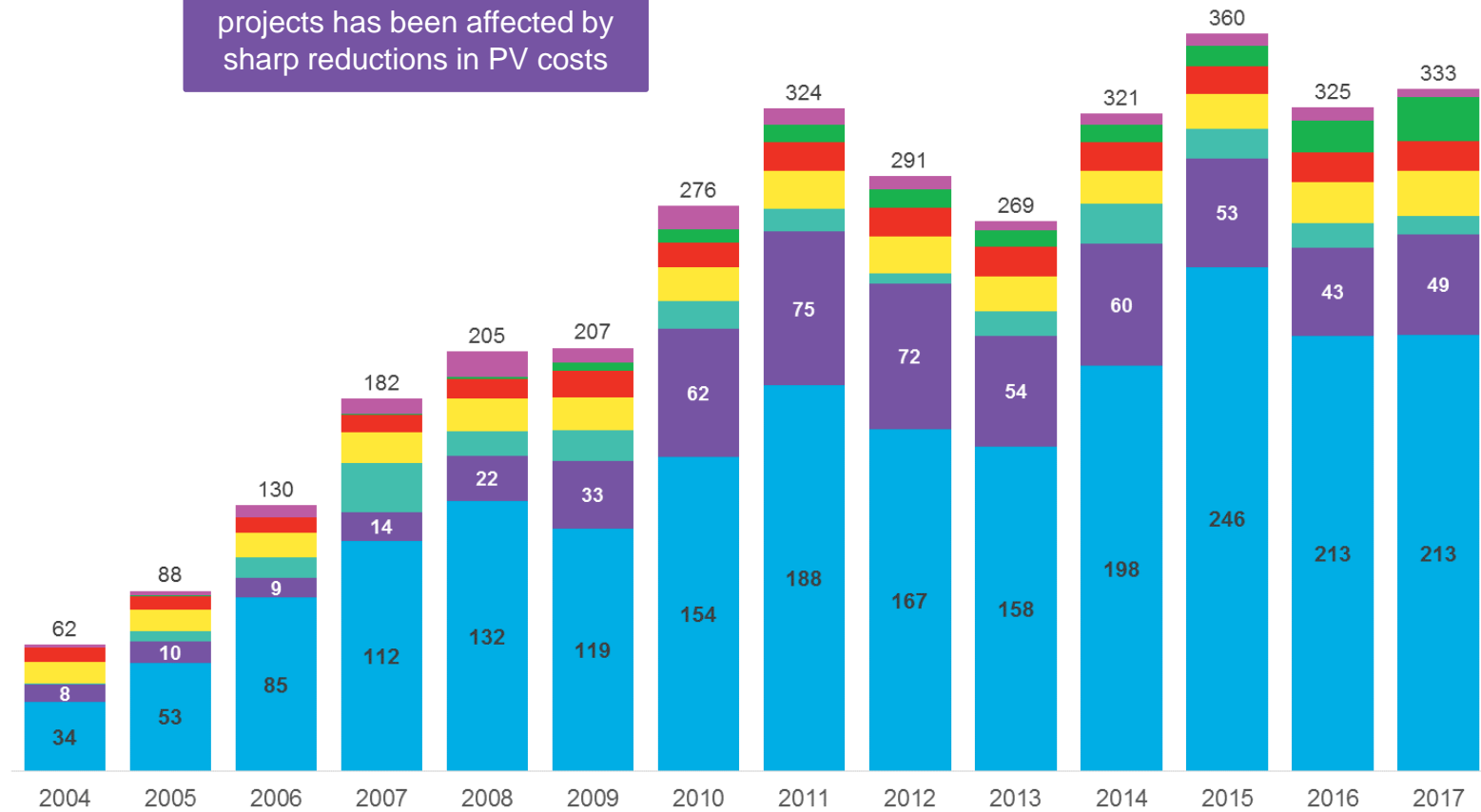
Source:  
Bloomberg New Energy Finance

# Global New Investment in Clean Energy by Asset Class

2004 – 2017

\$bn

Dollar investment via asset finance and small-scale solar projects has been affected by sharp reductions in PV costs



Version WF18.01  
All values nominal

■ Asset fin ■ Small-scale solar ■ Public markets ■ CorpR&D ■ GovR&D ■ Asset fin (EST) ■ VCPE

Source:  
Bloomberg New Energy Finance

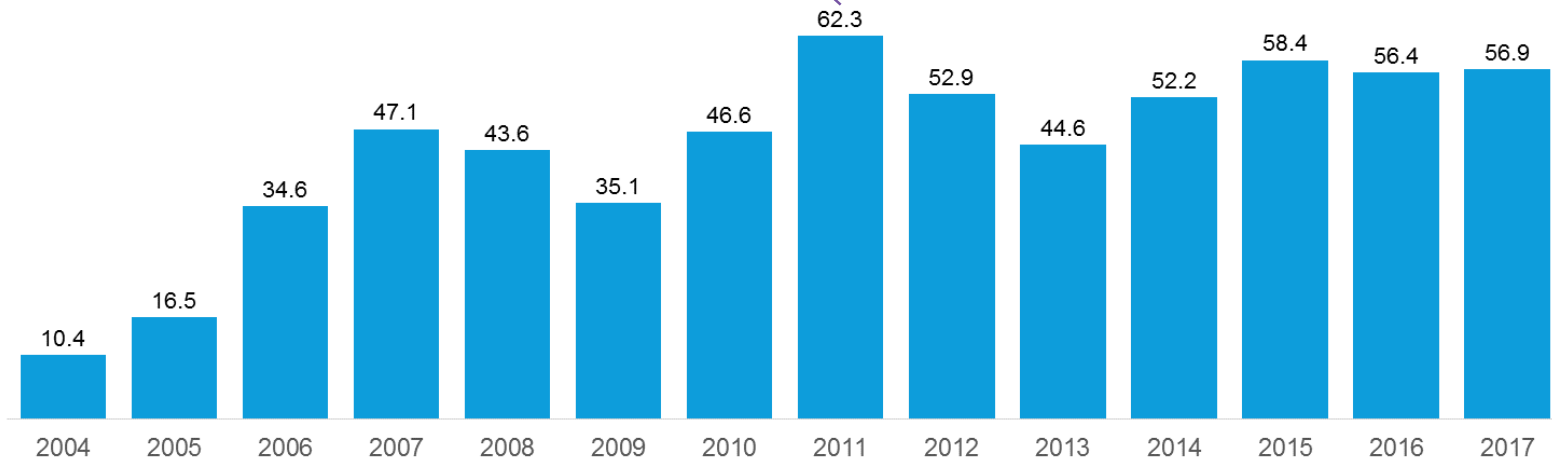


# New Investment in Clean Energy United States

2004 – 2017

\$bn

High levels of investment in 2011 came on the back of spending under the American Recovery and Reinvestment Act, and a rush to build wind projects in advance of what would have been the end of the Production Tax Credit in 2012.



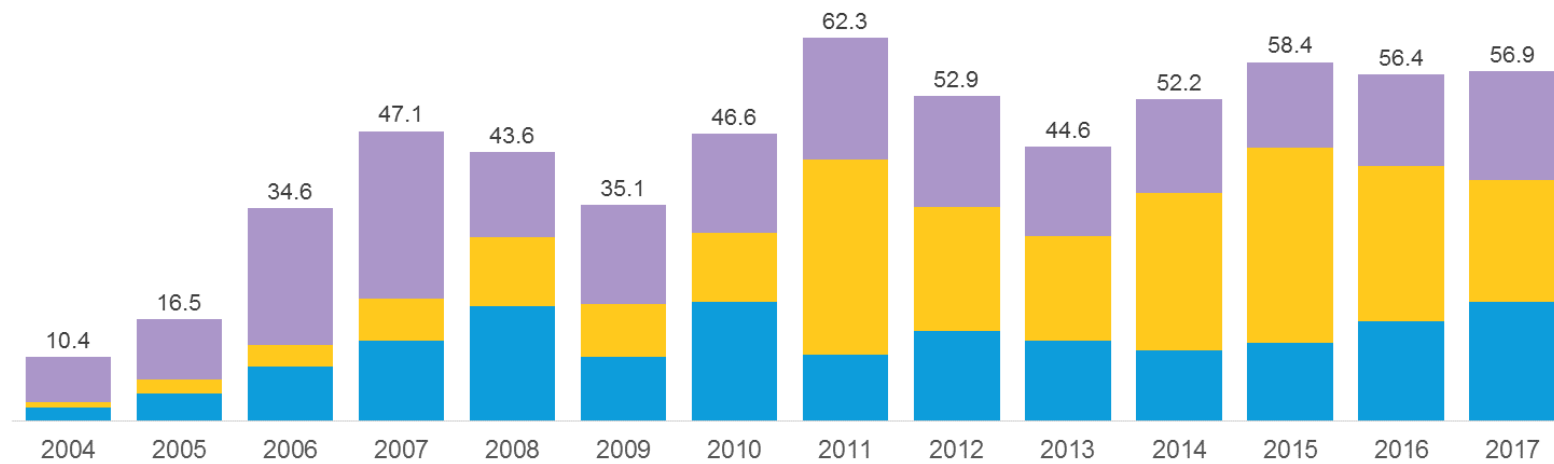
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All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy United States, by sector

2004 – 2017

\$bn



Version WF18.01  
All values nominal

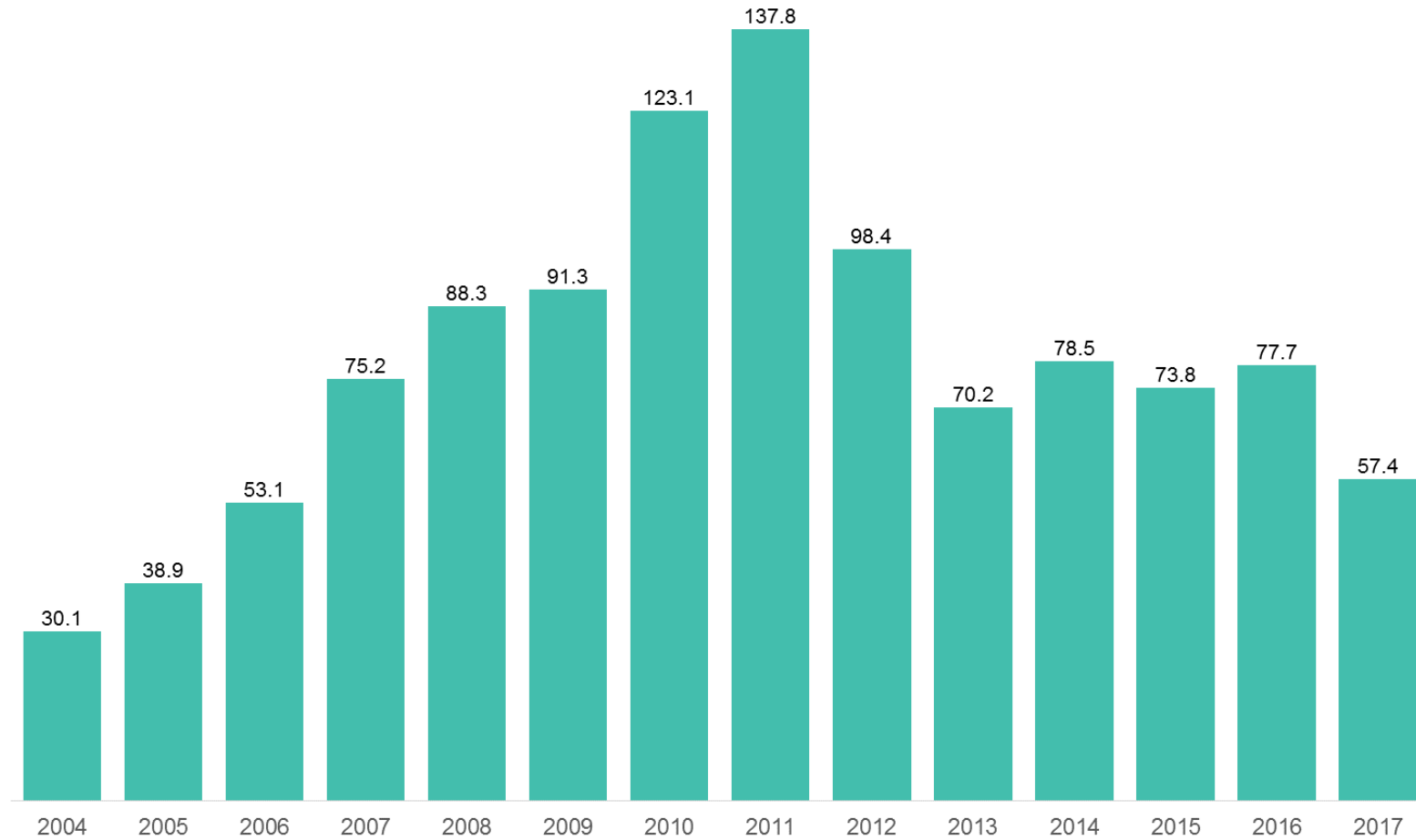
■ Wind ■ Solar ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Europe

2004 – 2017

\$bn



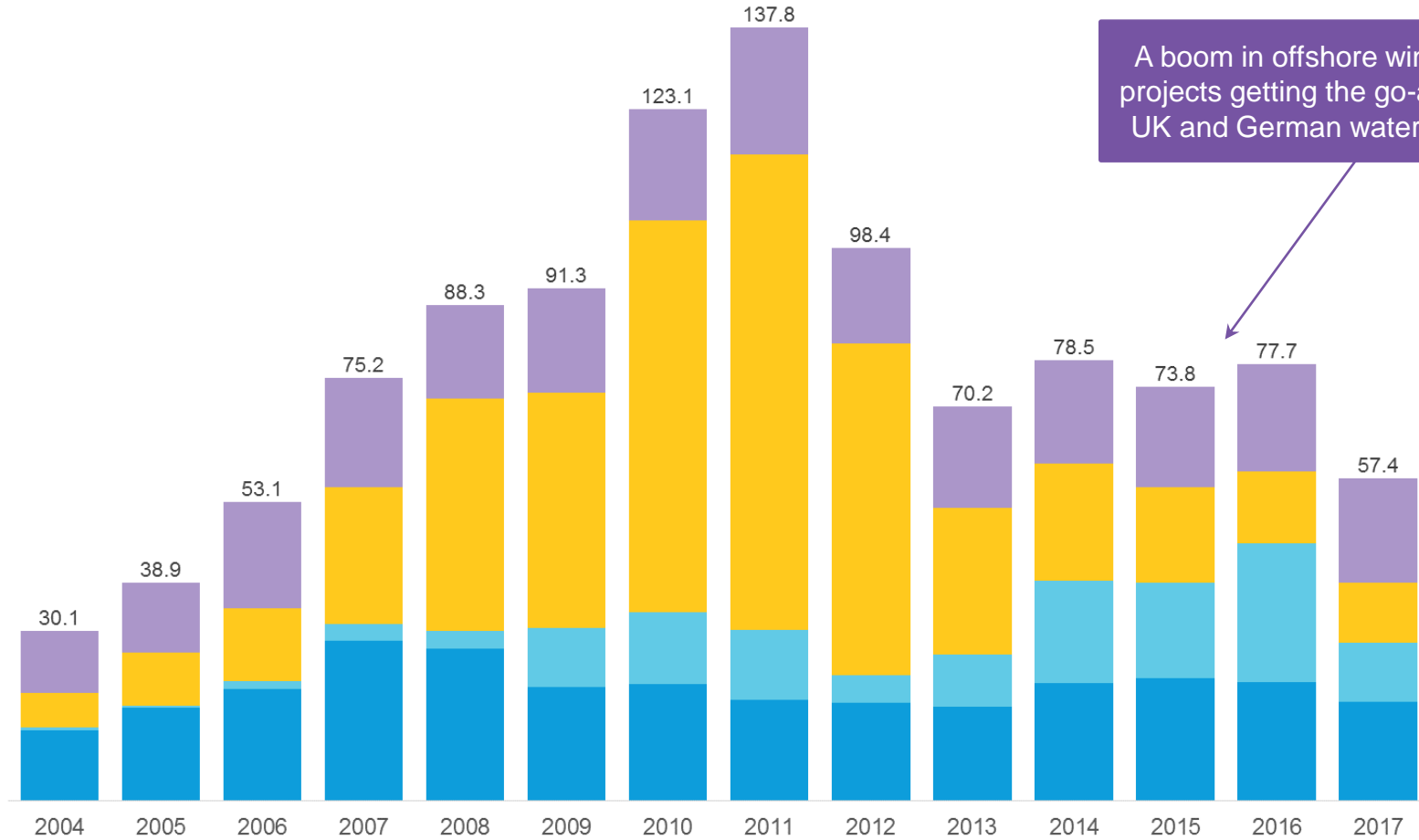
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All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Europe

2004 – 2017

\$bn



A boom in offshore wind saw huge projects getting the go-ahead in both UK and German waters in 2015-16

Version WF18.01  
All values nominal

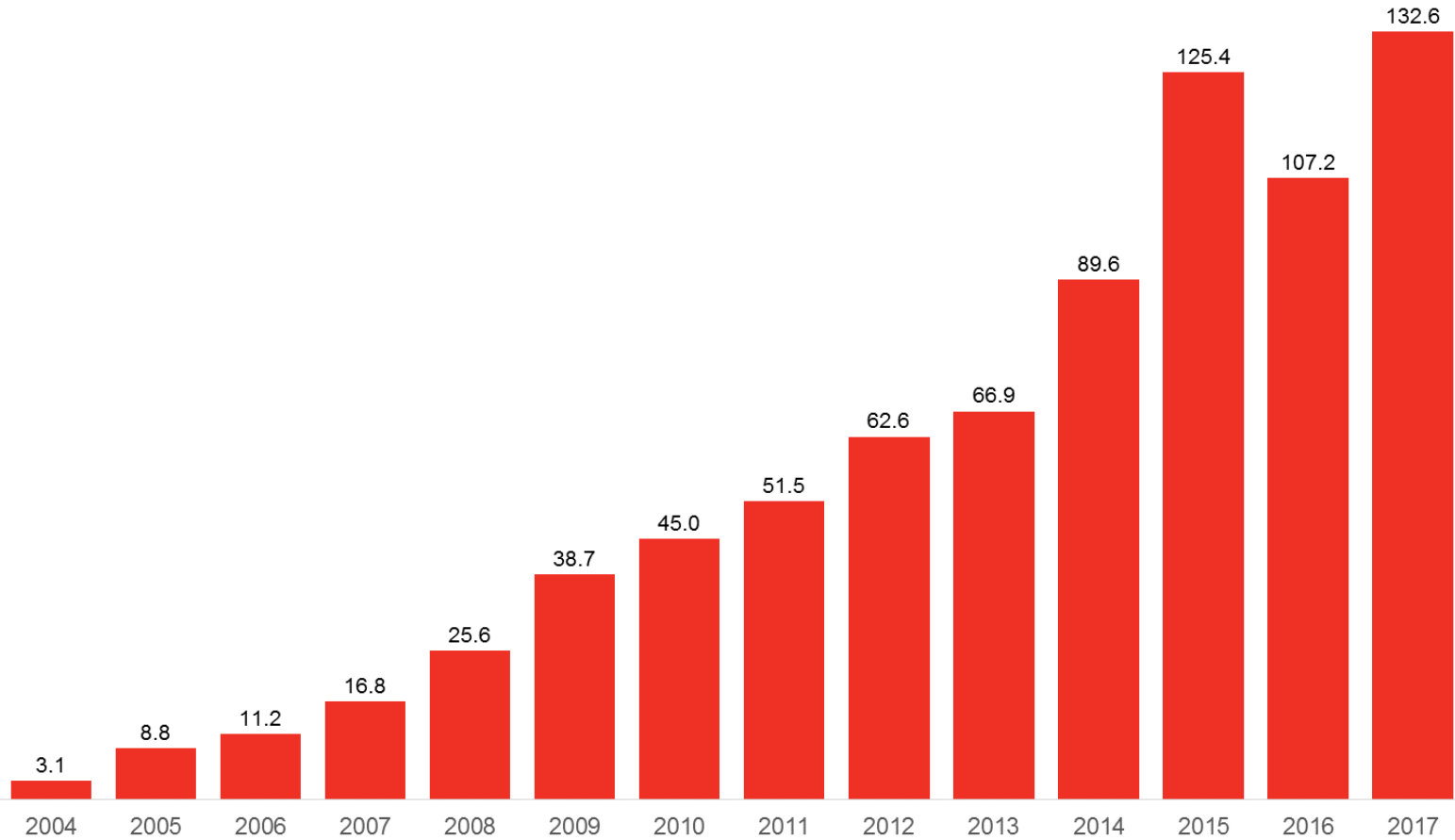
■ Onshore ■ Offshore ■ Solar ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy China

2004 – 2017

\$bn



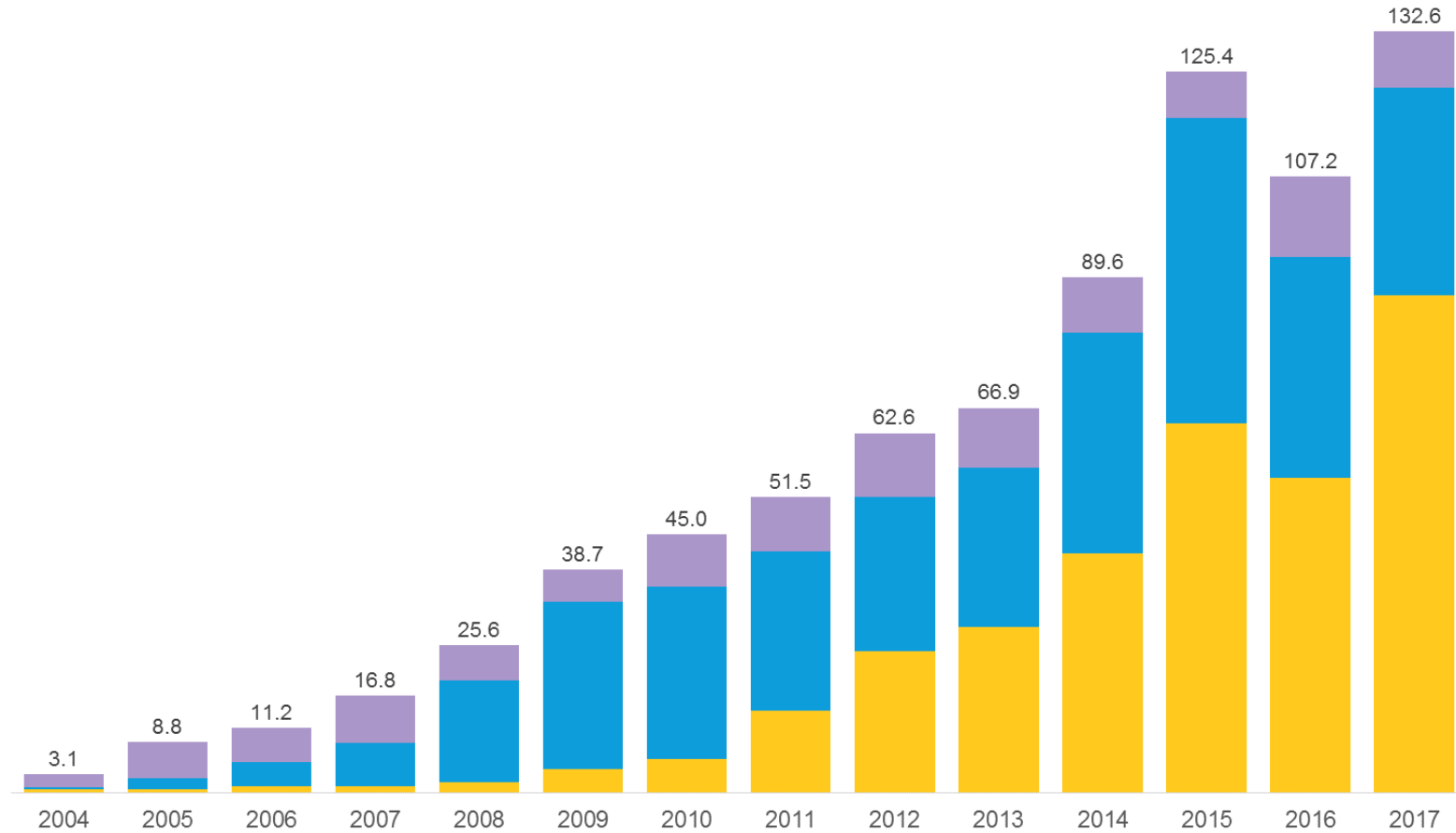
Version WF18.01  
All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy China, by sector

2004 – 2017

\$bn



Regulators curbed investment in utility-scale solar, they did however not set caps on distribution-grid connected (DGC) systems (basically town-level systems) which developers invested heavily in

Version WF18.01  
All values nominal

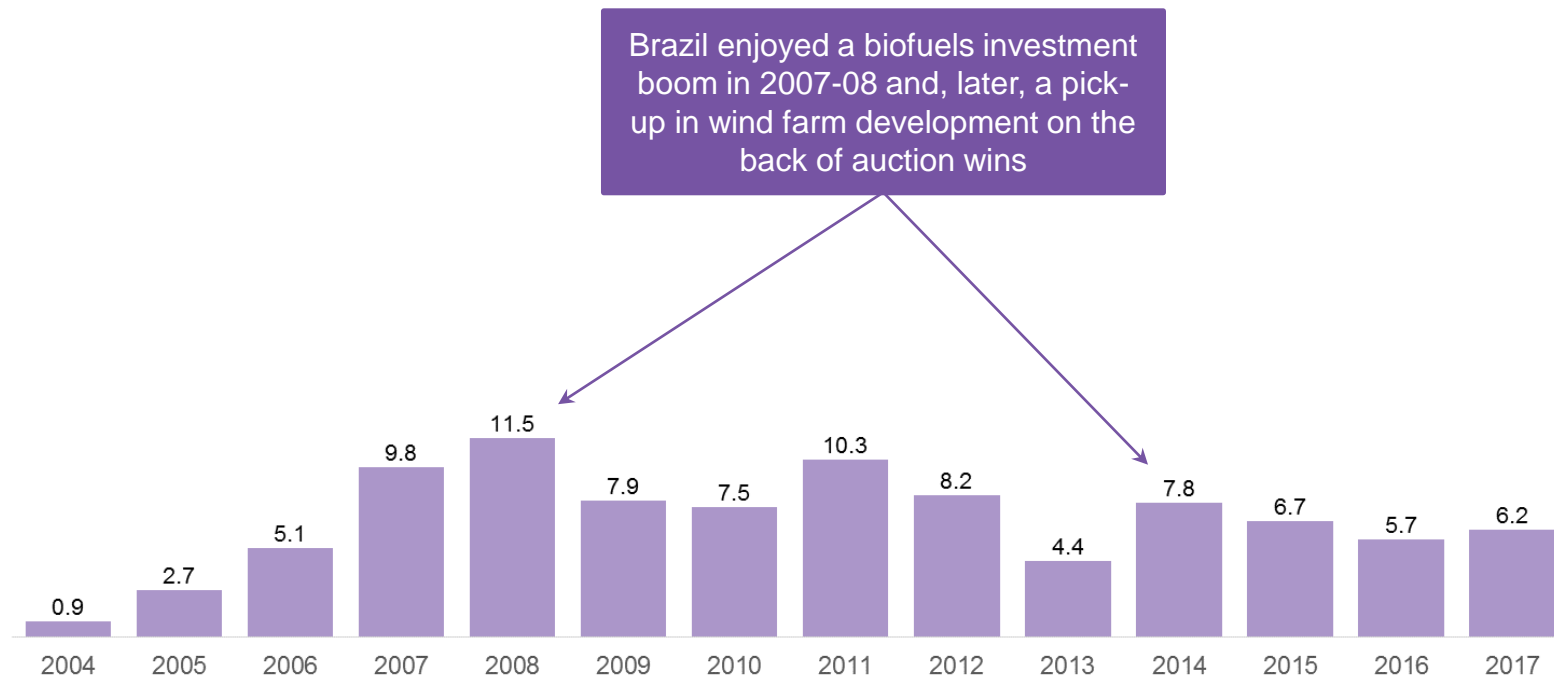
■ Solar ■ Wind ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Brazil

2004 – 2017

\$bn



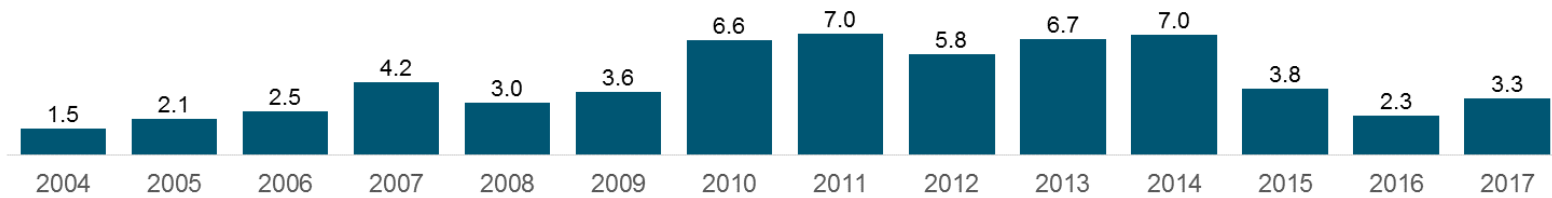
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All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Canada

2004 – 2017

\$bn



Version WF18.01  
All values nominal

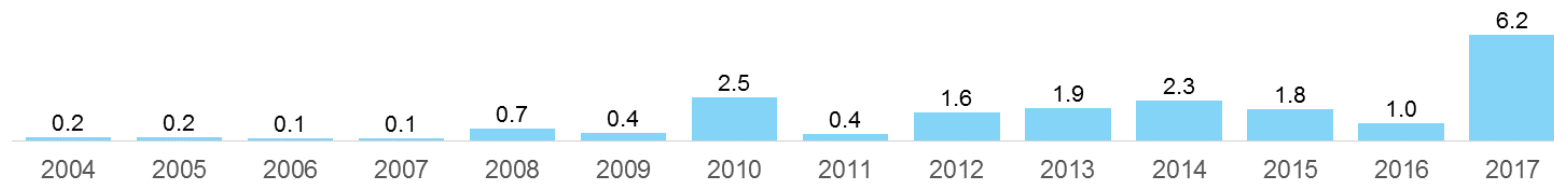
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Bloomberg New Energy Finance



# New Investment in Clean Energy Mexico

2004 – 2017

\$bn



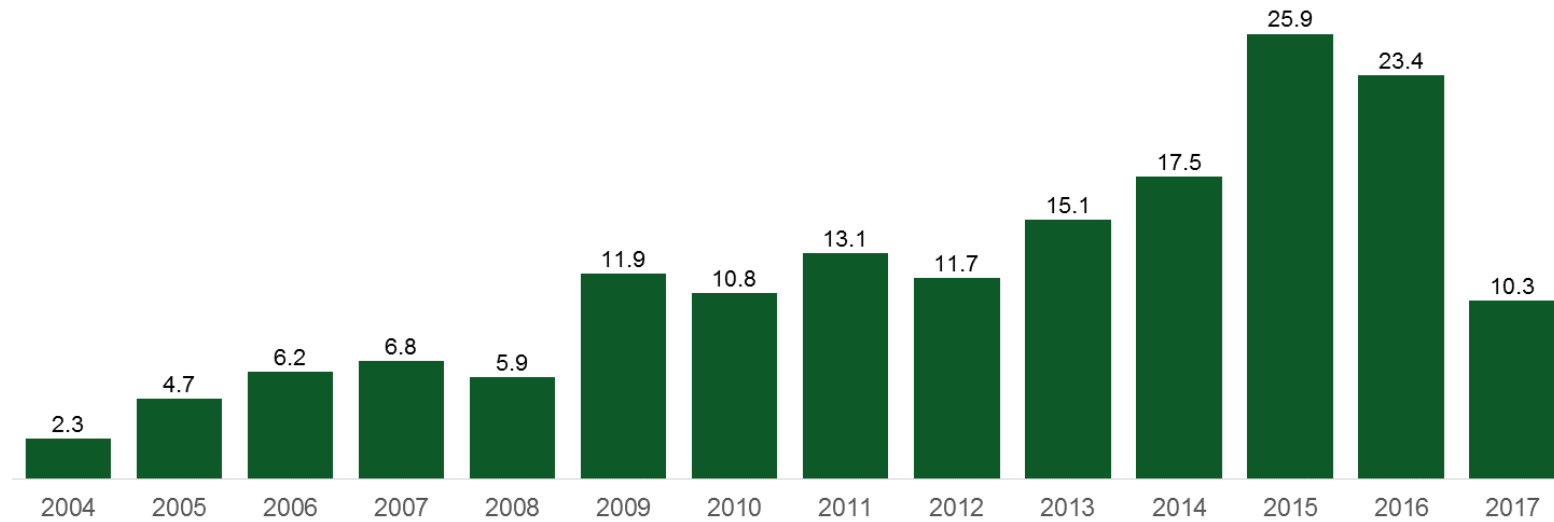
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All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy United Kingdom

2004 – 2017

\$bn



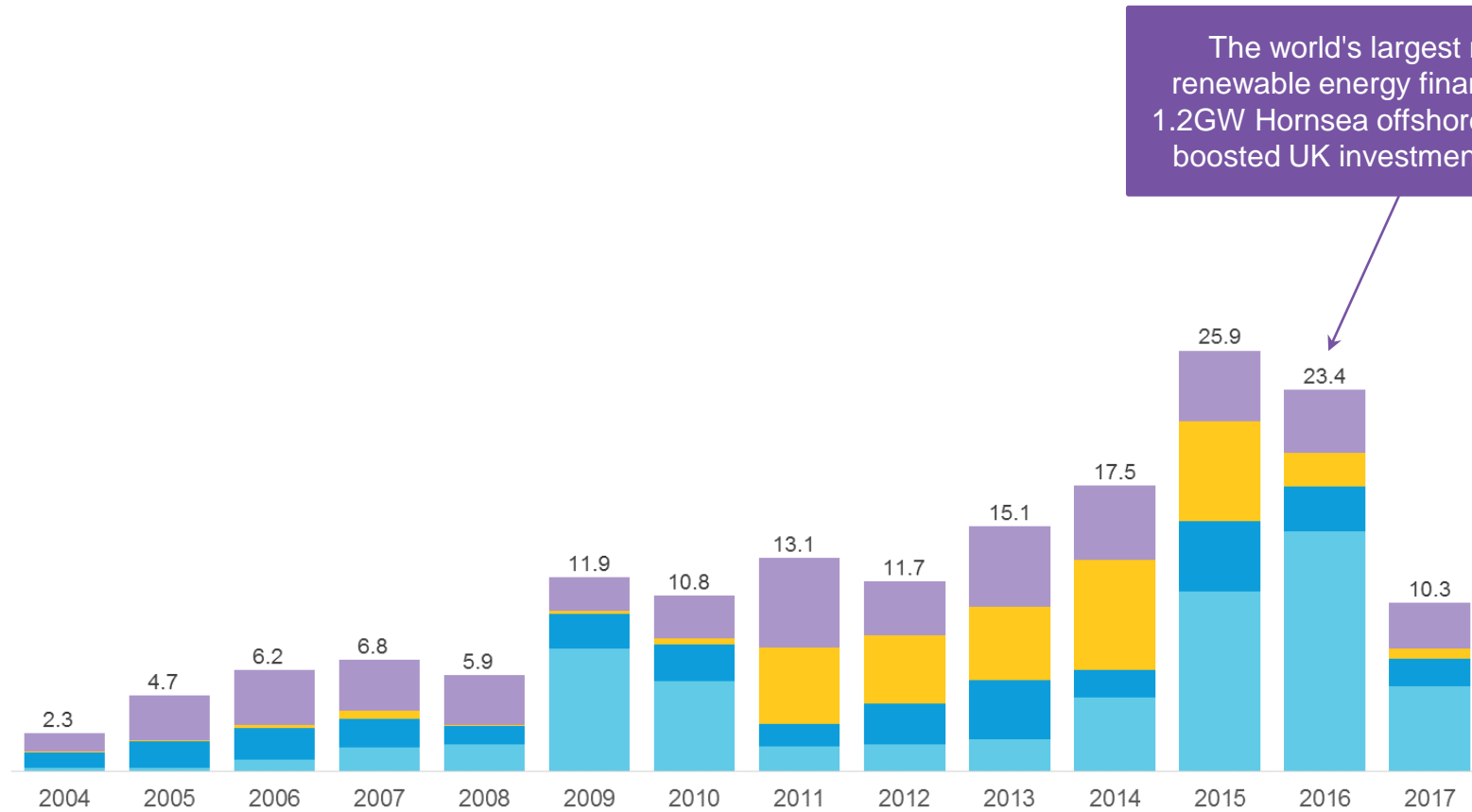
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All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy United Kingdom, by sector

2004 – 2017

\$bn



The world's largest non-hydro renewable energy financing, for the 1.2GW Hornsea offshore wind project, boosted UK investment in 1Q 2016

Version WF18.01  
All values nominal

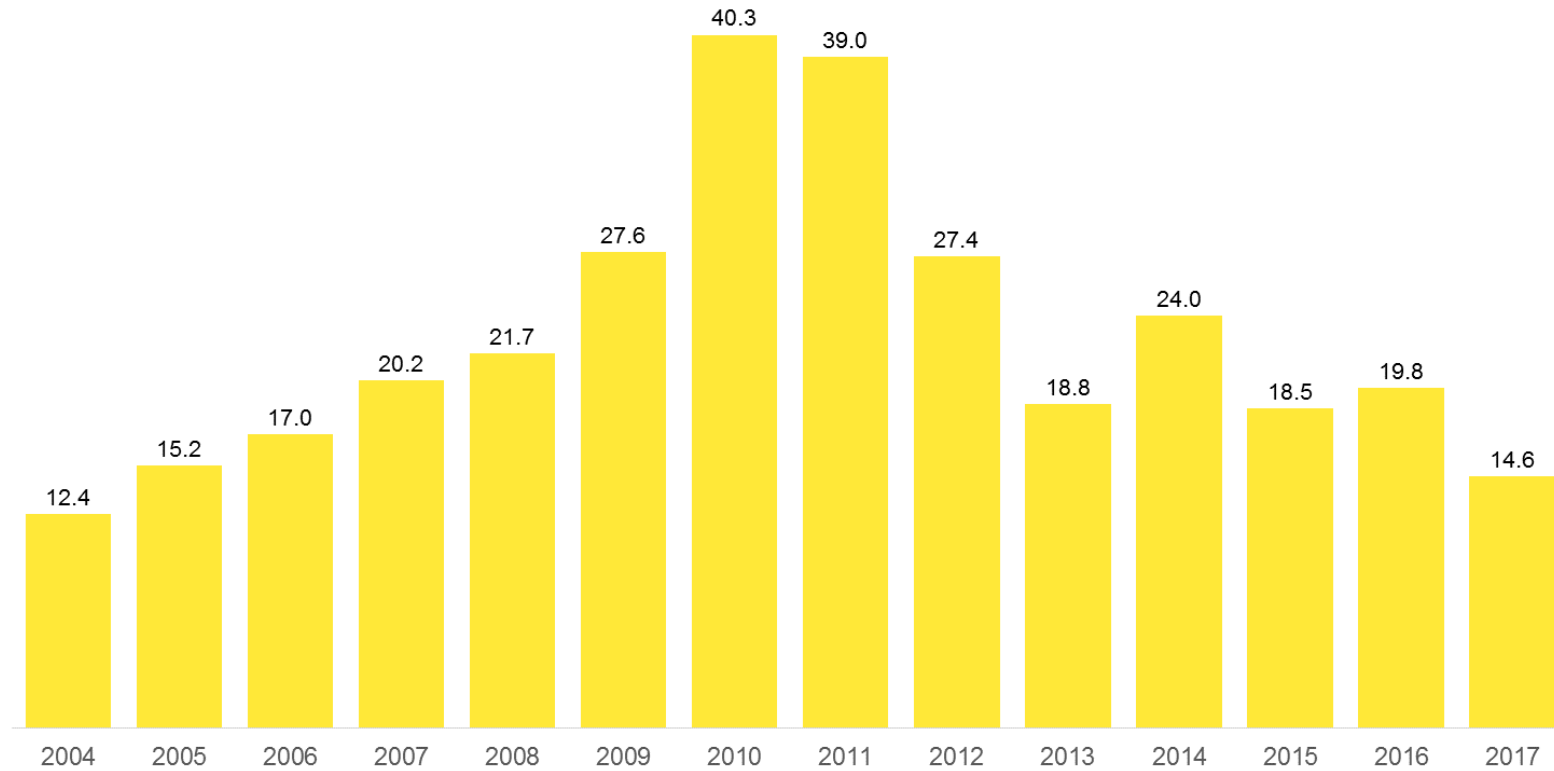
■ Offshore ■ Onshore ■ Solar ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Germany

2004 – 2017

\$bn



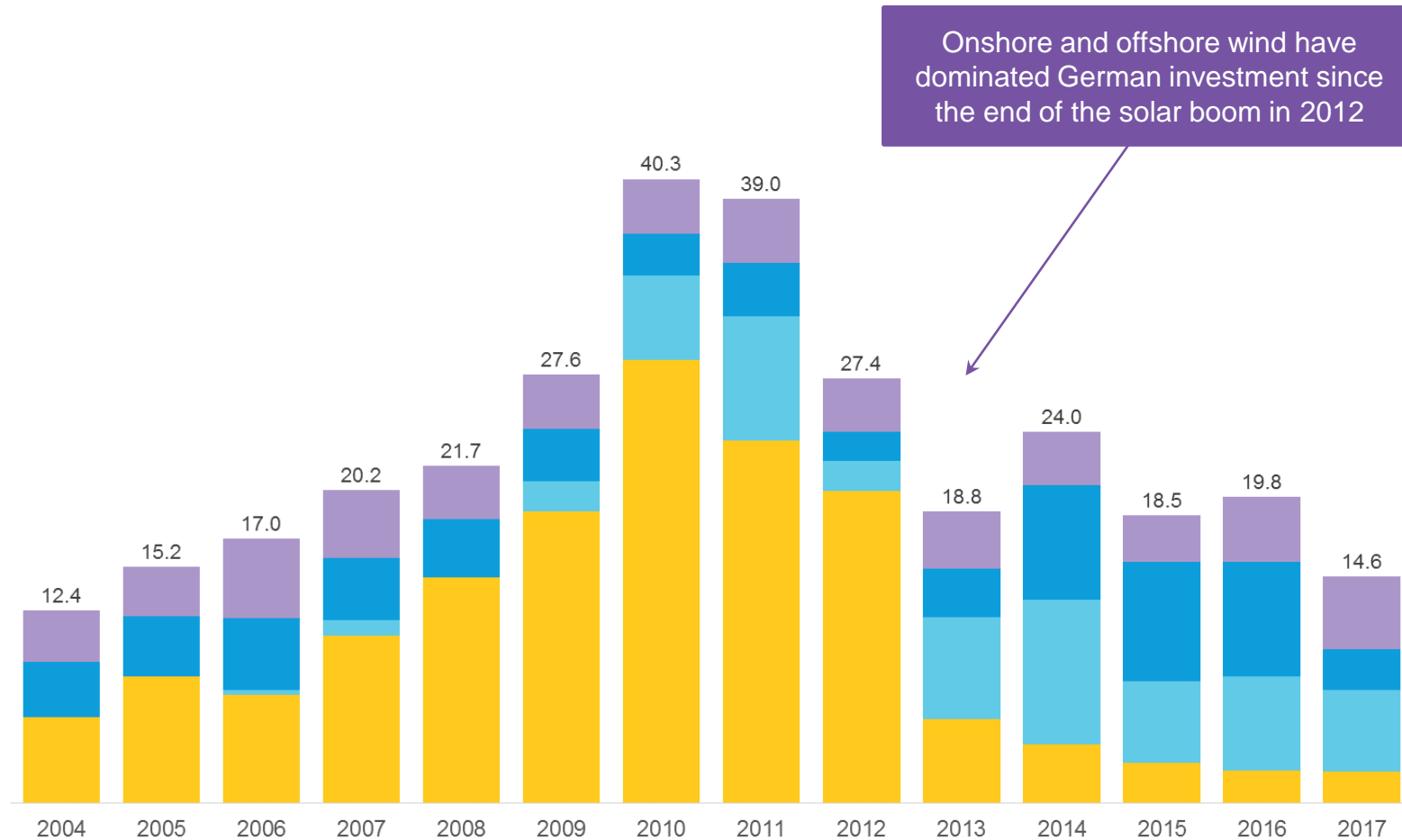
Version WF18.01  
All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Germany, by sector

2004 – 2017

\$bn



Onshore and offshore wind have dominated German investment since the end of the solar boom in 2012

Version WF18.01  
All values nominal

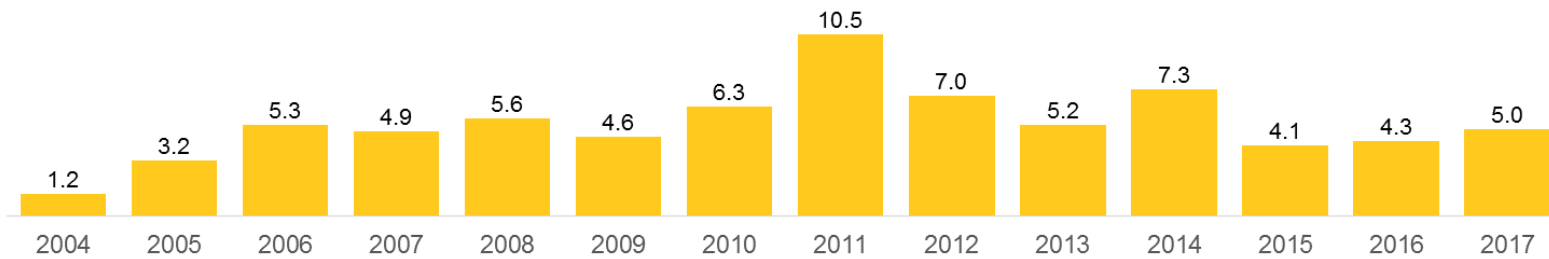
■ Solar ■ Offshore ■ Onshore ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy France

2004 – 2017

\$bn



France has been a relatively steady market for wind and solar in recent years, but far below the UK and Germany in terms of dollars invested

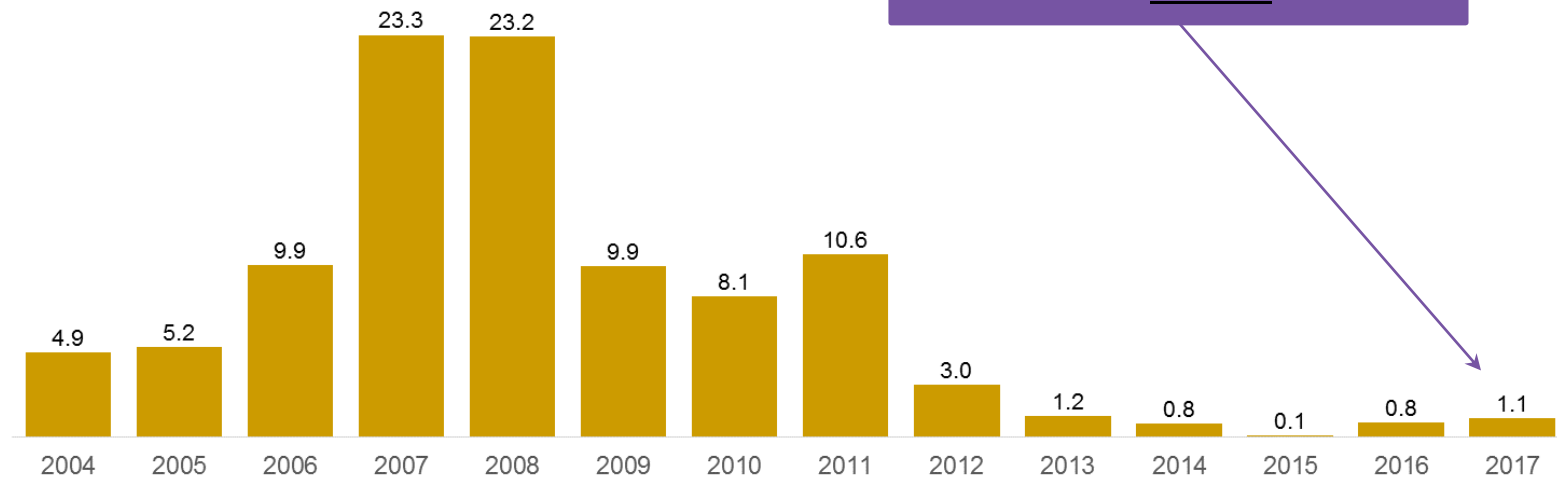
Version WF18.01  
All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Spain

2004 – 2017

\$bn



In May 2017, Spain auctioned 3GW of renewable capacity, mostly wind. Clean energy investment expected to pick up in the next two years. See [this note](#)

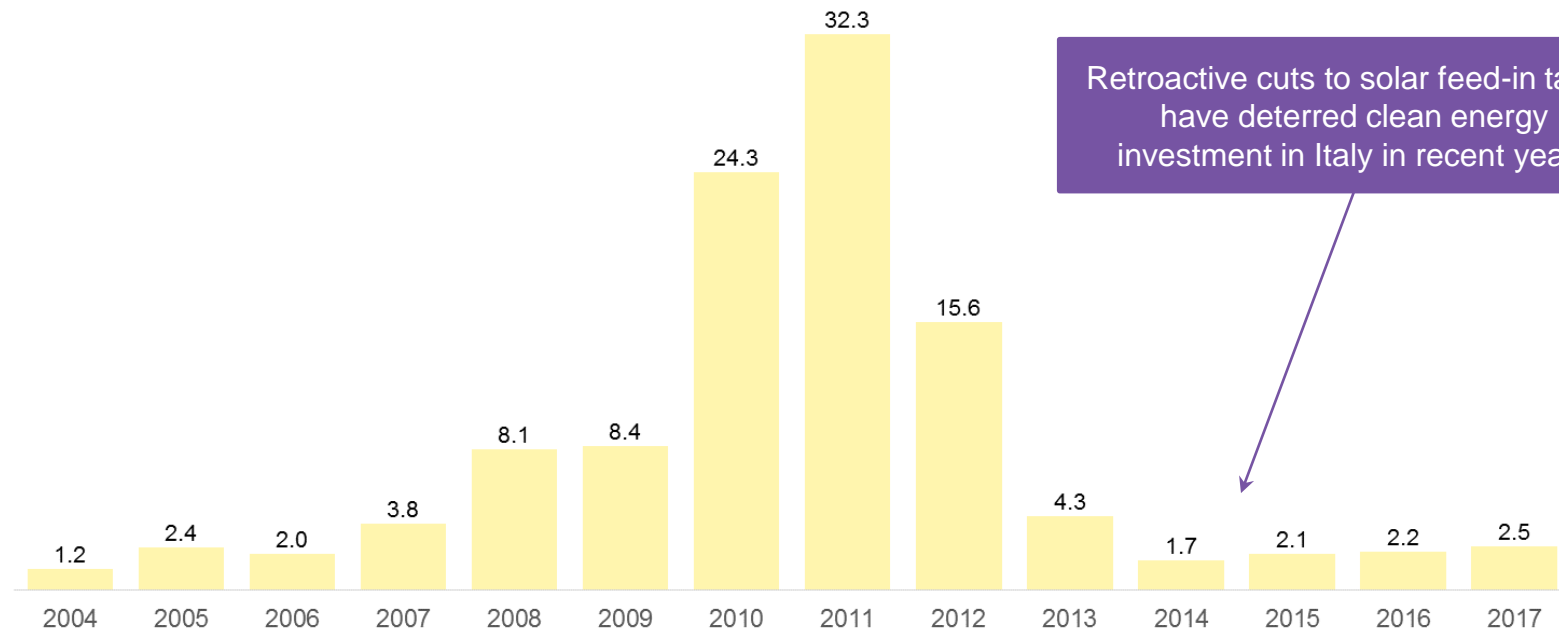
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All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Italy

2004 – 2017

\$bn



Retroactive cuts to solar feed-in tariffs have deterred clean energy investment in Italy in recent years

Version WF18.01  
All values nominal

Source:  
Bloomberg New Energy Finance

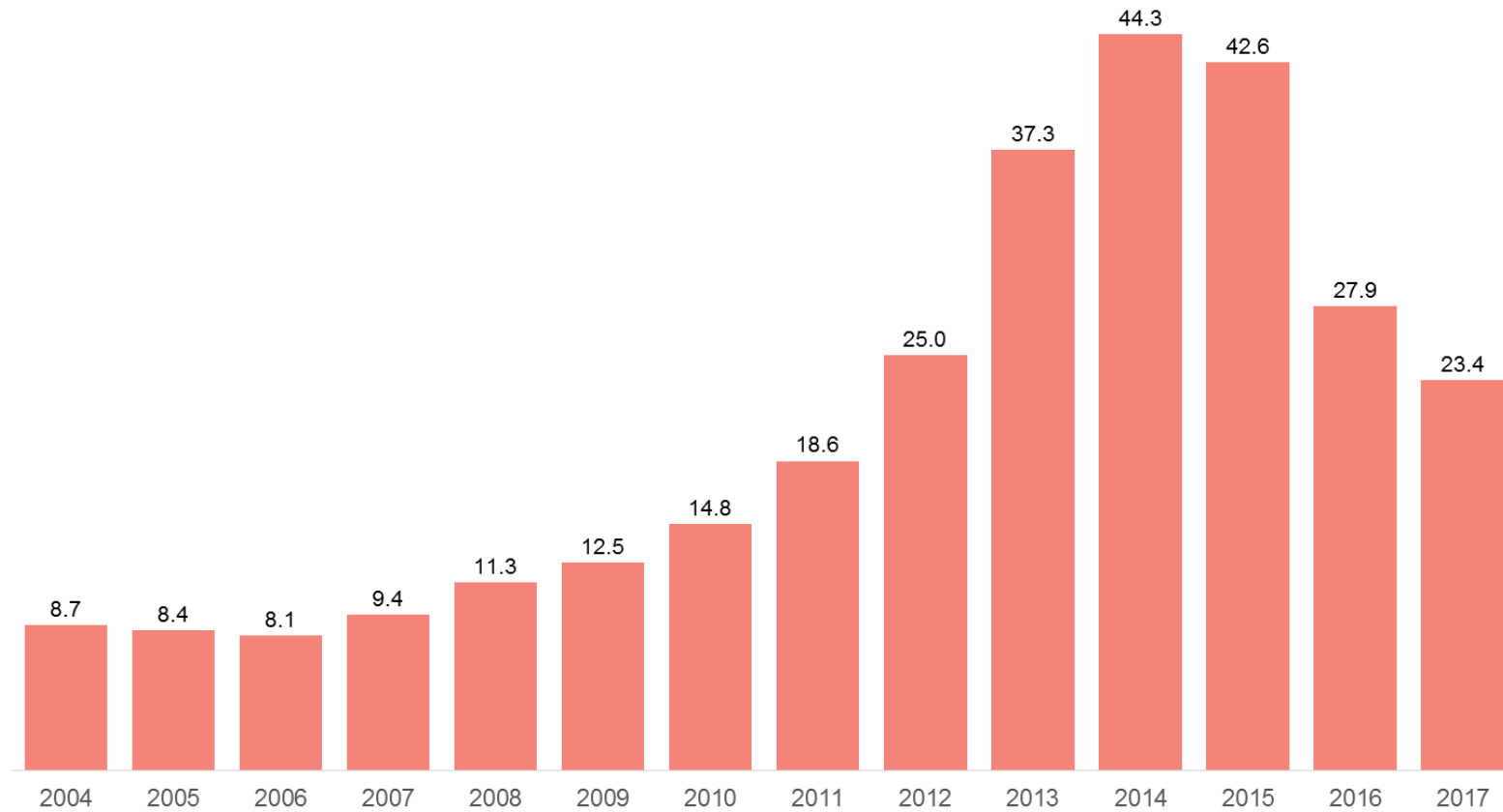


# New Investment in Clean Energy

## Japan

2004 – 2017

\$bn



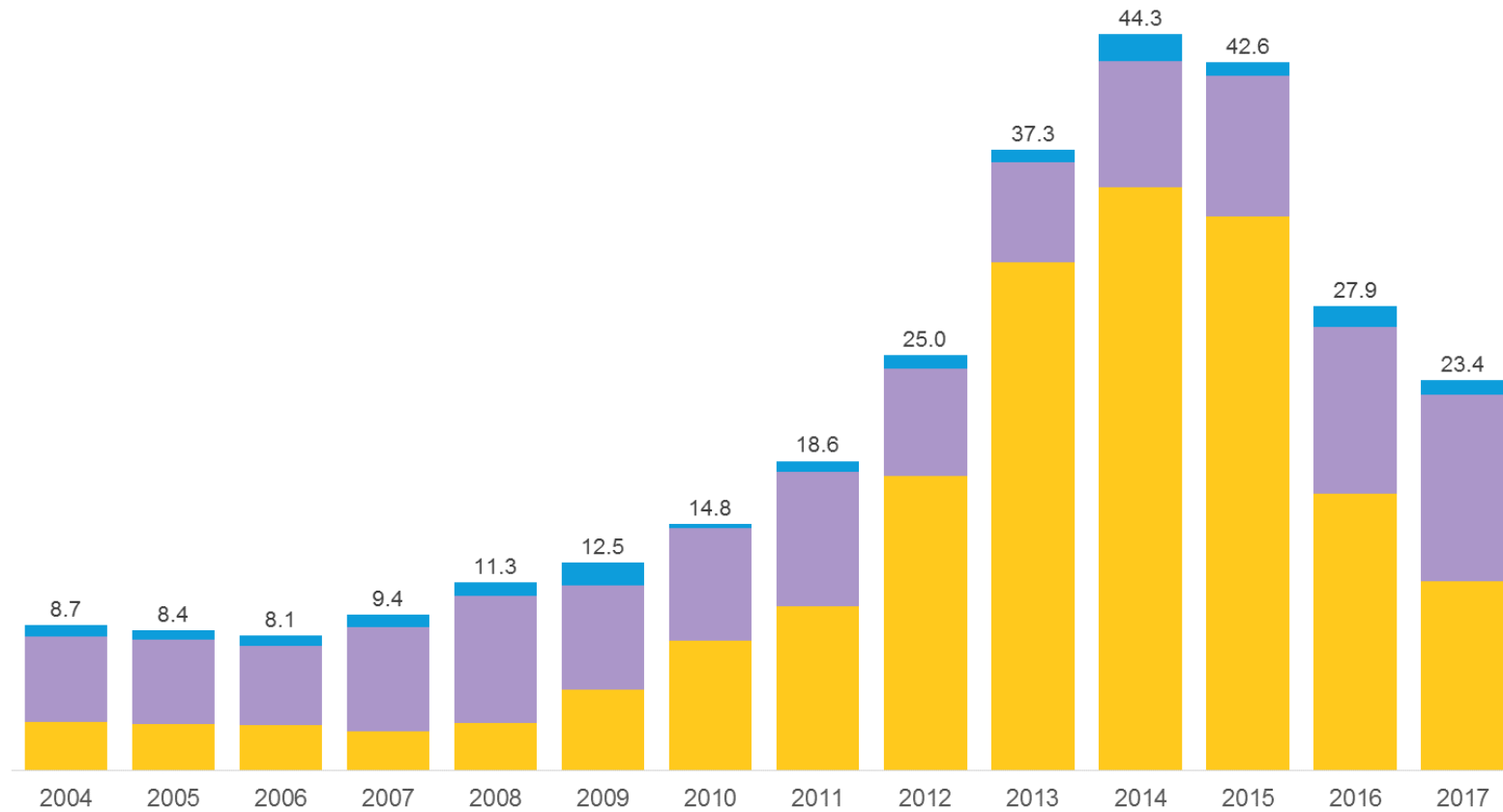
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All values nominal

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Japan, by sector

2004 – 2017

\$bn



Version WF18.01  
All values nominal

■ Solar ■ Other ■ Wind

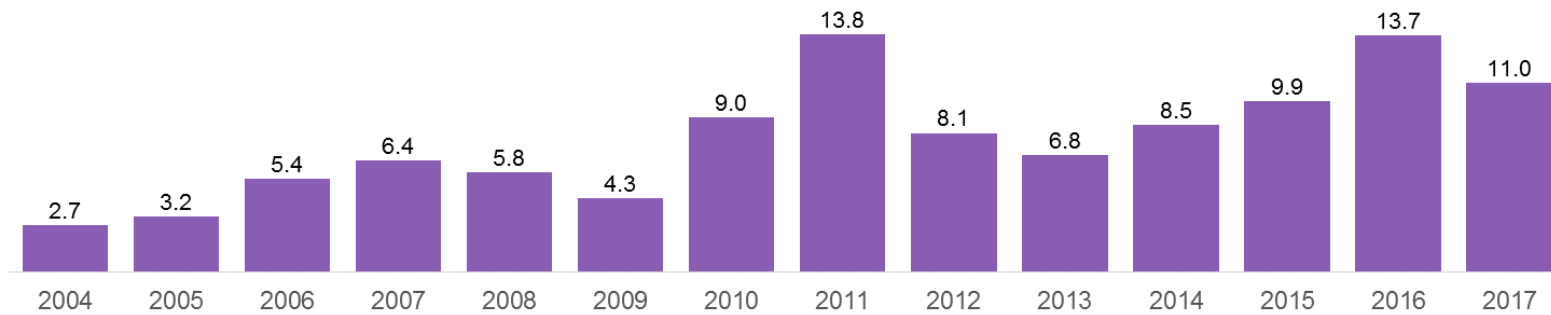
Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy India

2004 – 2017

\$bn

Indian investment is likely to increase in the years ahead, as investors try to meet the government's ambitious target of 100GW of solar by 2022



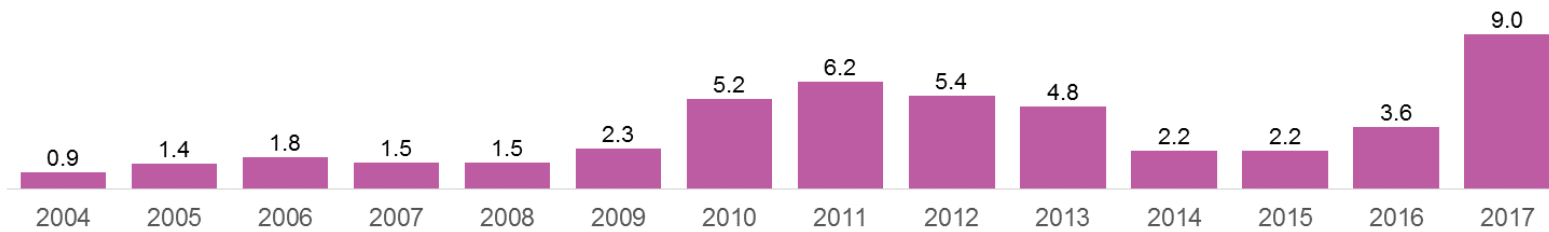
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Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Australia

2004 – 2017

\$bn



Version WF18.01  
All values nominal

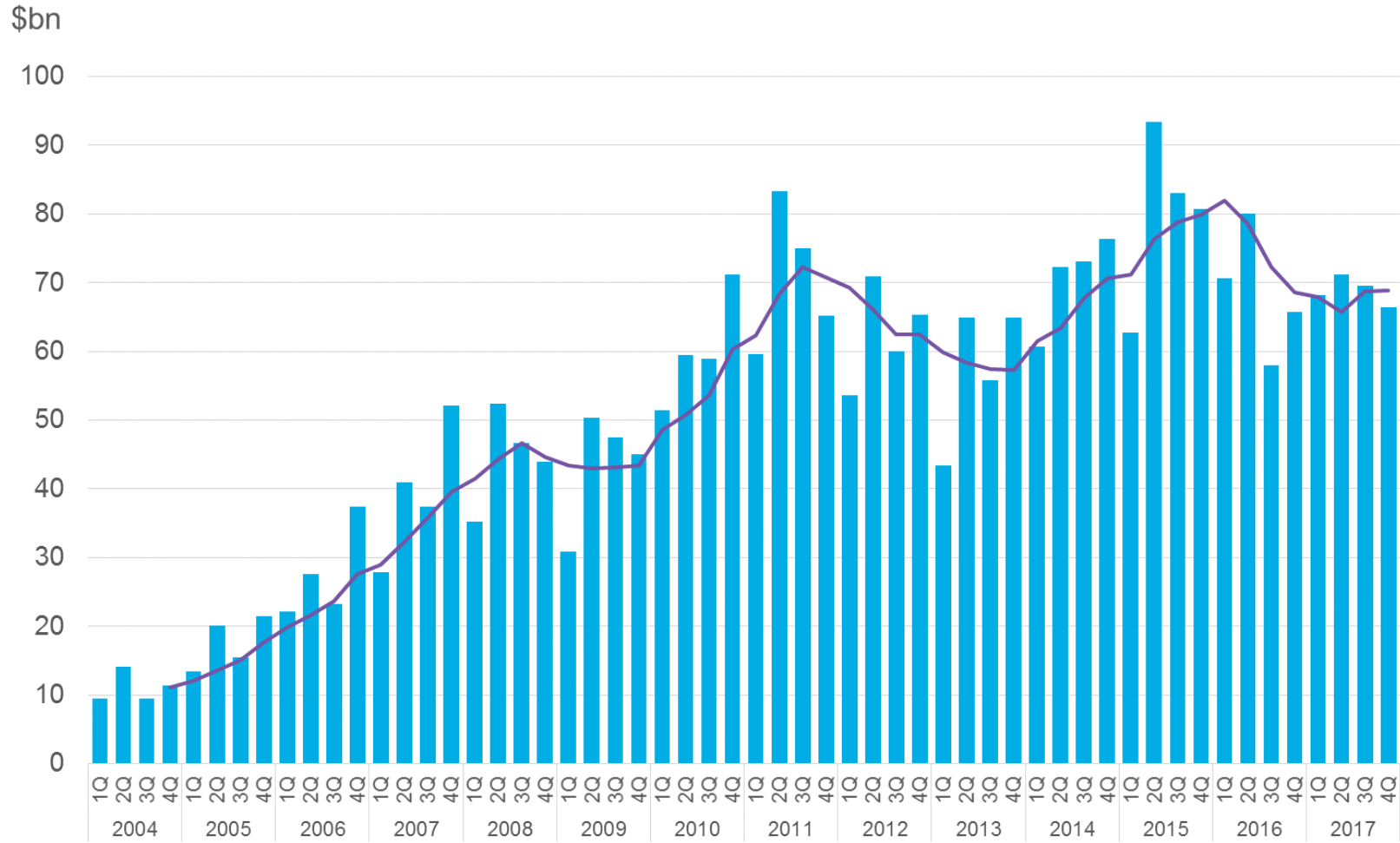
Source:  
Bloomberg New Energy Finance

# Quarterly Trends, New Investment

Quarterly trends since 1Q 2004

# Global New Investment in Clean Energy

1Q 2004 – 4Q 2017



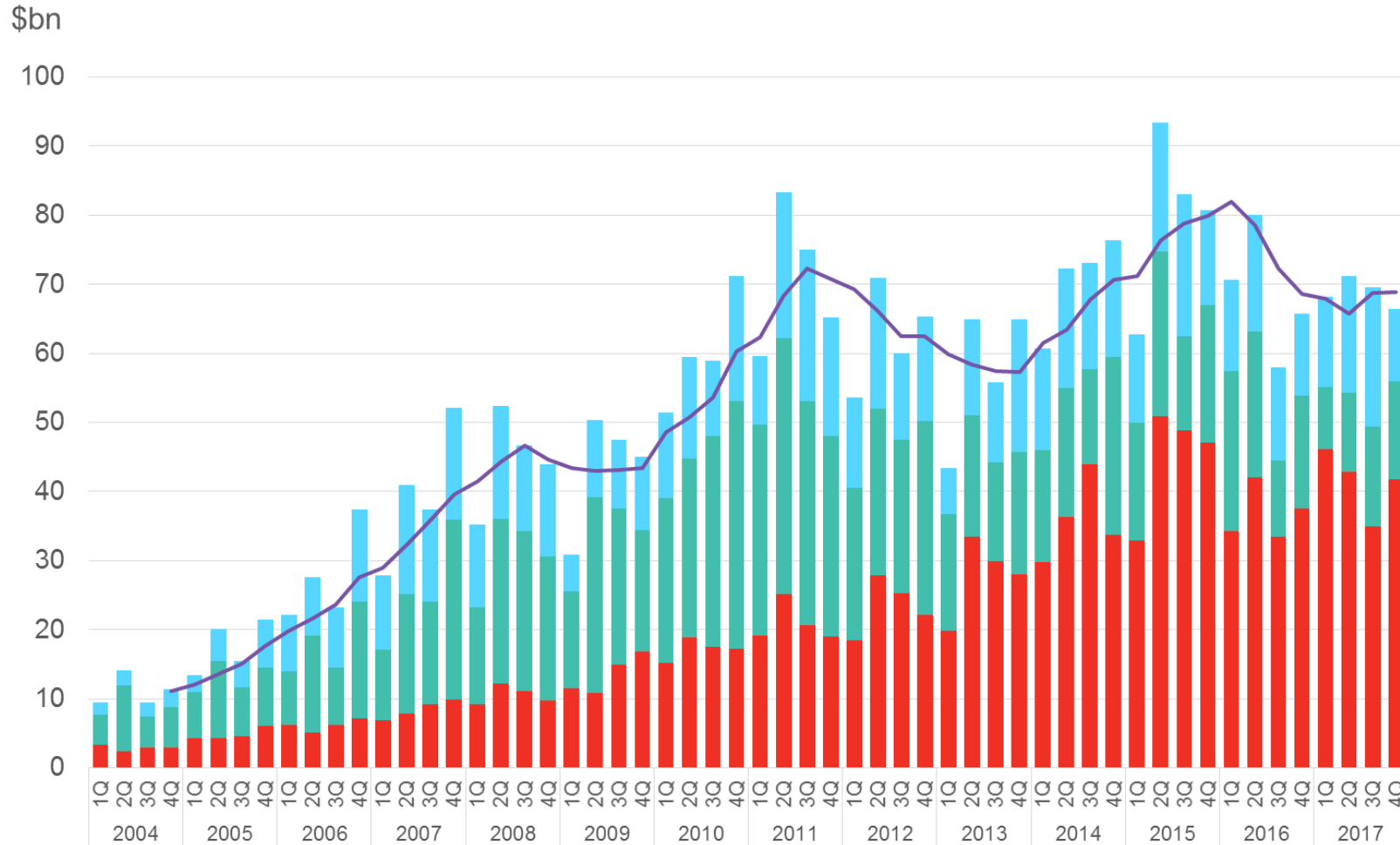
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All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# Global New Investment in Clean Energy, by Region

1Q 2004 – 4Q 2017



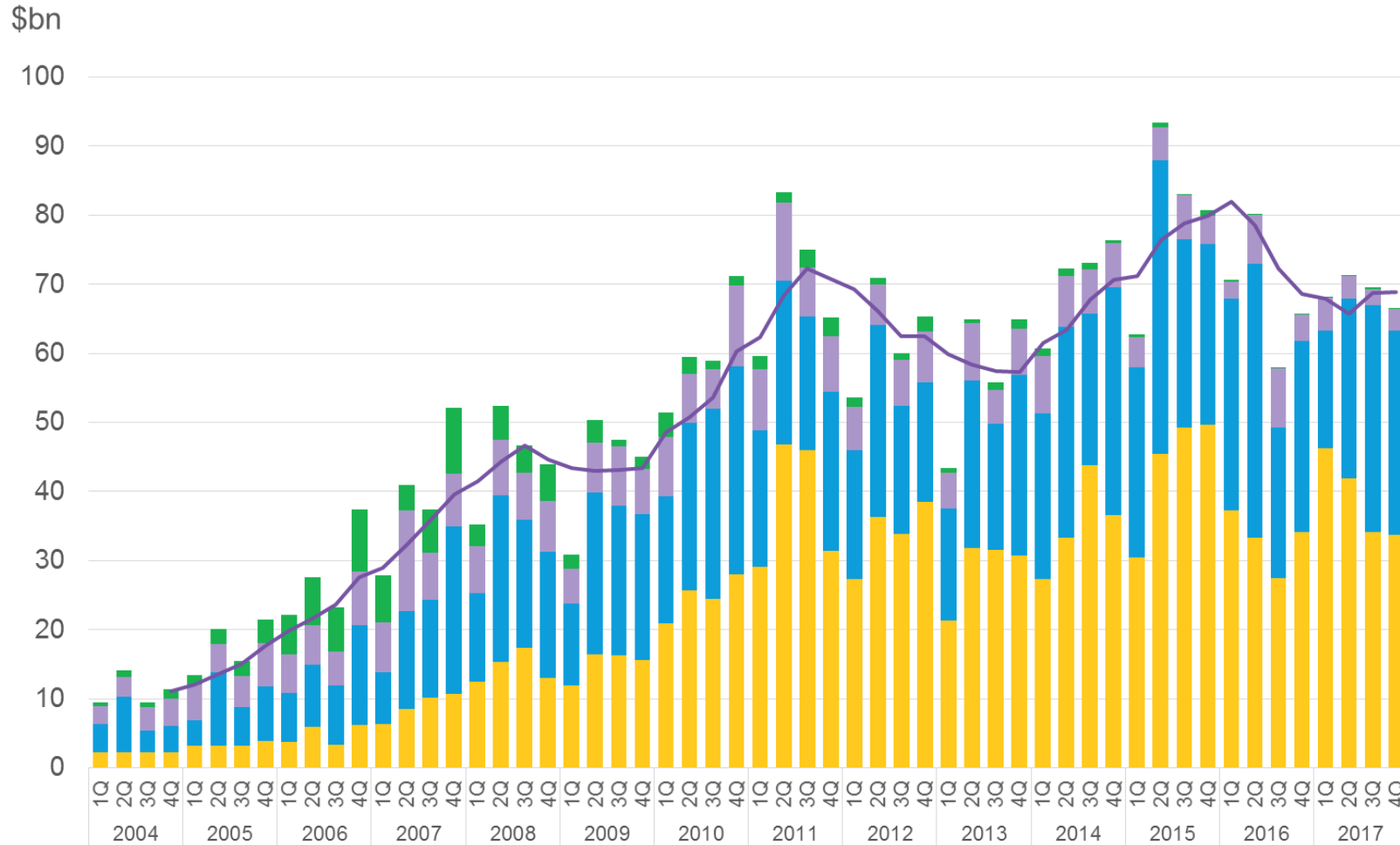
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All values nominal

■ APAC ■ EMEA ■ AMER

Source:  
Bloomberg New Energy Finance

# Global New Investment in Clean Energy, by Sector

1Q 2004 – 4Q 2017



Version WF18.01  
All values nominal

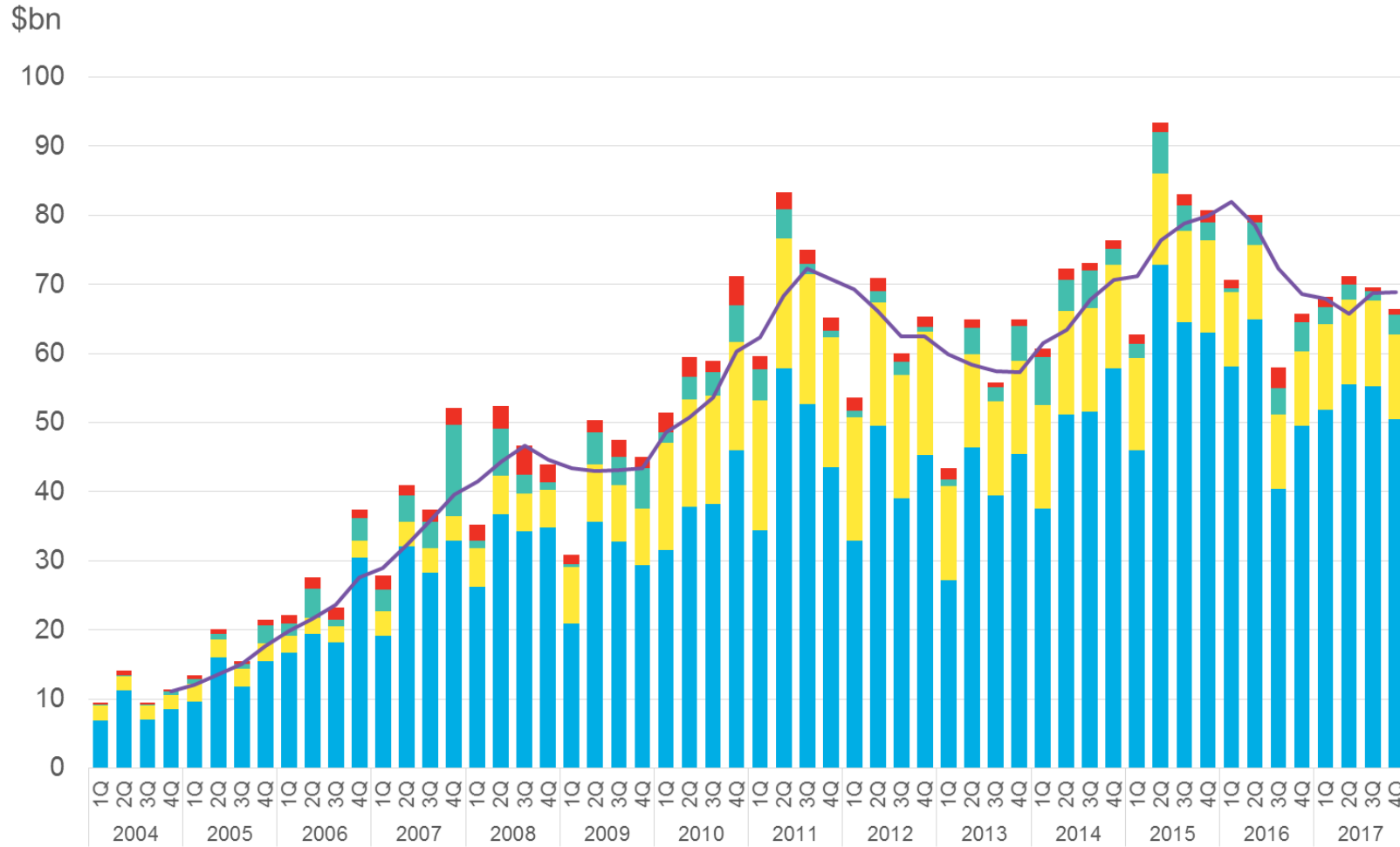
■ Solar ■ Wind ■ Other ■ Biofuels

Source:  
Bloomberg New Energy Finance



# Global New Investment in Clean Energy, by Asset Class

1Q 2004 – 4Q 2017



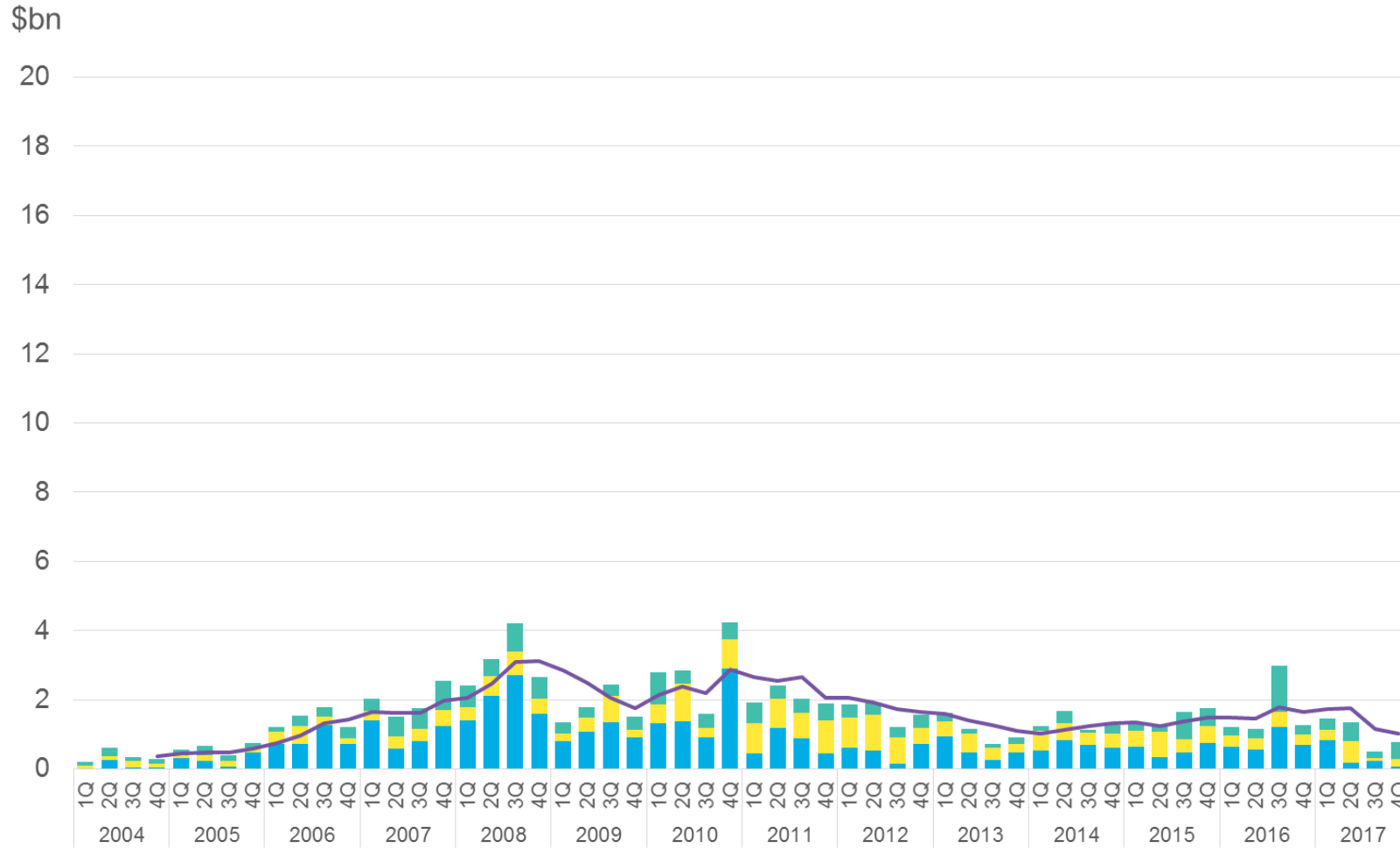
Version WF18.01  
All values nominal

■ Asset finance\* ■ Small scale solar ■ Public markets ■ VC/PE

Source:  
Bloomberg New Energy Finance

# Global New Investment in Clean Energy, VC / PE

1Q 2004 – 4Q 2017



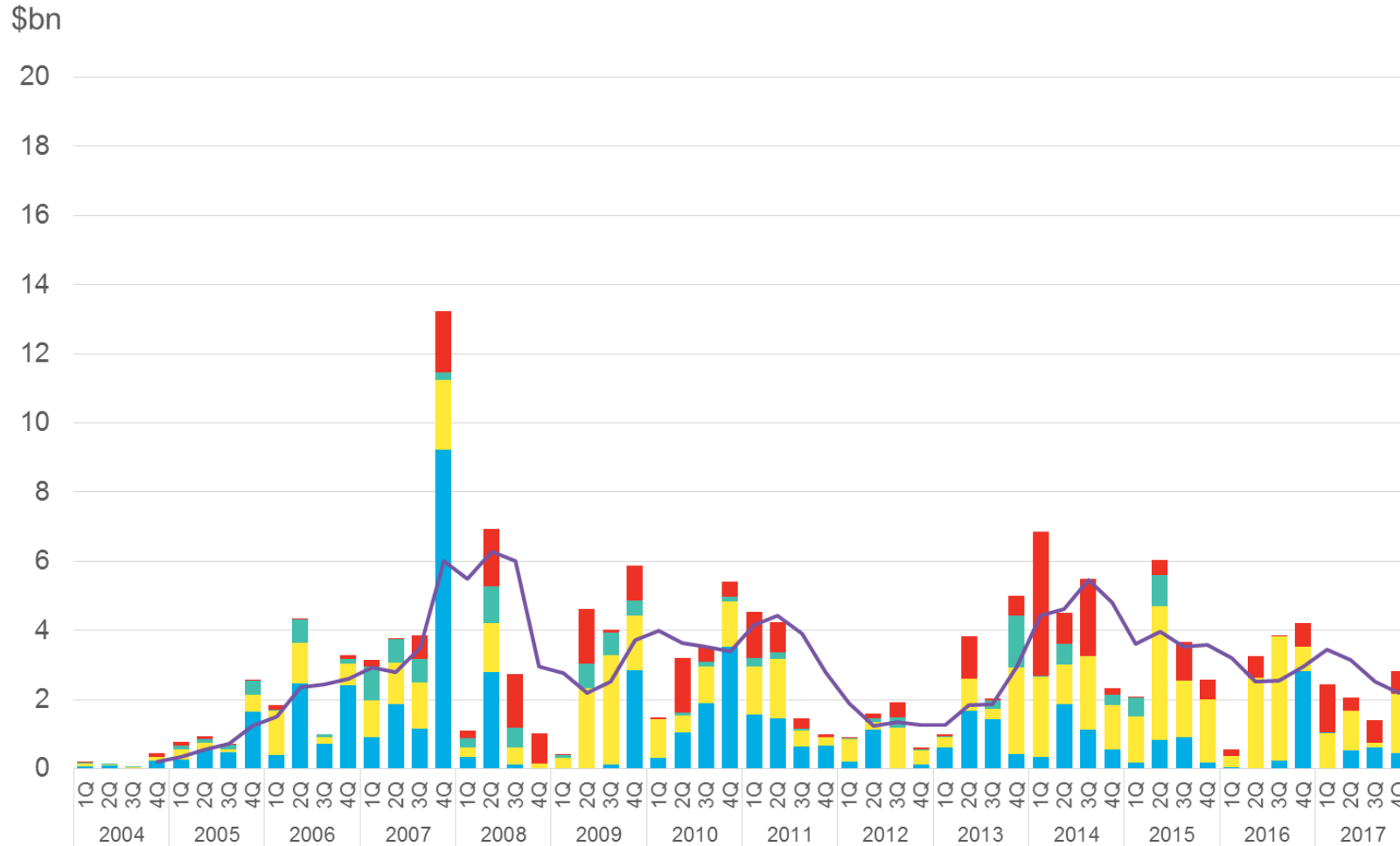
Version WF18.01  
All values nominal

■ PE expansion ■ VC late ■ VC early

Source:  
Bloomberg New Energy Finance

# Global New Investment in Clean Energy, Public Markets

1Q 2004 – 4Q 2017



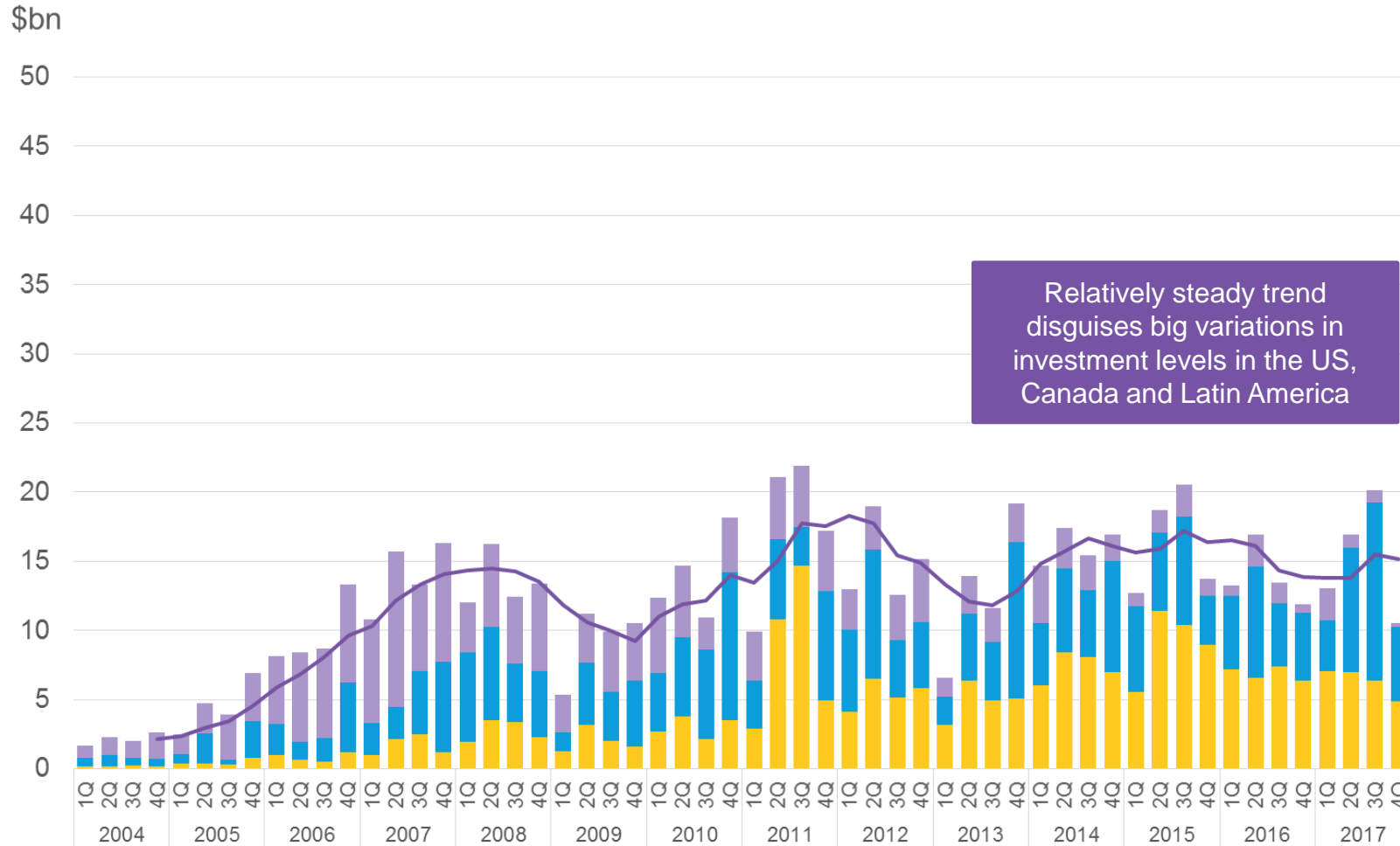
Version WF18.01  
All values nominal

■ IPO ■ Secondary & PIPE ■ OTC ■ Convertible & other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy AMER

1Q 2004 – 4Q 2017



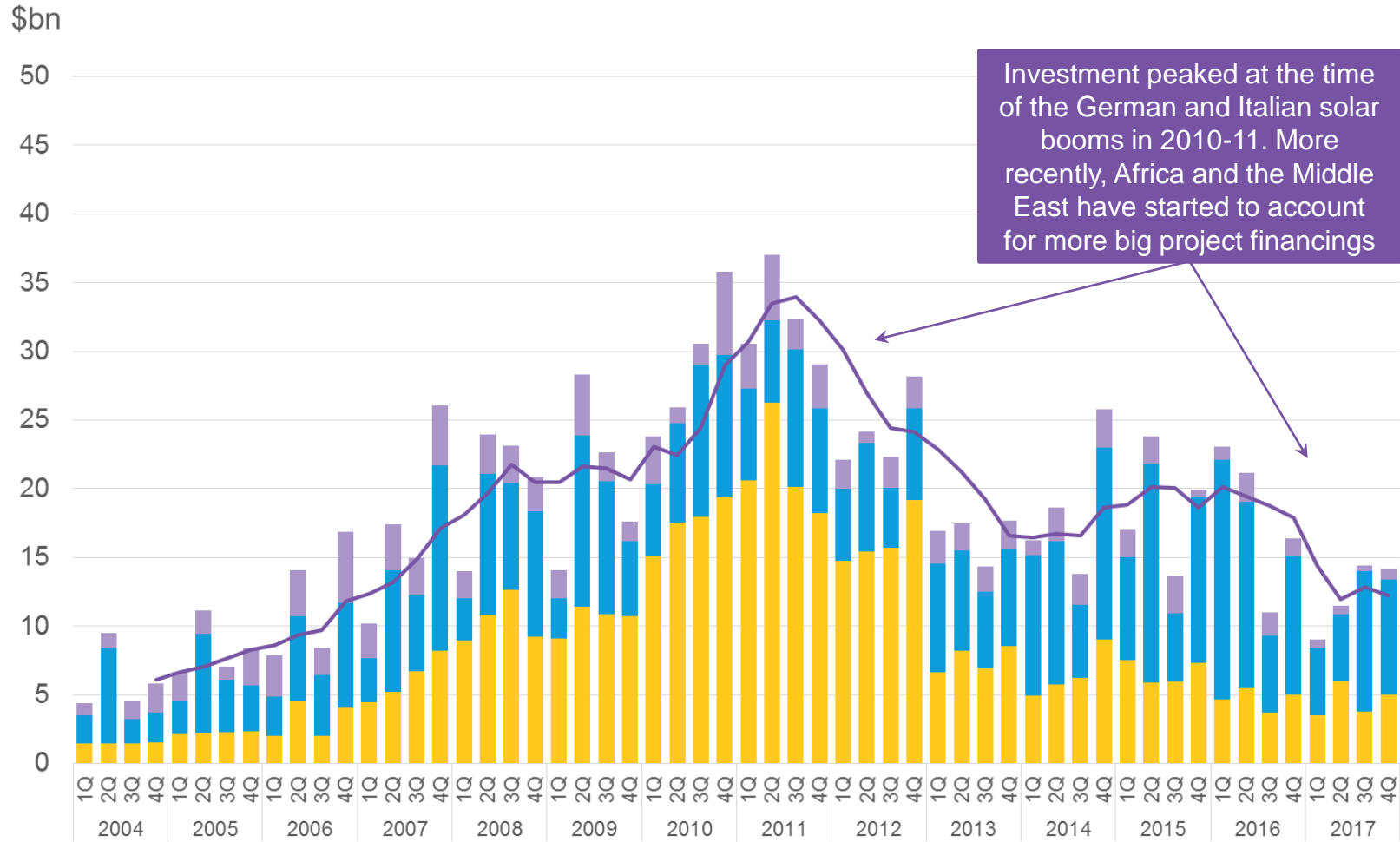
Version WF18.01  
All values nominal

■ Solar ■ Wind ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy EMEA

1Q 2004 – 4Q 2017



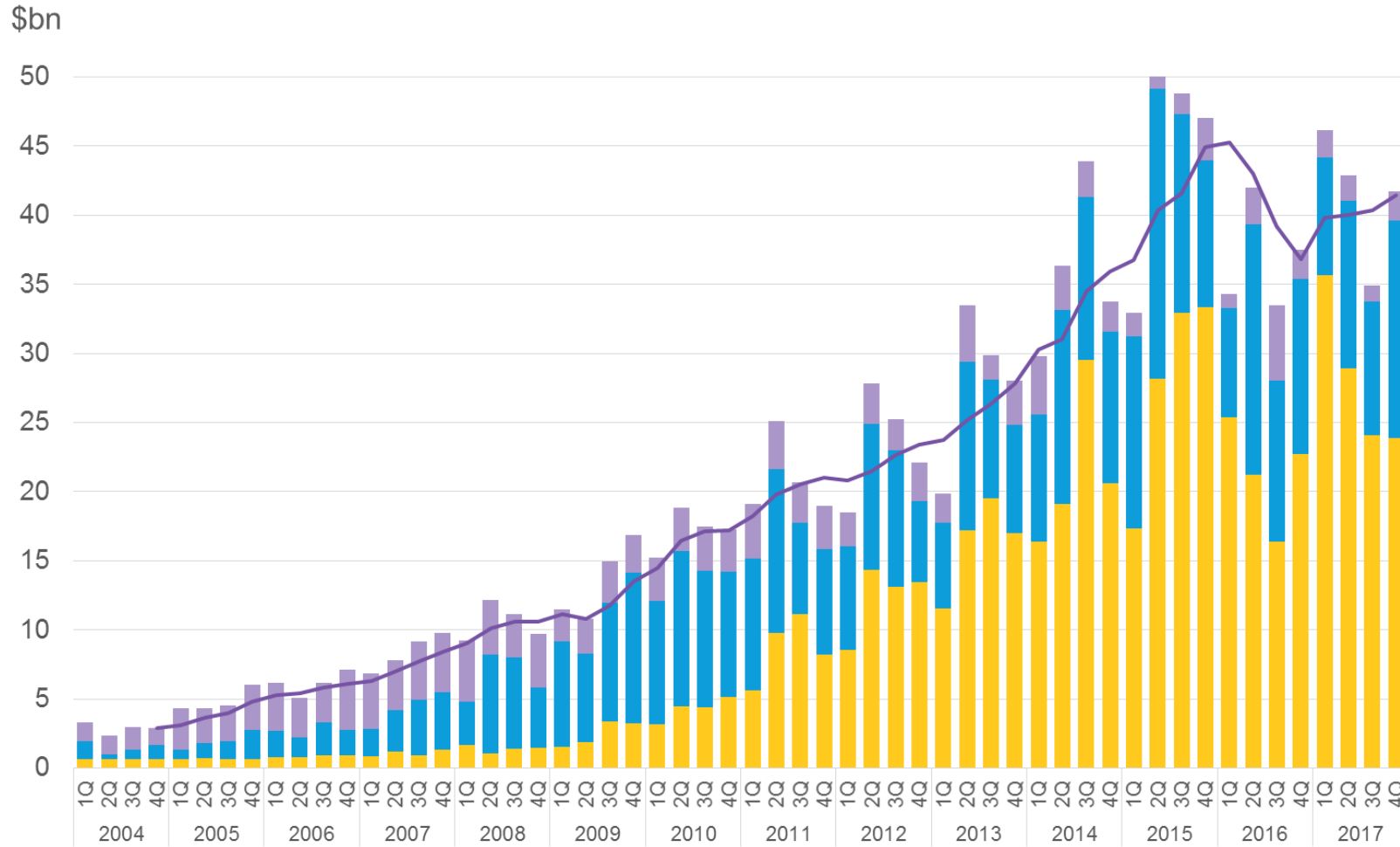
Version WF18.01  
All values nominal

■ Solar ■ Wind ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy APAC

1Q 2004 – 4Q 2017



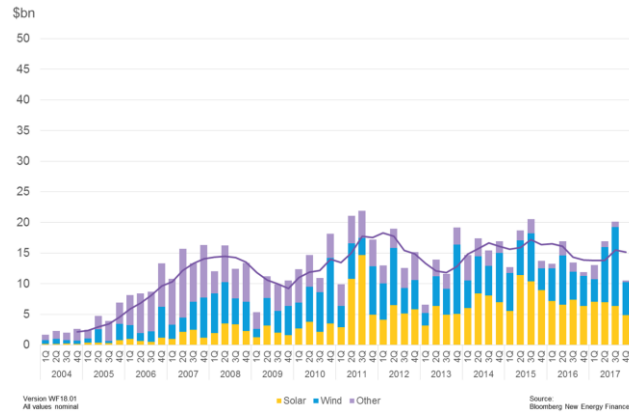
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All values nominal

■ Solar ■ Wind ■ Other

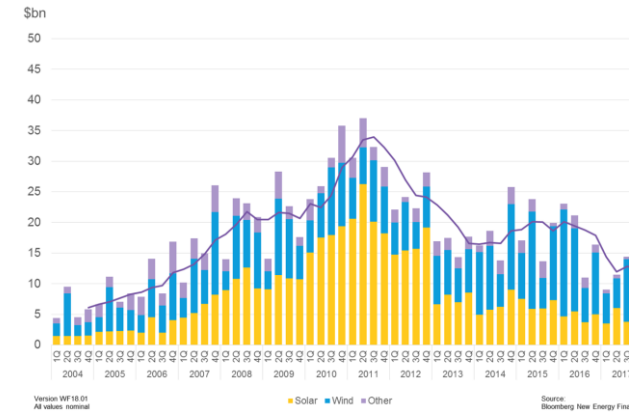
Source:  
Bloomberg New Energy Finance

# Comparing AMER, EMEA & APAC

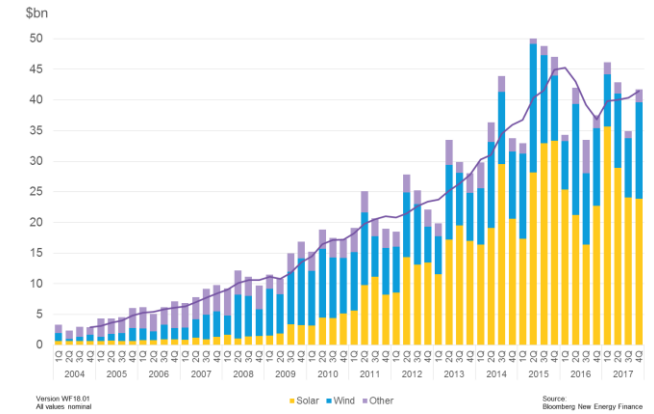
Will AMER break out of the \$15 - \$25bn range?



Will EMEA ever experience the highs of 2010 & 2011 again?

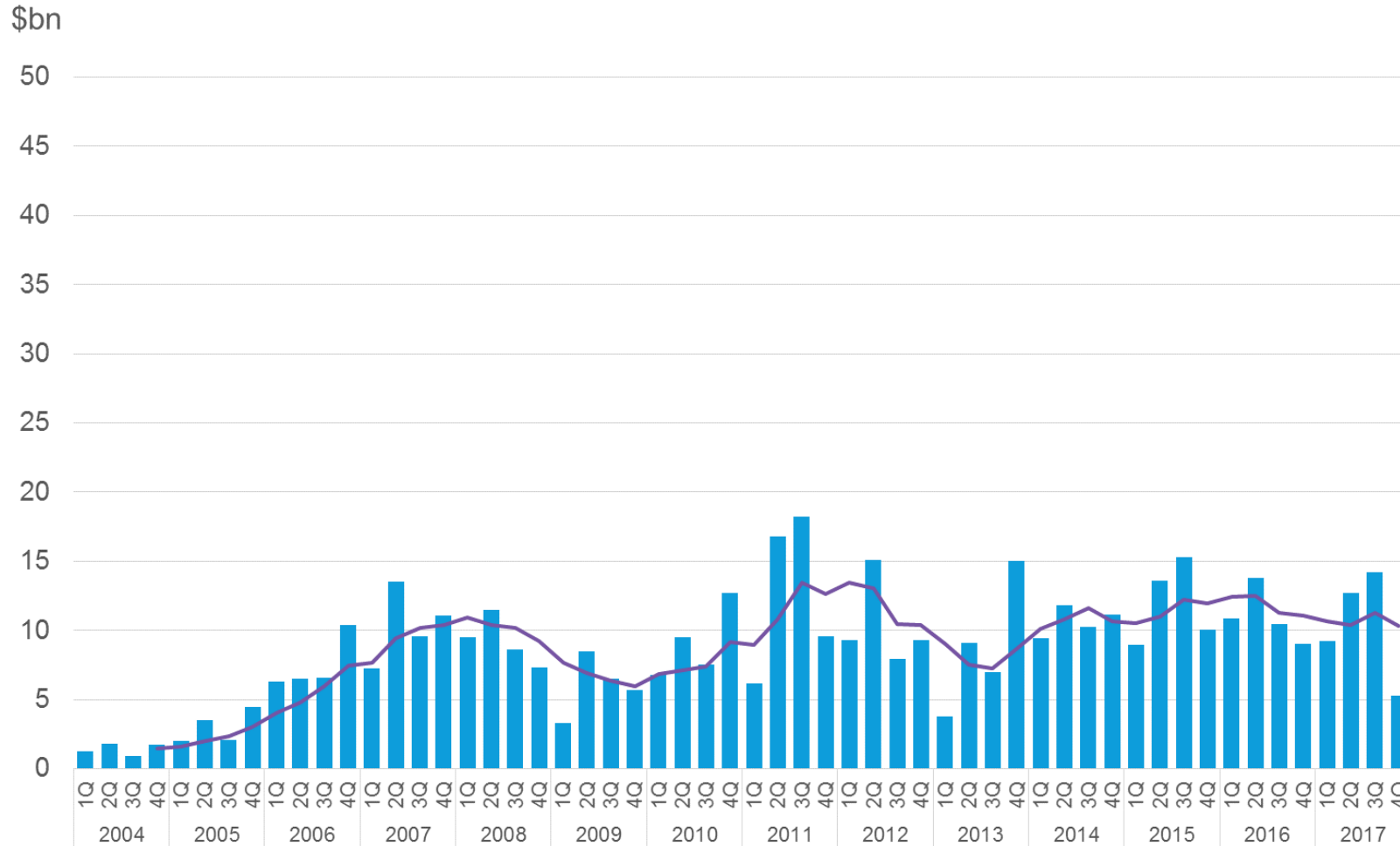


Will APAC continue to be the driver of green investment?



# New Investment in Clean Energy United States

1Q 2004 – 4Q 2017



Version WF18.01  
All values nominal

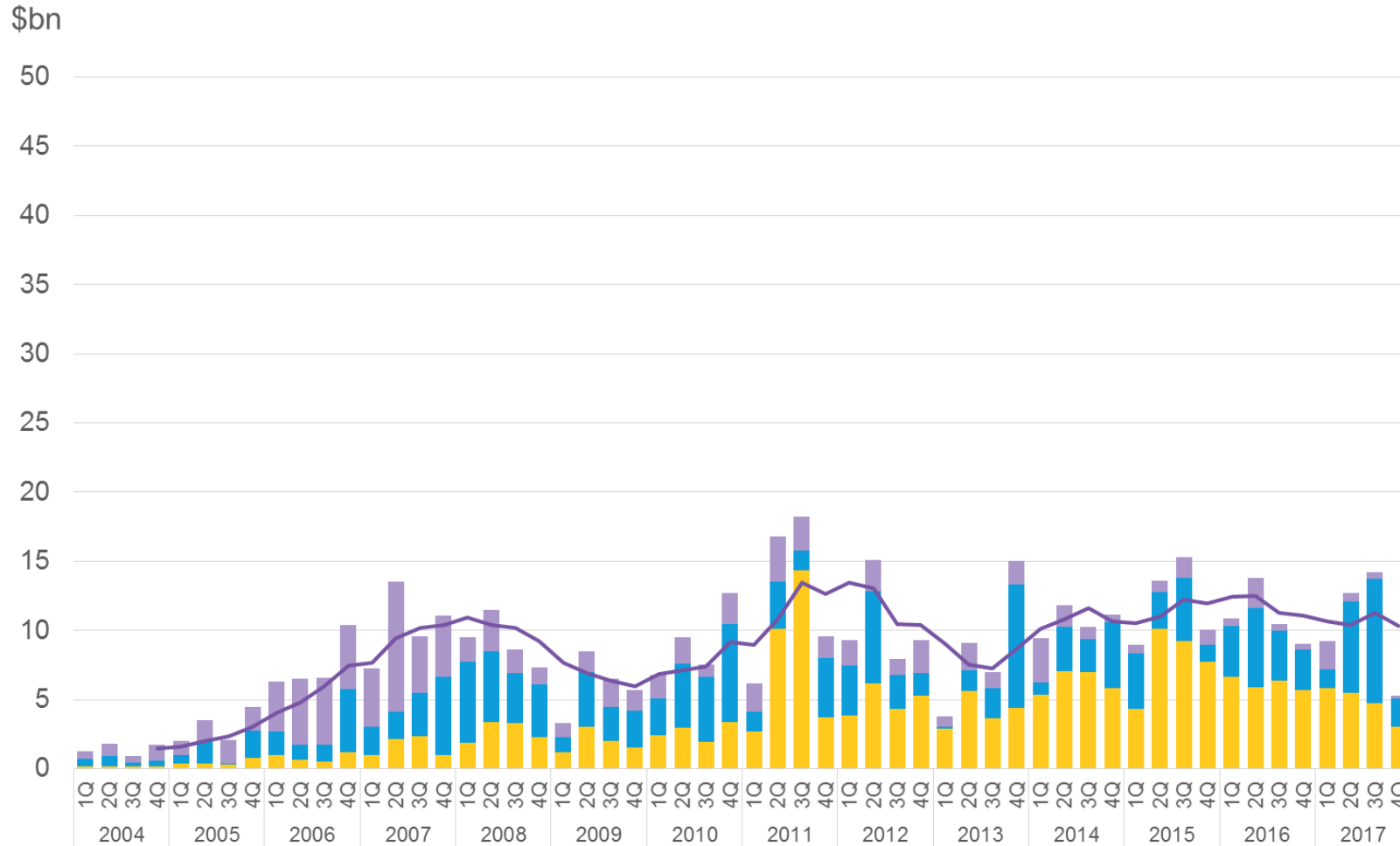
— Four quarter running average

Source:  
Bloomberg New Energy Finance



# New Investment in Clean Energy United States, by Sector

1Q 2004 – 4Q 2017



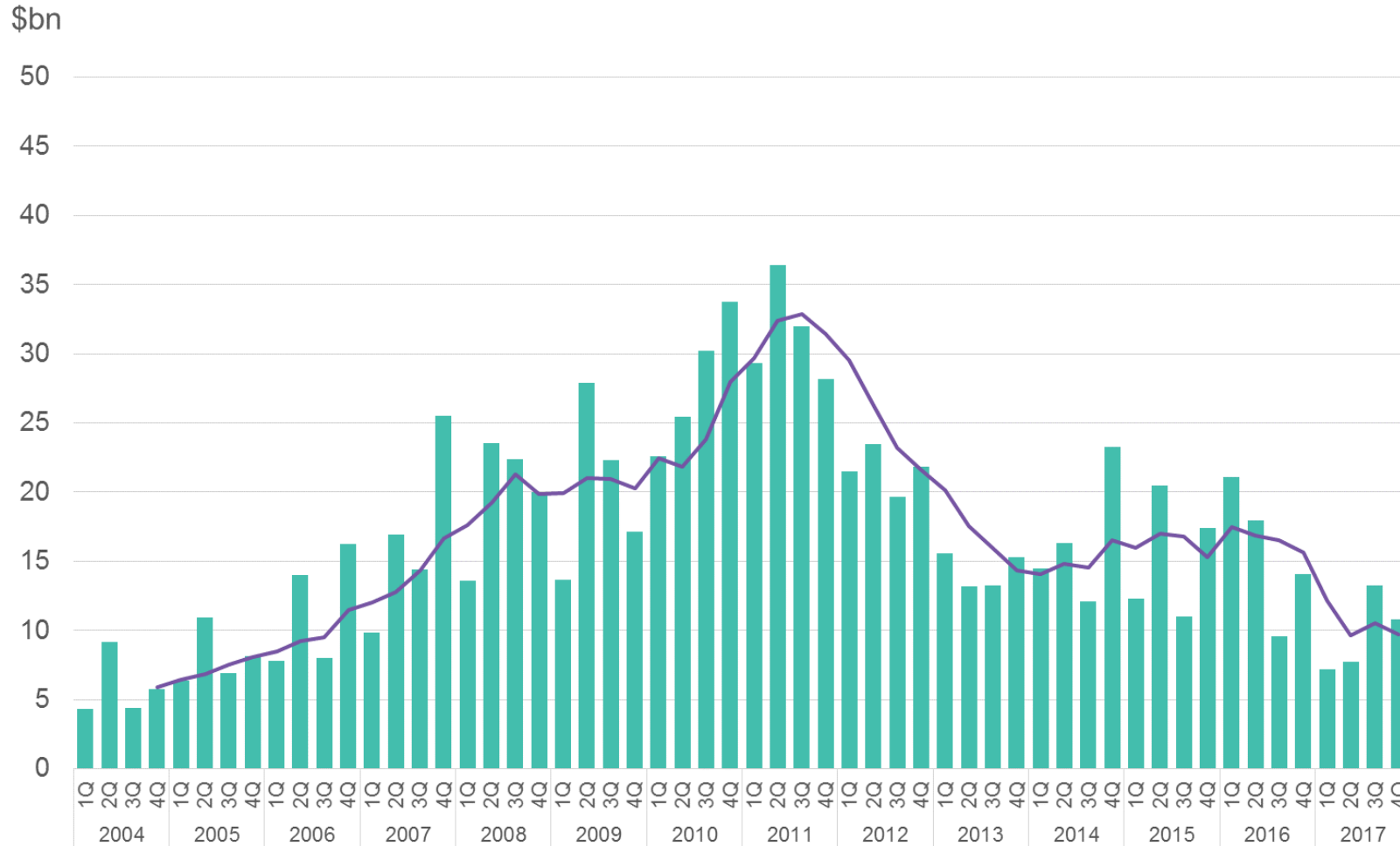
Version WF18.01  
All values nominal

■ Solar ■ Wind ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Europe

1Q 2004 – 4Q 2017



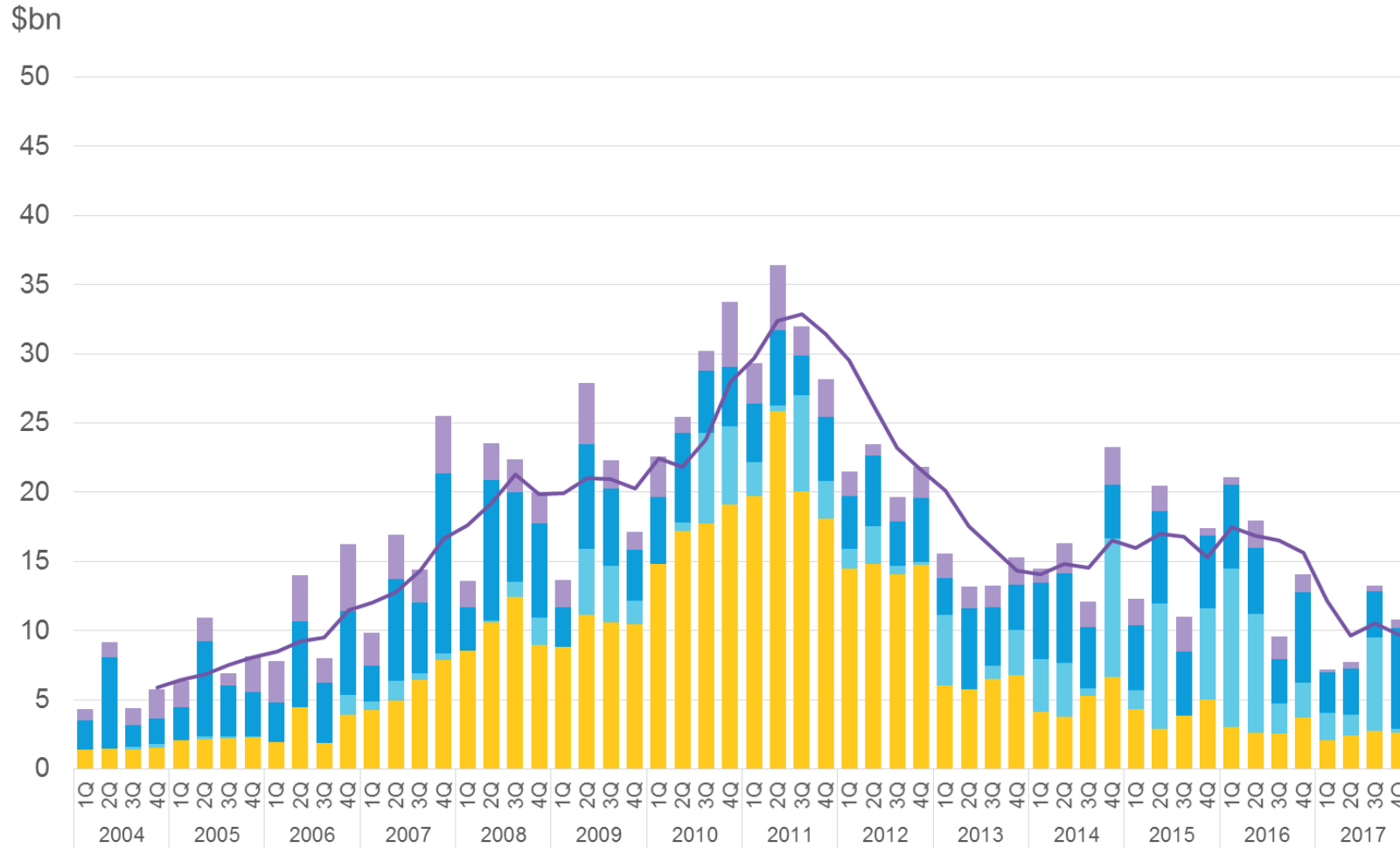
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Europe, by sector

1Q 2004 – 4Q 2017



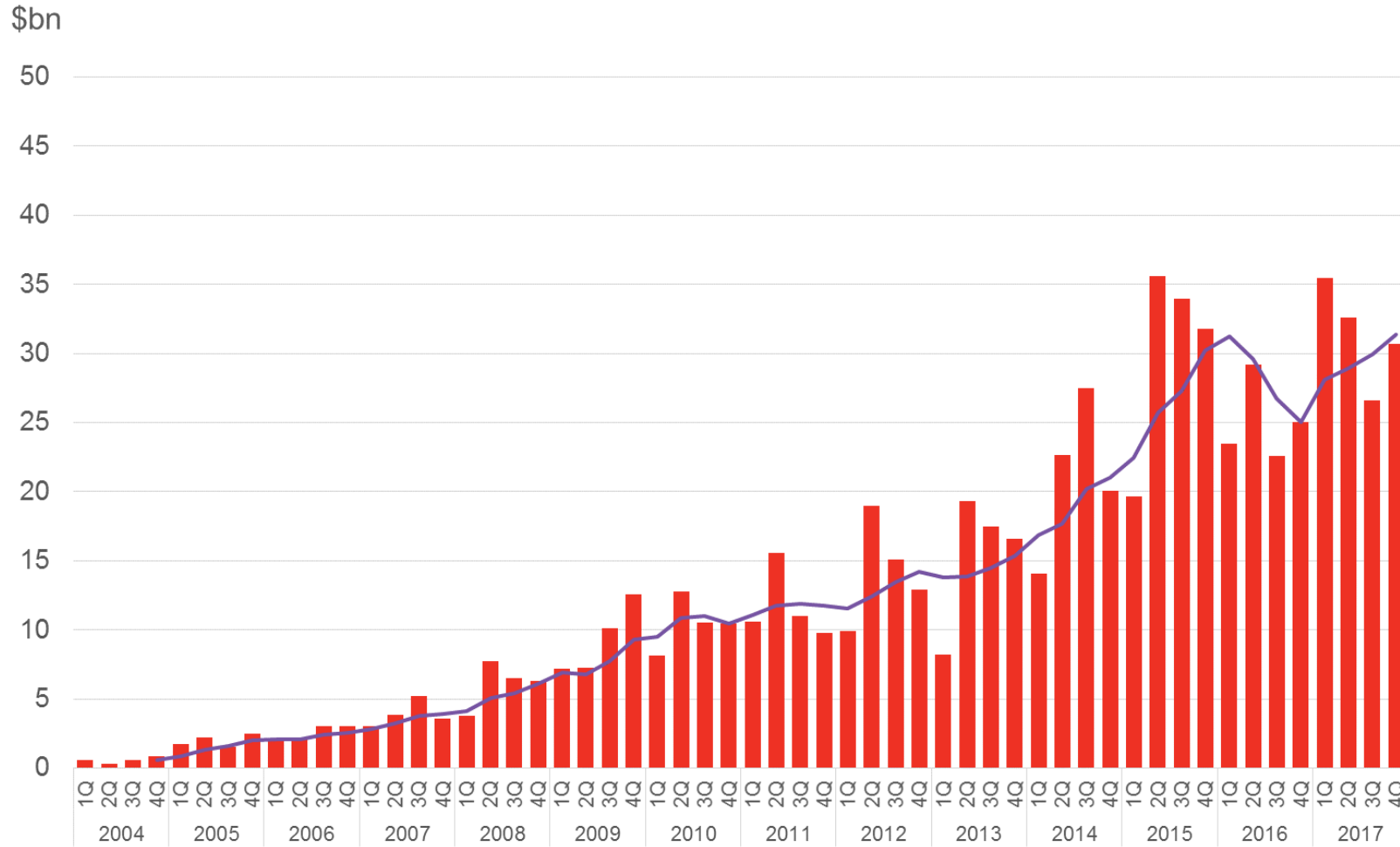
Version WF18.01  
All values nominal

■ Solar ■ Offshore ■ Onshore ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy China

1Q 2004 – 4Q 2017



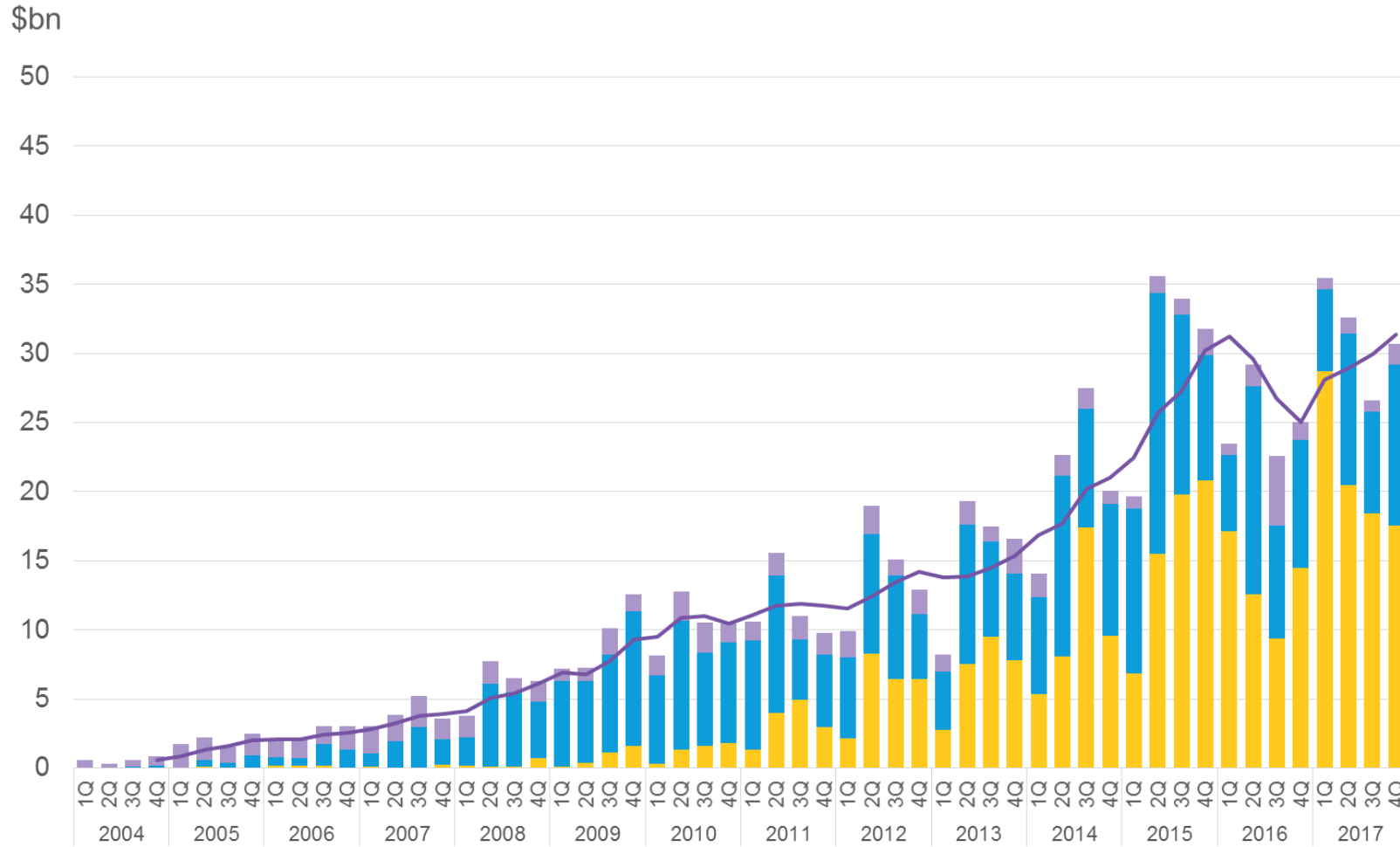
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy China, by sector

1Q 2004 – 4Q 2017



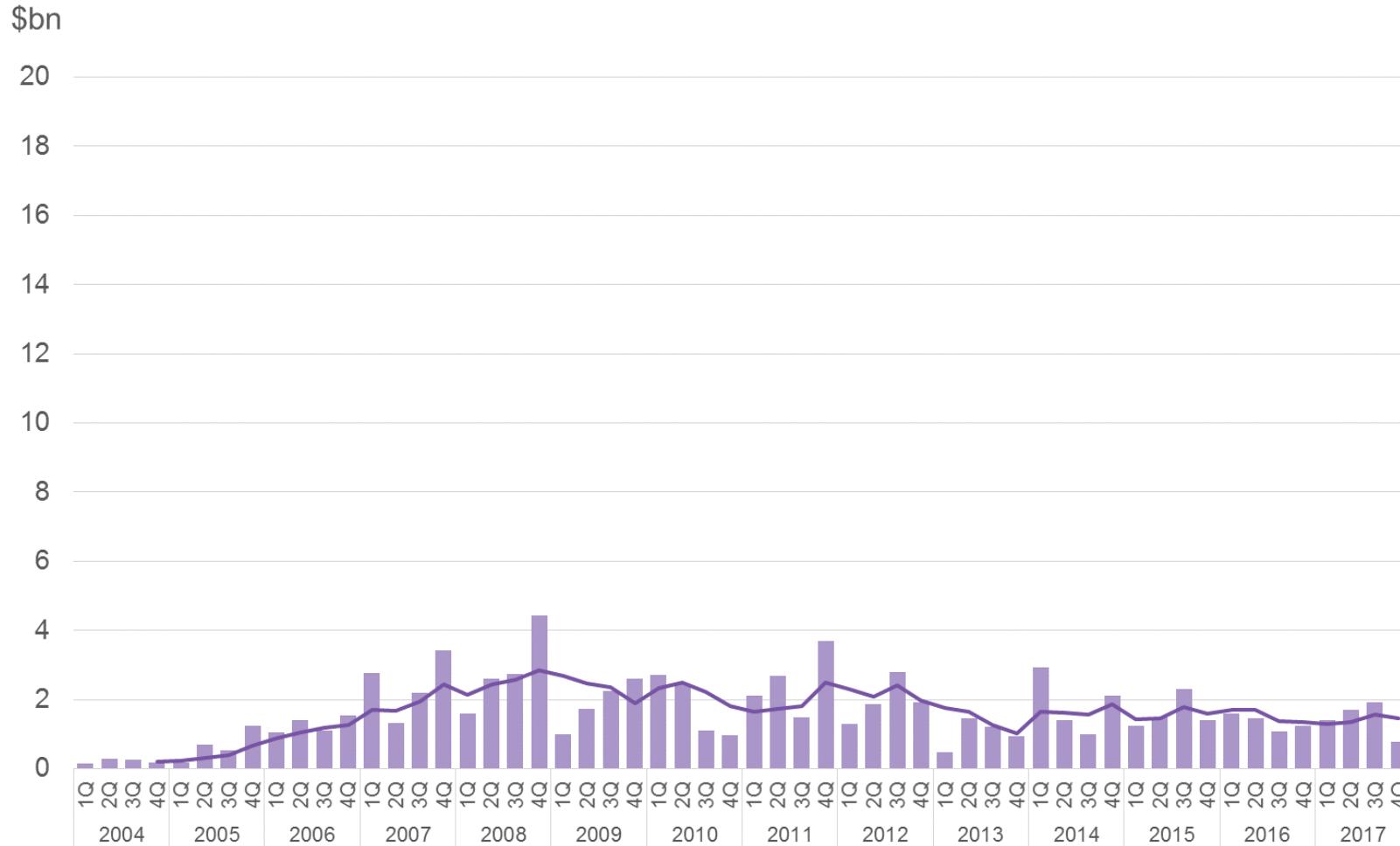
Version WF18.01  
All values nominal

■ Solar ■ Wind ■ Other

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Brazil

1Q 2004 – 4Q 2017



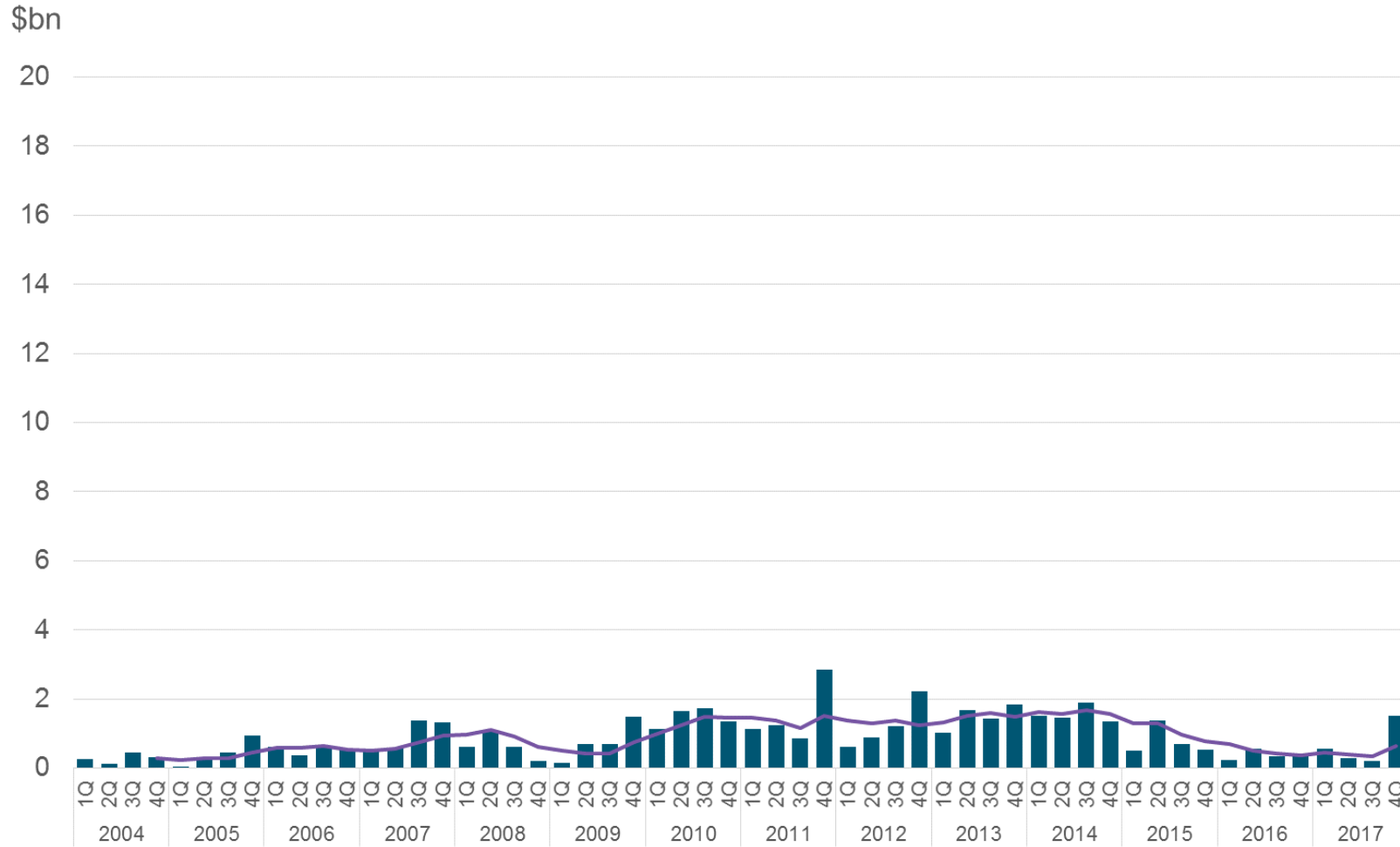
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Canada

1Q 2004 – 4Q 2017



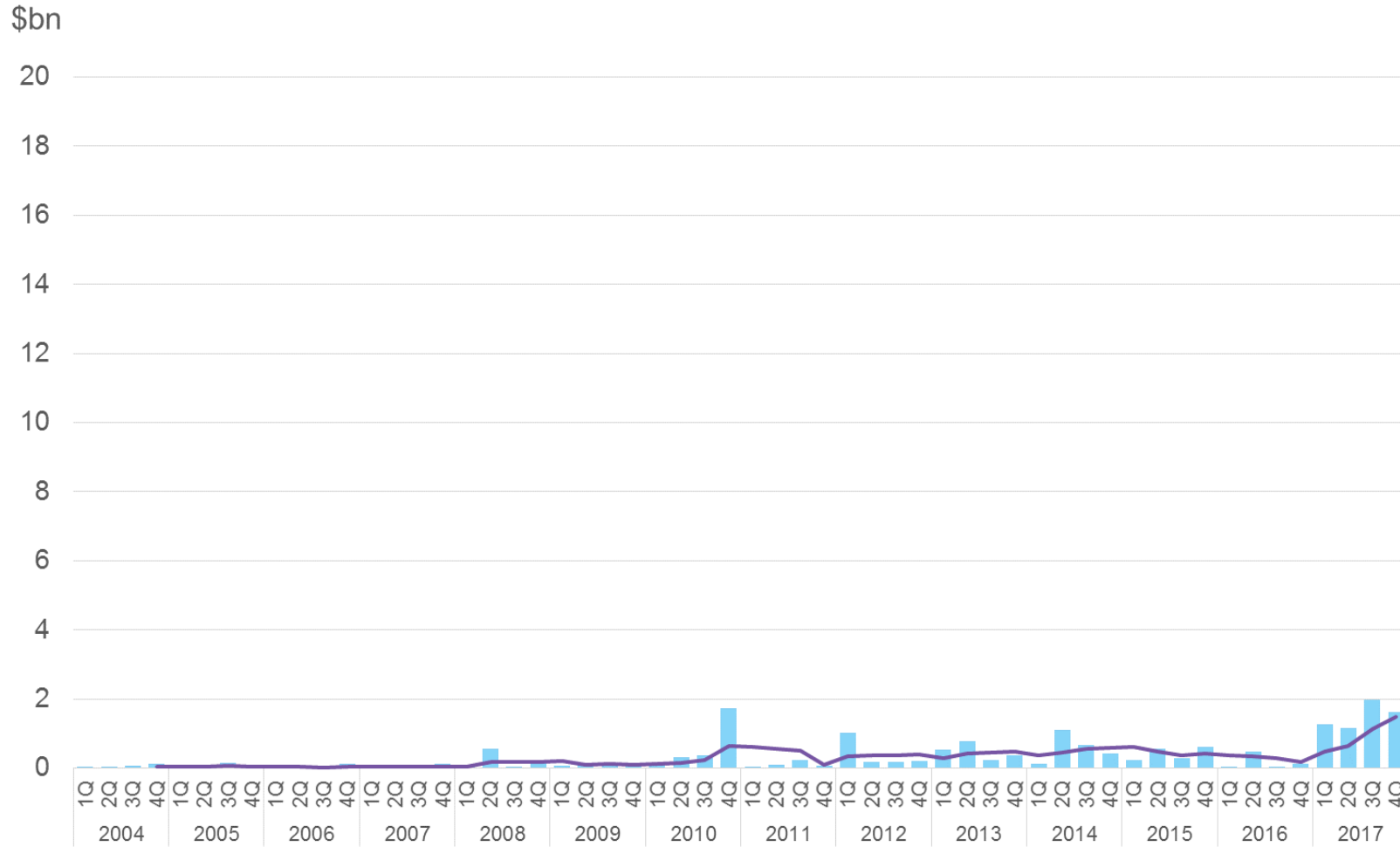
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Mexico

1Q 2004 – 4Q 2017



Version WF18.01  
All values nominal

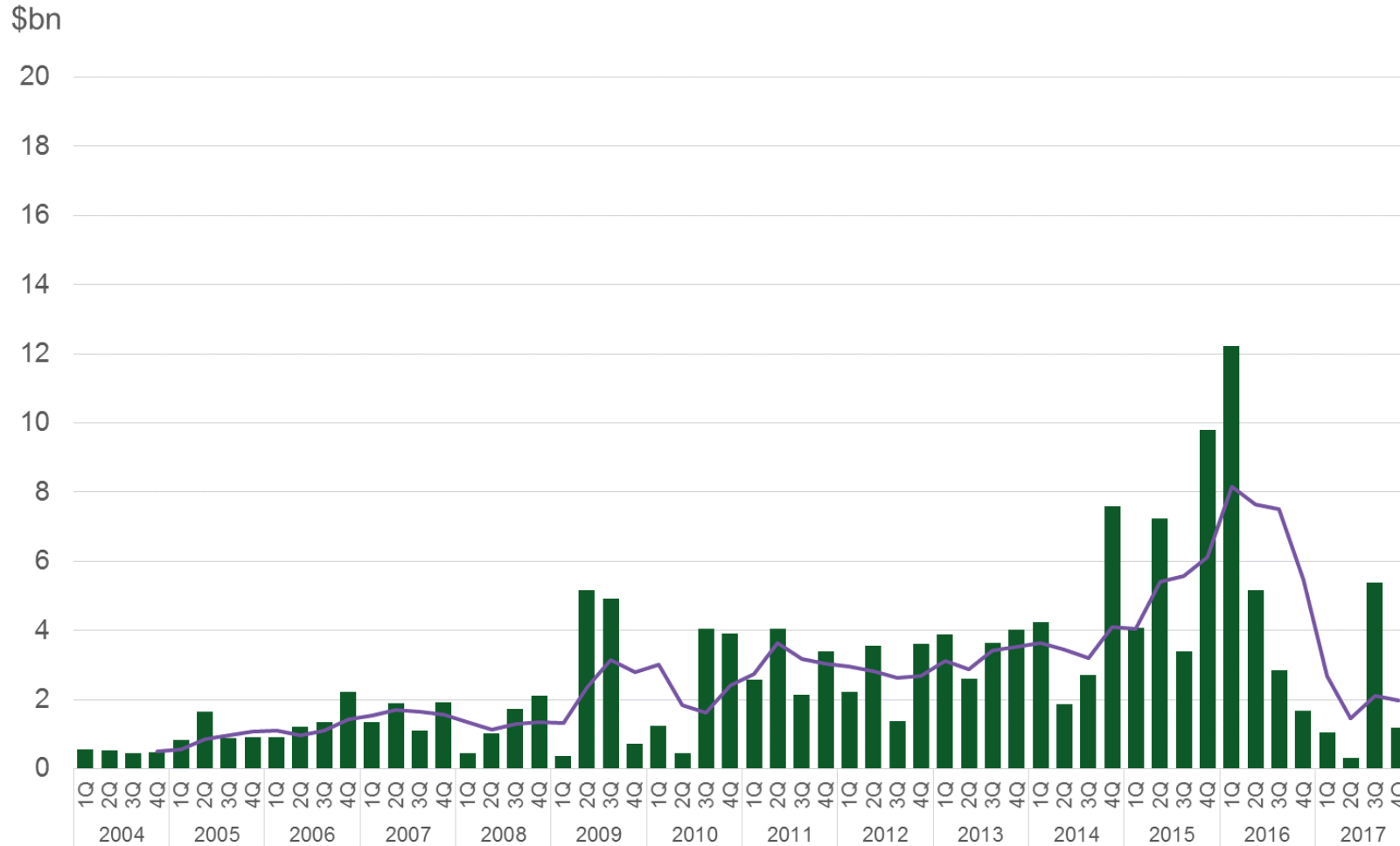
— Four quarter running average

Source:  
Bloomberg New Energy Finance



# New Investment in Clean Energy United Kingdom

1Q 2004 – 4Q 2017



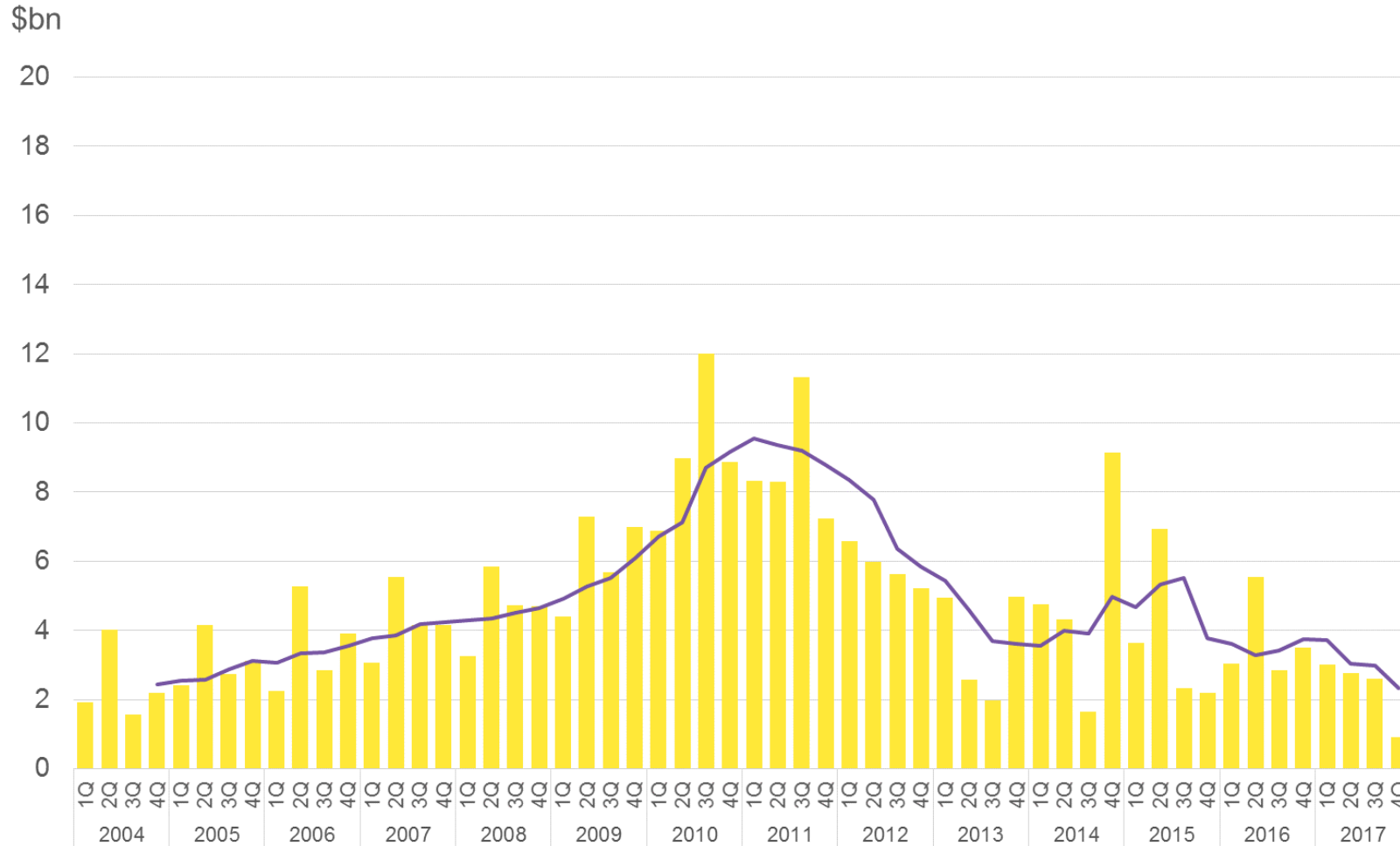
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Germany

1Q 2004 – 4Q 2017



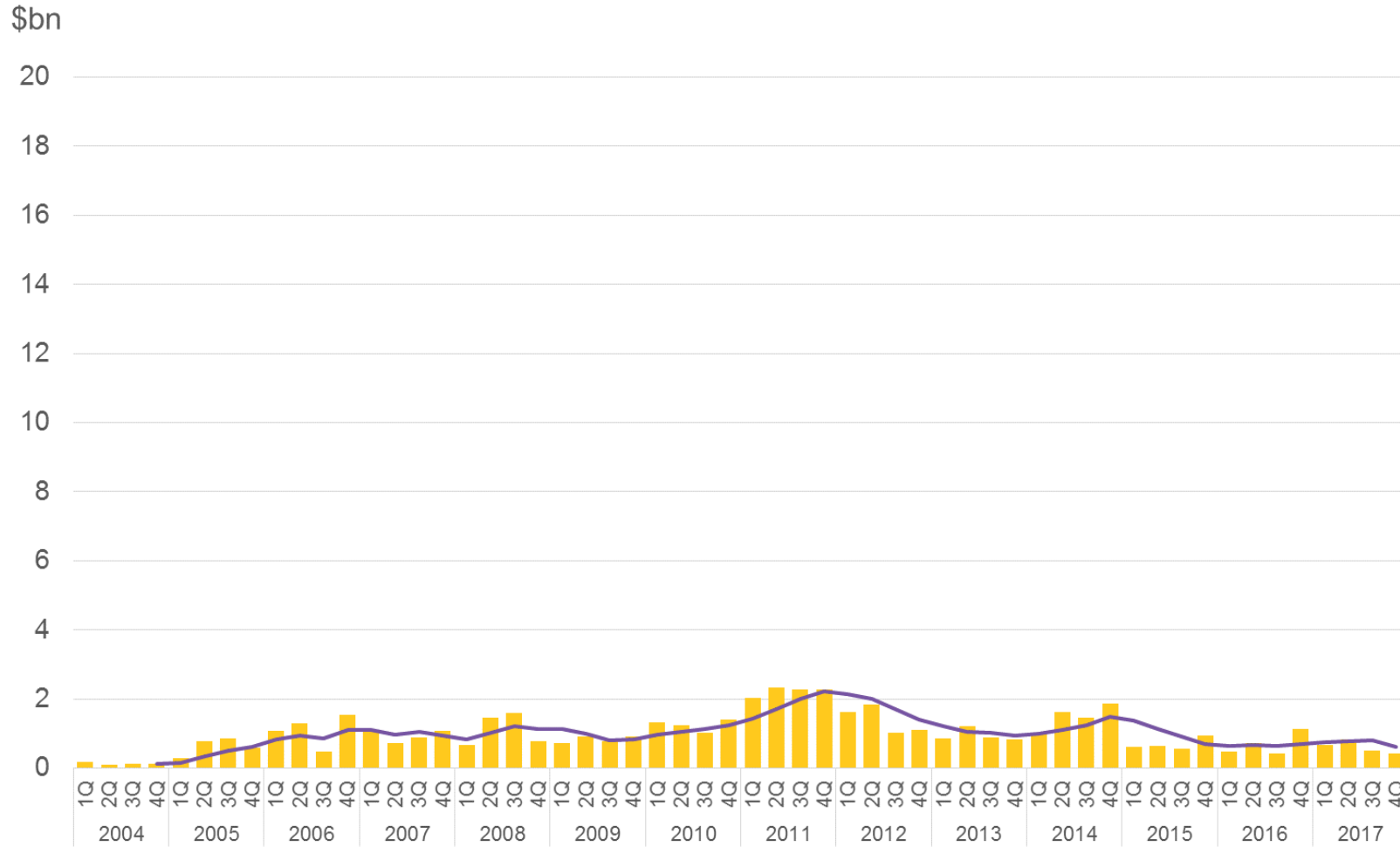
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy France

1Q 2004 – 4Q 2017



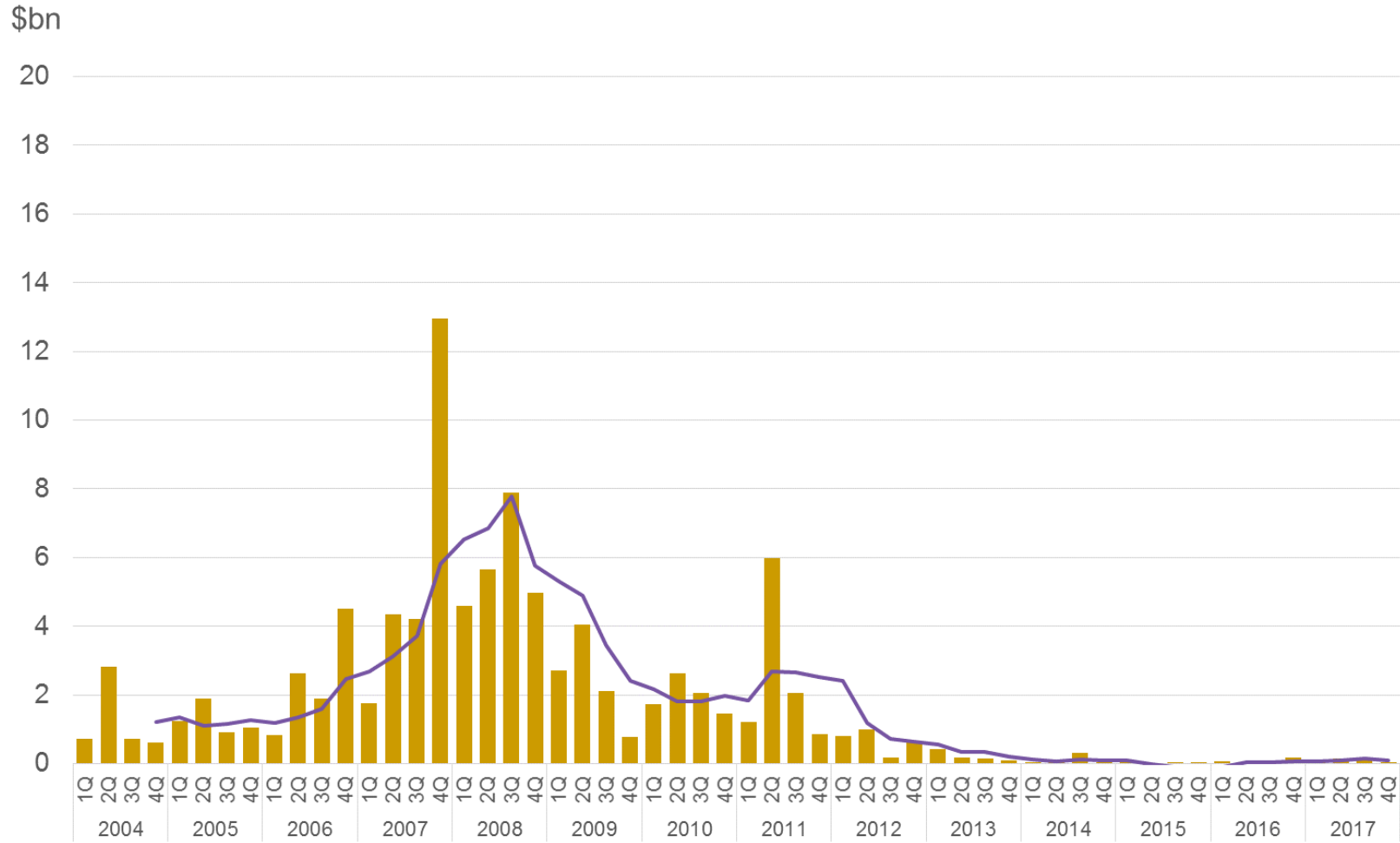
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Spain

1Q 2004 – 4Q 2017



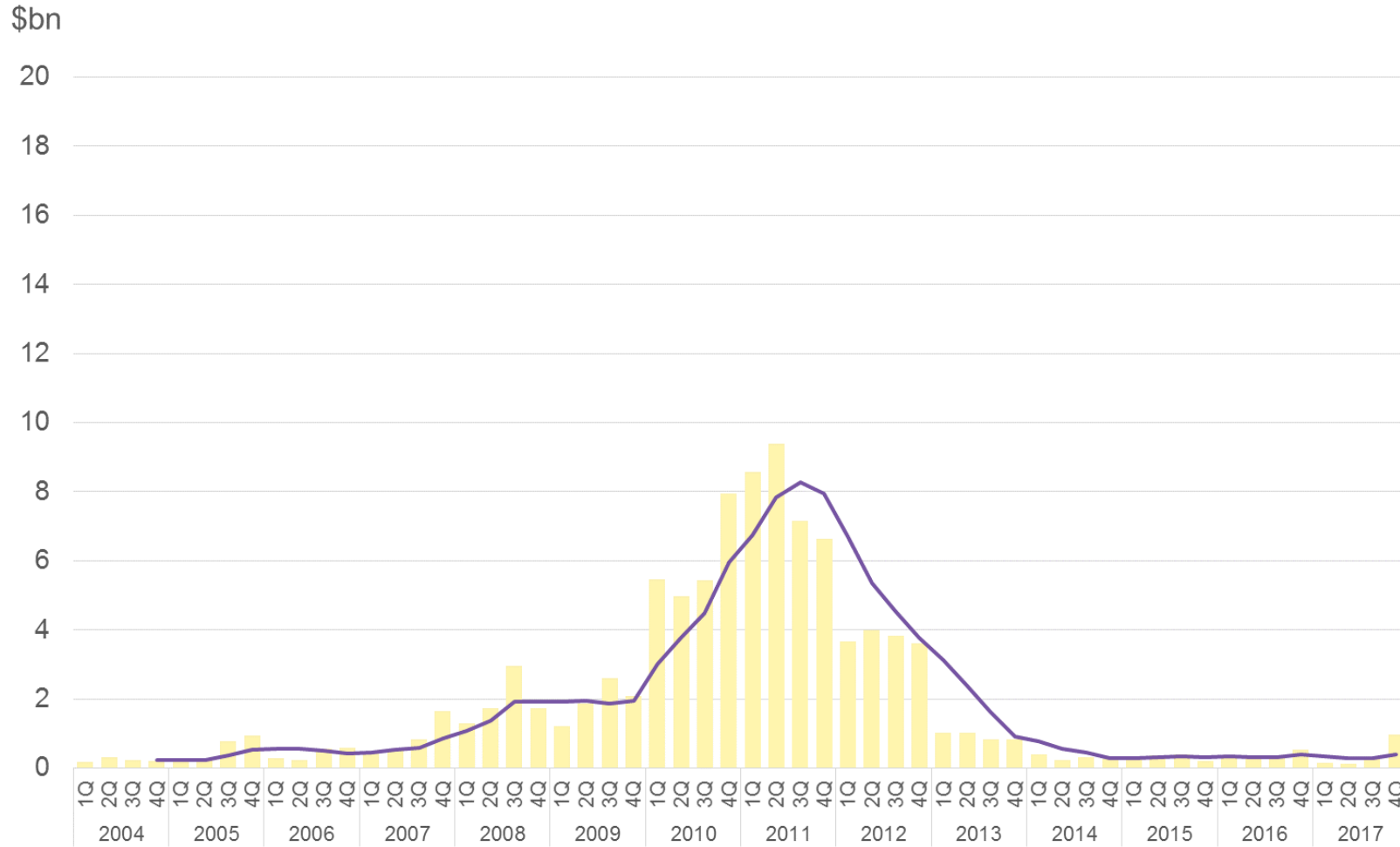
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Italy

1Q 2004 – 4Q 2017



Version WF18.01  
All values nominal

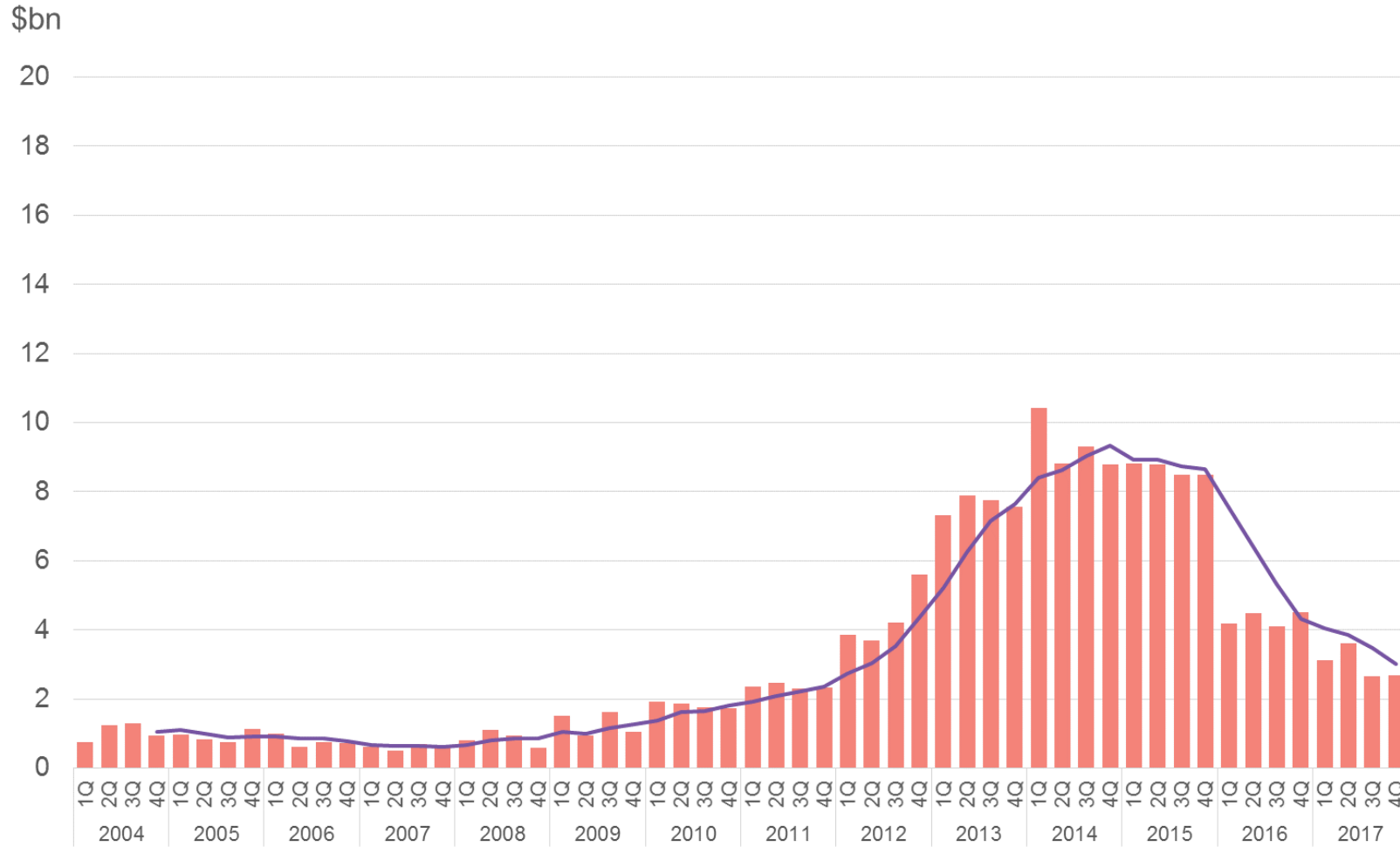
— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy

## Japan

1Q 2004 – 4Q 2017



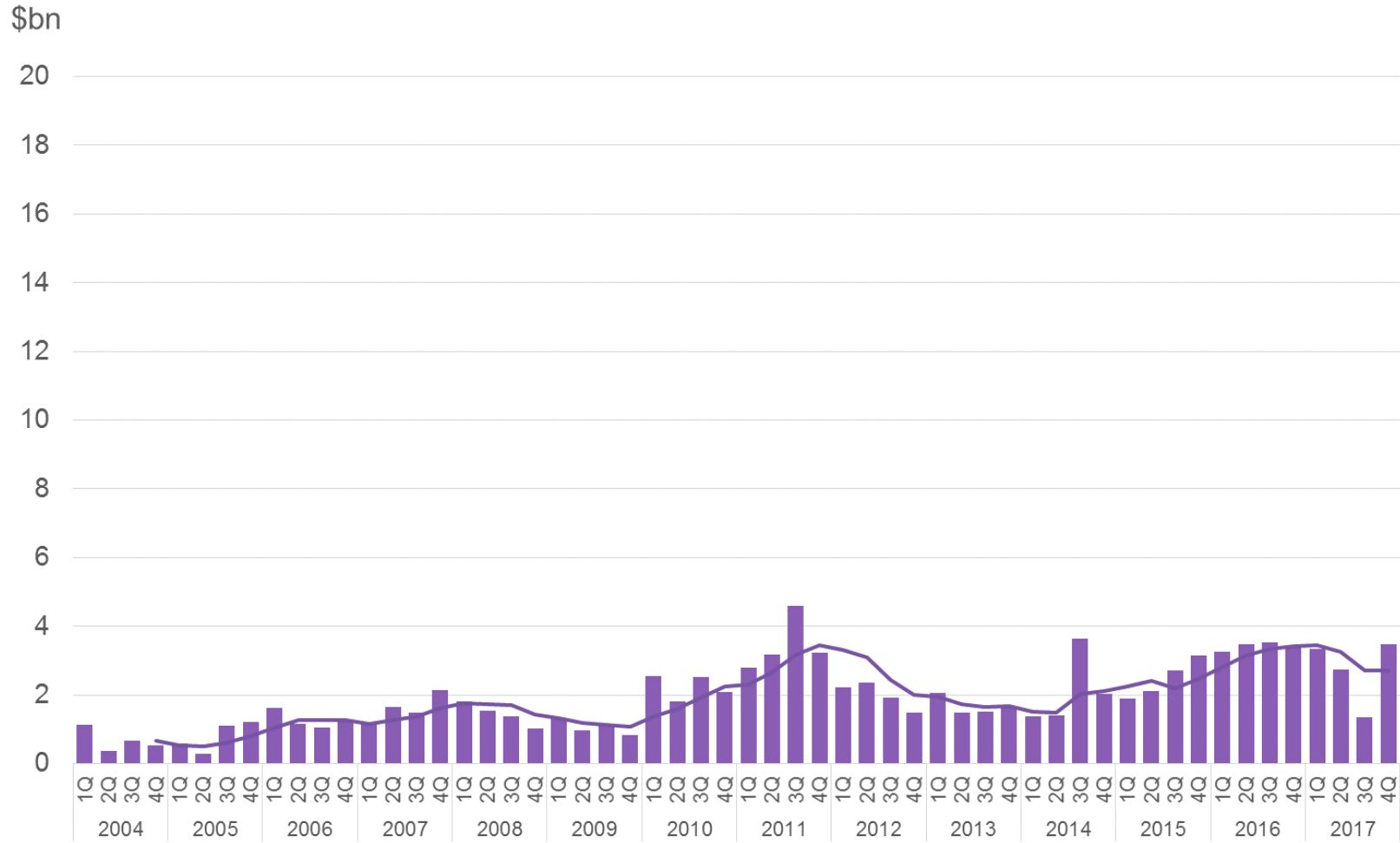
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy India

1Q 2004 – 4Q 2017



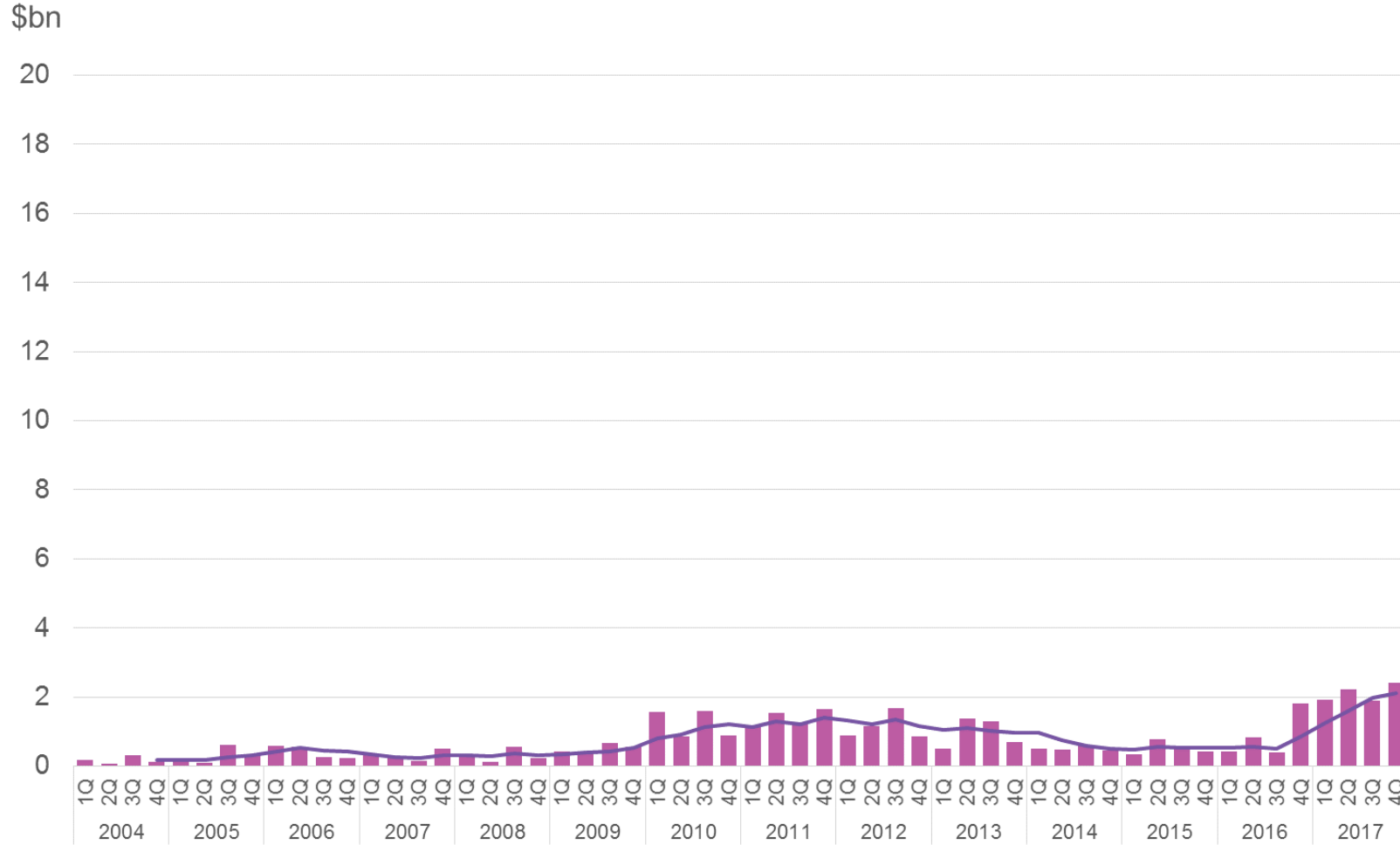
Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

# New Investment in Clean Energy Australia

1Q 2004 – 4Q 2017



Version WF18.01  
All values nominal

— Four quarter running average

Source:  
Bloomberg New Energy Finance

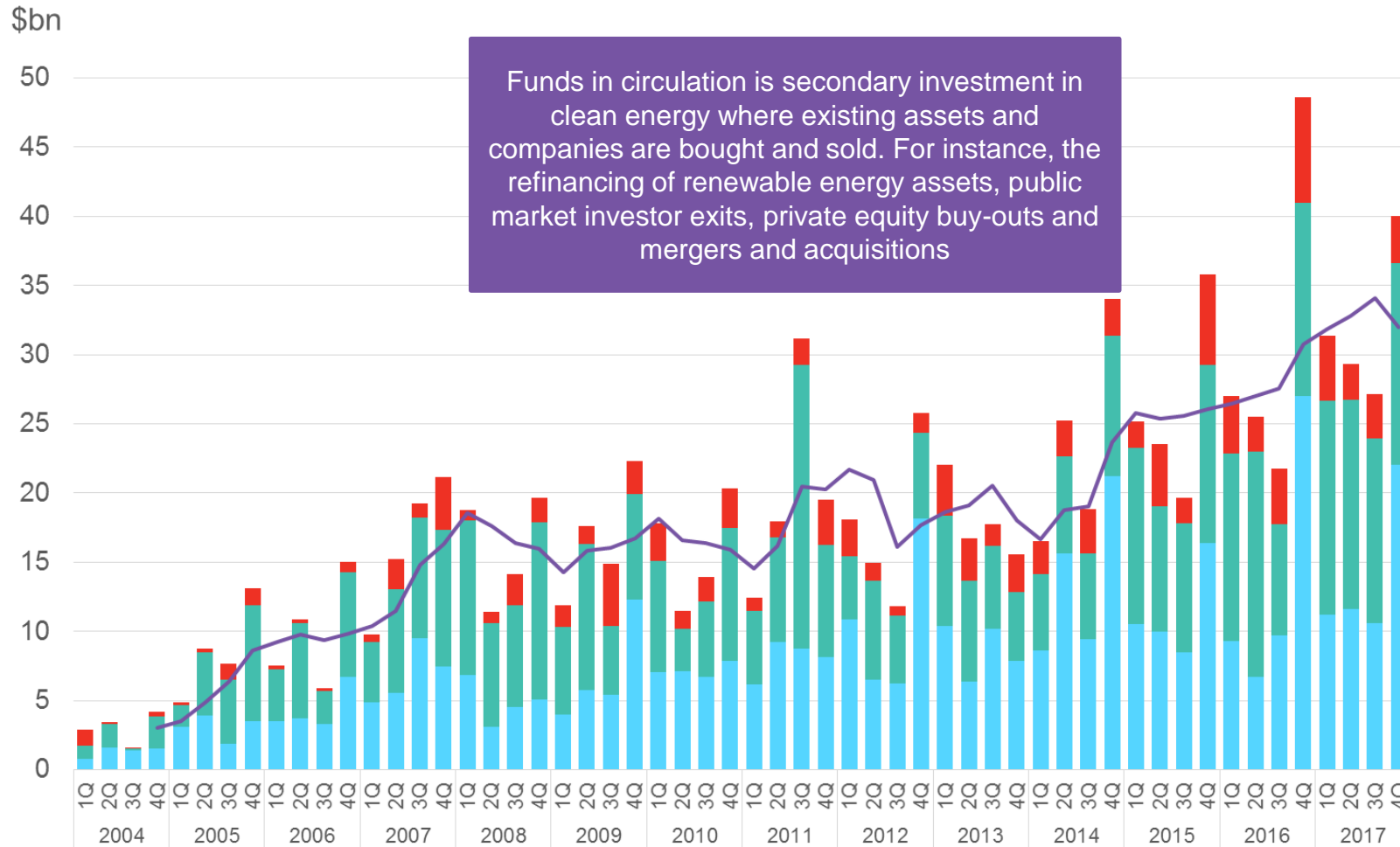


# Quarterly Trends, Funds in Circulation

Quarterly trends since 1Q 2004

# Global Clean Energy, Funds in Circulation, by Region

1Q 2004 – 4Q 2017



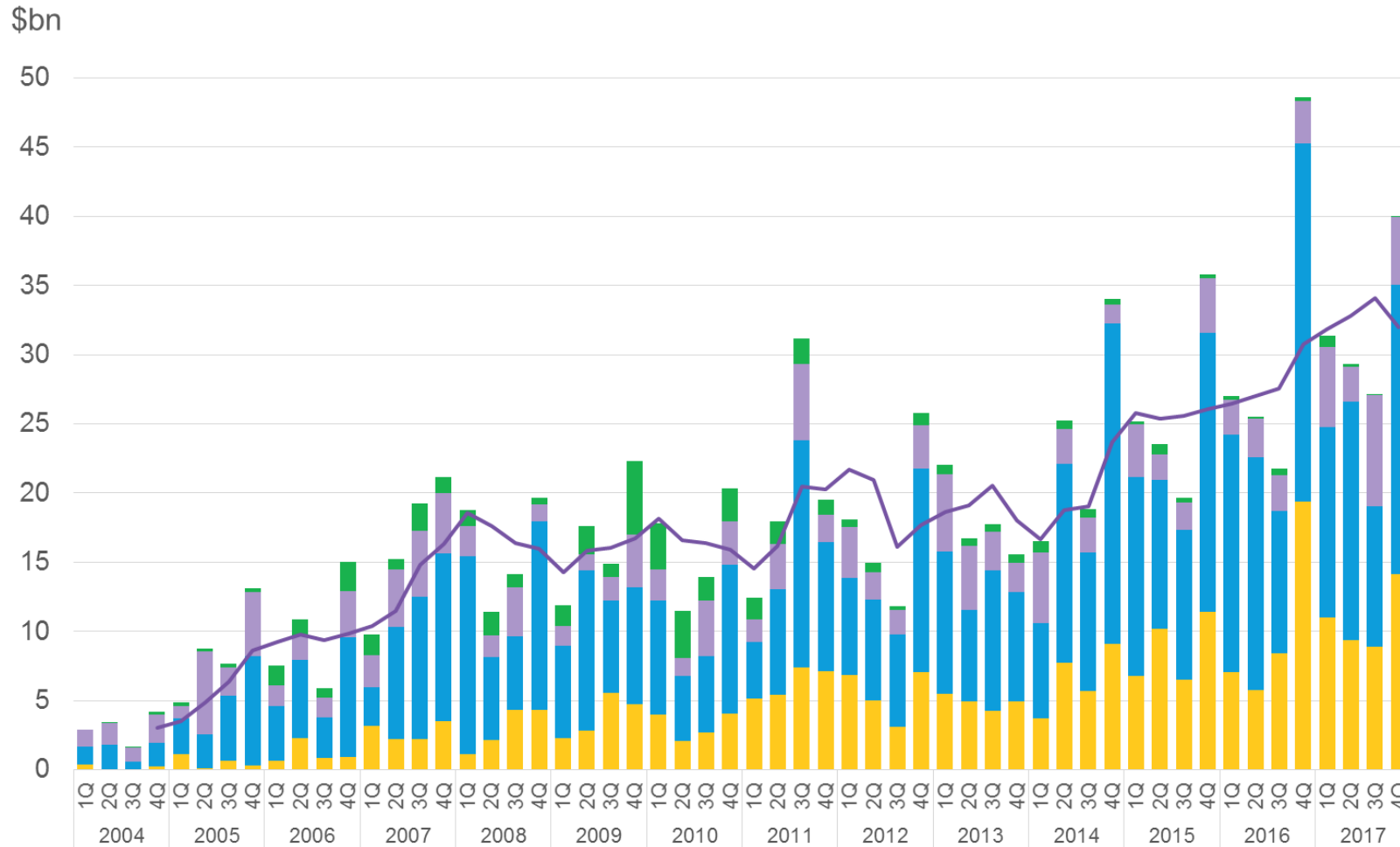
Version WF18.01  
All values nominal

AMER EMEA APAC

Source:  
Bloomberg New Energy Finance

# Global Clean Energy, Funds in Circulation, by Sector

1Q 2004 – 4Q 2017



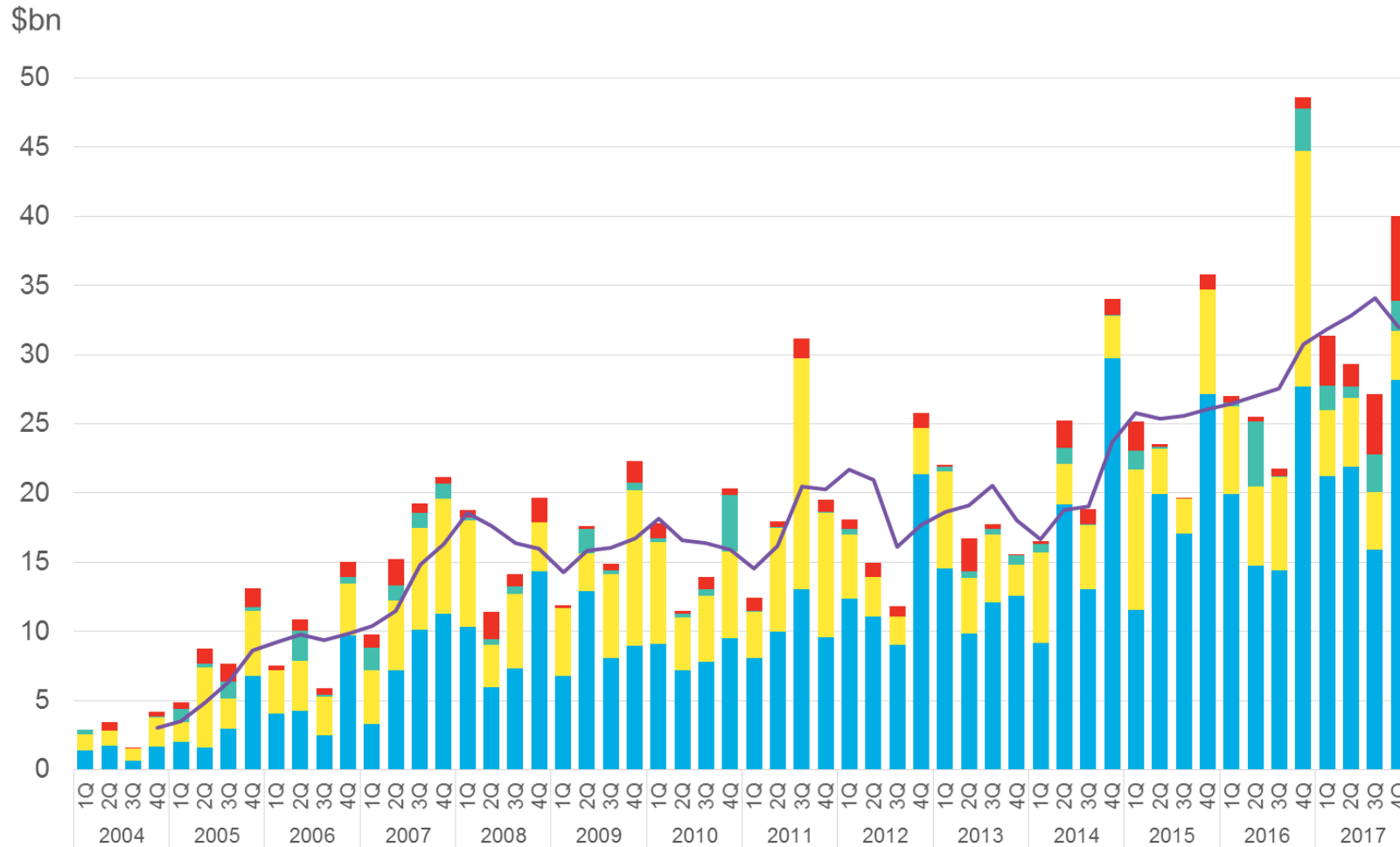
Version WF18.01  
All values nominal

■ Solar ■ Wind ■ Other ■ Biofuels

Source:  
Bloomberg New Energy Finance

# Global Clean Energy, Funds in Circulation, by Asset Class

1Q 2004 – 4Q 2017



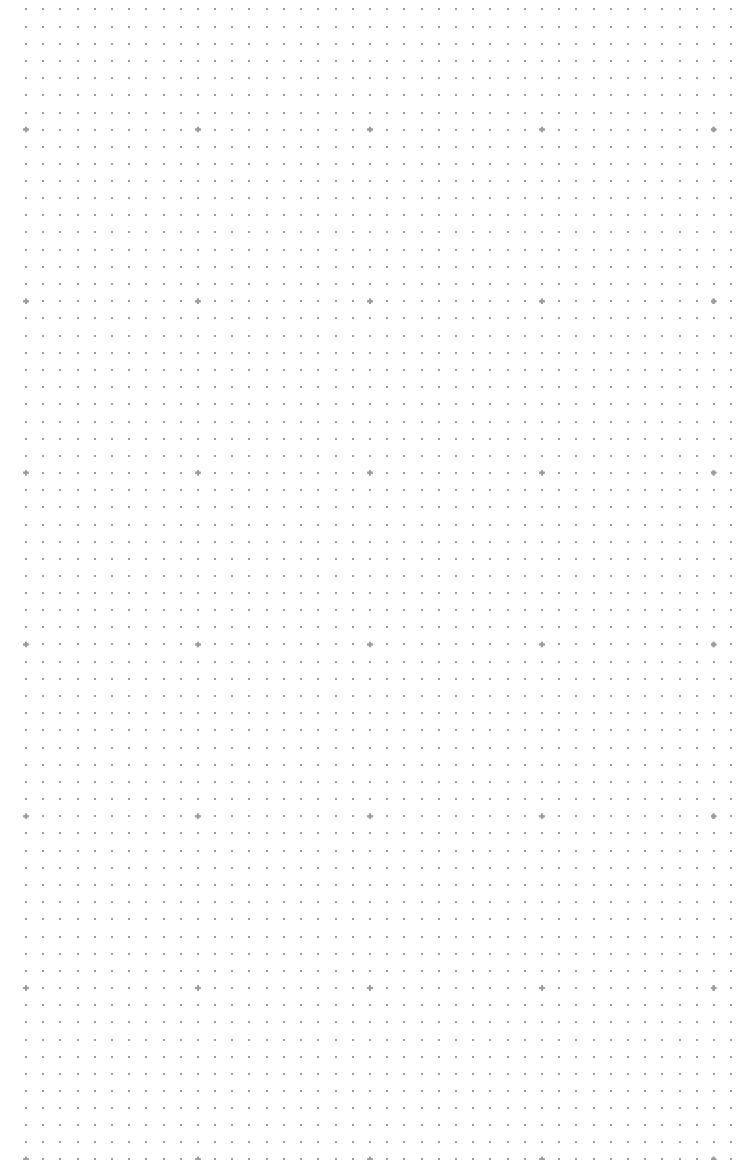
Version WF18.01  
All values nominal

■ Asset fin acq & ref ■ Corporate m&a ■ PM exits ■ PE buy outs

Source:  
Bloomberg New Energy Finance

# Top Deals

## Top Quarterly Deals for 4Q 2017



# Top Asset Finance Deals

## 2017



Project Name	Country	Sector	Type of Transaction	Capacity	Value
<u>Hornsea Project Two Offshore Wind Farm</u>	U.K.	Wind	Equity	1386 MW	\$4,828m
<u>Oklahoma Wind Catcher Wind Farm</u>	U.S.	Wind	Equity	2000 MW	\$2,902m
<u>Hohe See Offshore Wind Farm</u>	Germany	Wind	Equity	497 MW	\$1,910m
<u>Deutsche Bucht Offshore Wind Farm</u>	Germany	Wind	Debt	252 MW	\$1,550m
<u>Shanghai Electric Power Yancheng Dafeng H3 Offshore Wind Farm</u>	China	Wind	Equity	302 MW	na

# Top Venture Capital / Private Equity Deals

## 2017

Organisation	Country	Sector	Type of Transaction	Value
<u>Microvast Power System</u>	China	Electrified Transport	VC - Series A / First round	\$400m
<u>Greenko Energy Holdings</u>	India	Wind	PE - Expansion capital	\$155m
<u>Proterra</u>	U.S.	Electrified Transport	PE - Expansion capital	\$140m
<u>Sunlight Financial</u>	U.S.	Solar	VC - Series A / First round	\$130m
<u>Hero Future Energies</u>	India	Wind	PE - Expansion capital	\$125m

# Top Public Market Deals

## 2017



Organisation	Stock Exchange	Sector	Type of Transaction	New Equity Raised
<u>Tesla</u>	NASDAQ	Electrified Transport	Convertible	\$978m
<u>Guodian Nanjing Automation</u>	Shanghai Stock Exchange	Digital Energy	Private Investment in Public Equity (PIPE)	\$545m
<u>Risen Energy</u>	Shenzhen Stock Exchange	Solar	Secondary	\$465m
<u>Greencoat UK Wind</u>	London Stock Exchange	Wind	Secondary	\$447m
<u>China Everbright Greentech</u>	Hong Kong Stock Exchange	Biomass & Waste	IPO	\$434m

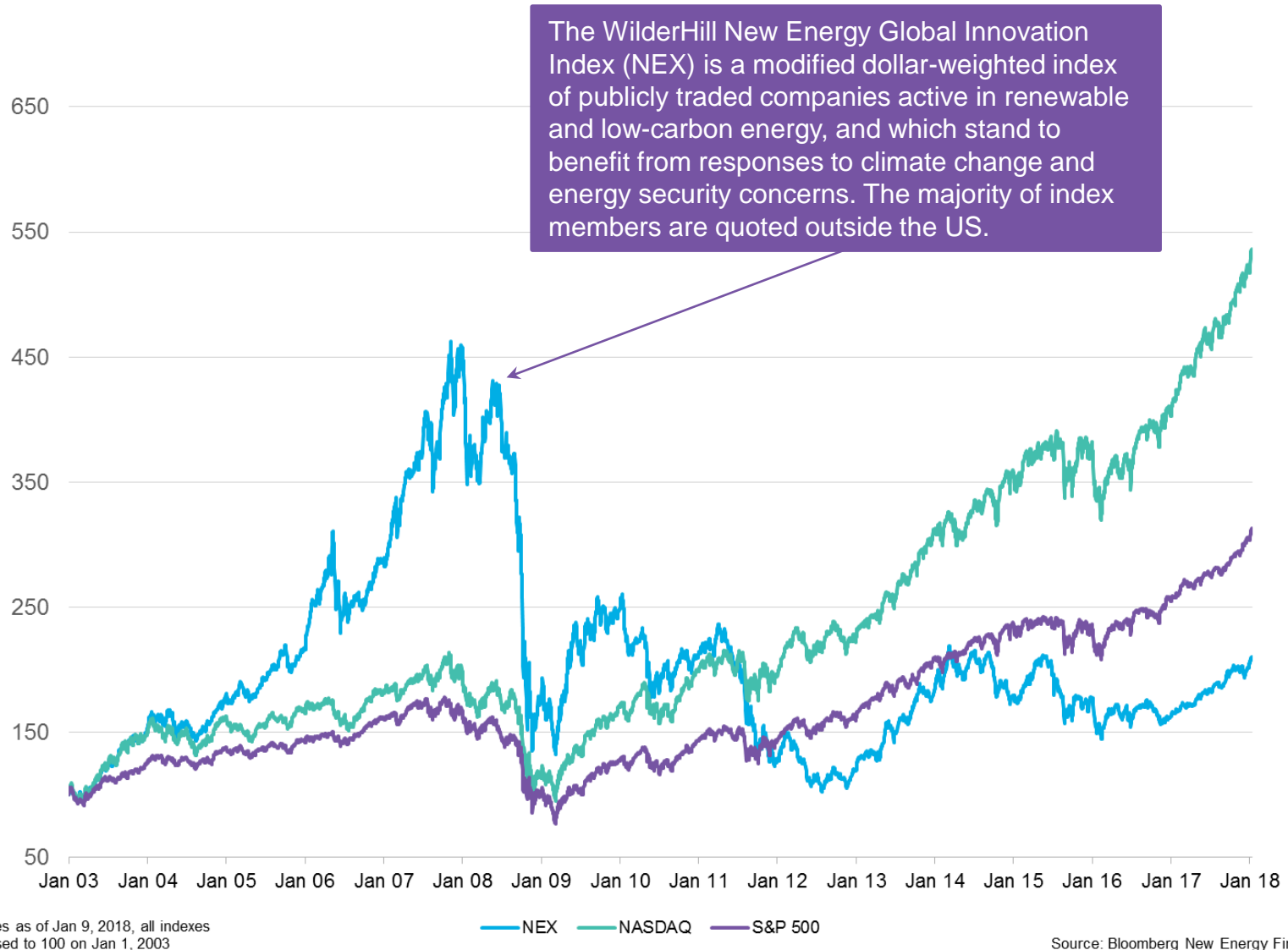


# Clean Energy Stock Performance

Clean energy and the stock market

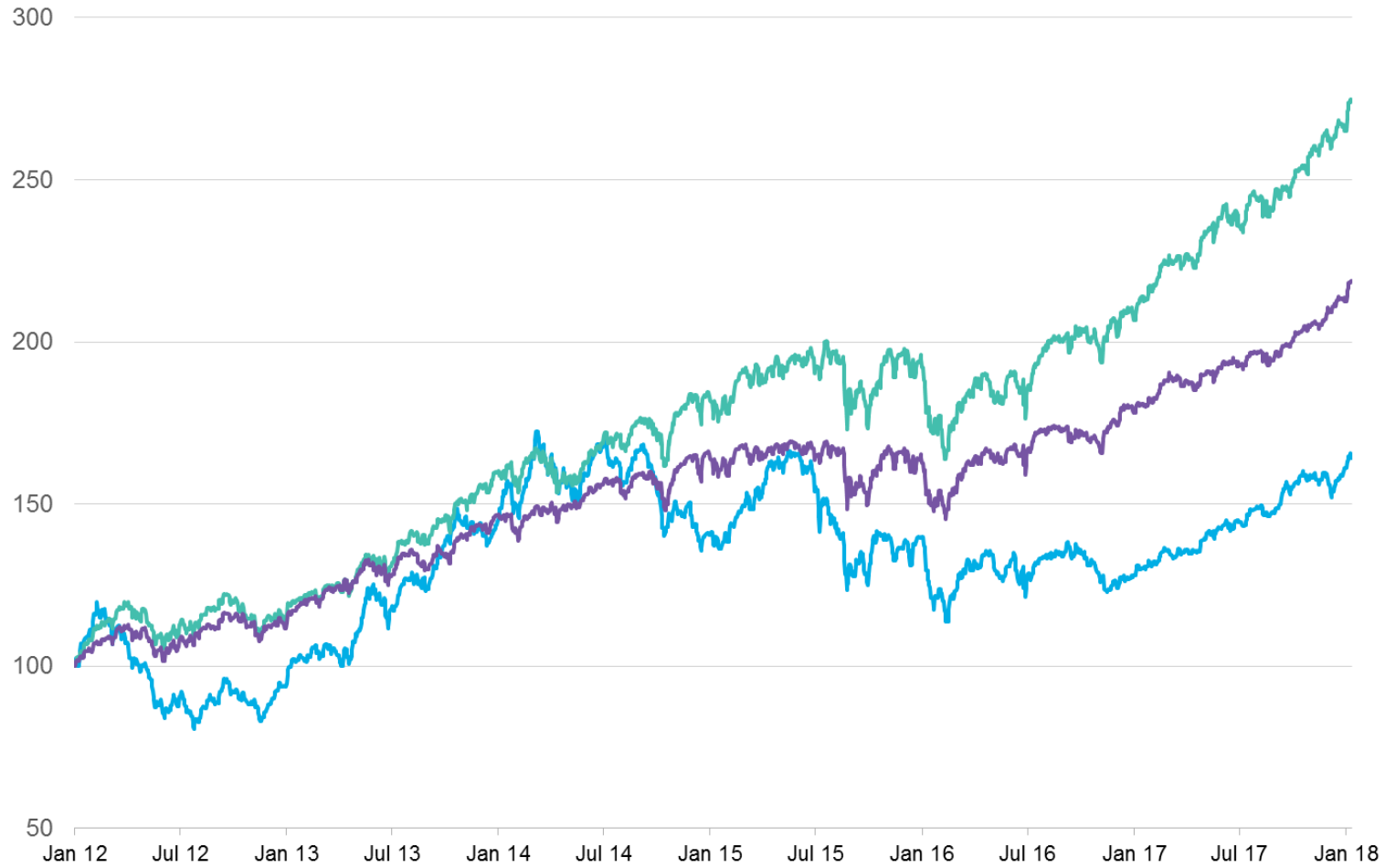
# NEX vs NASDAQ & S&P 500

2004 – 2018 YTD



# NEX vs NASDAQ & S&P 500

2012 – 2018 YTD



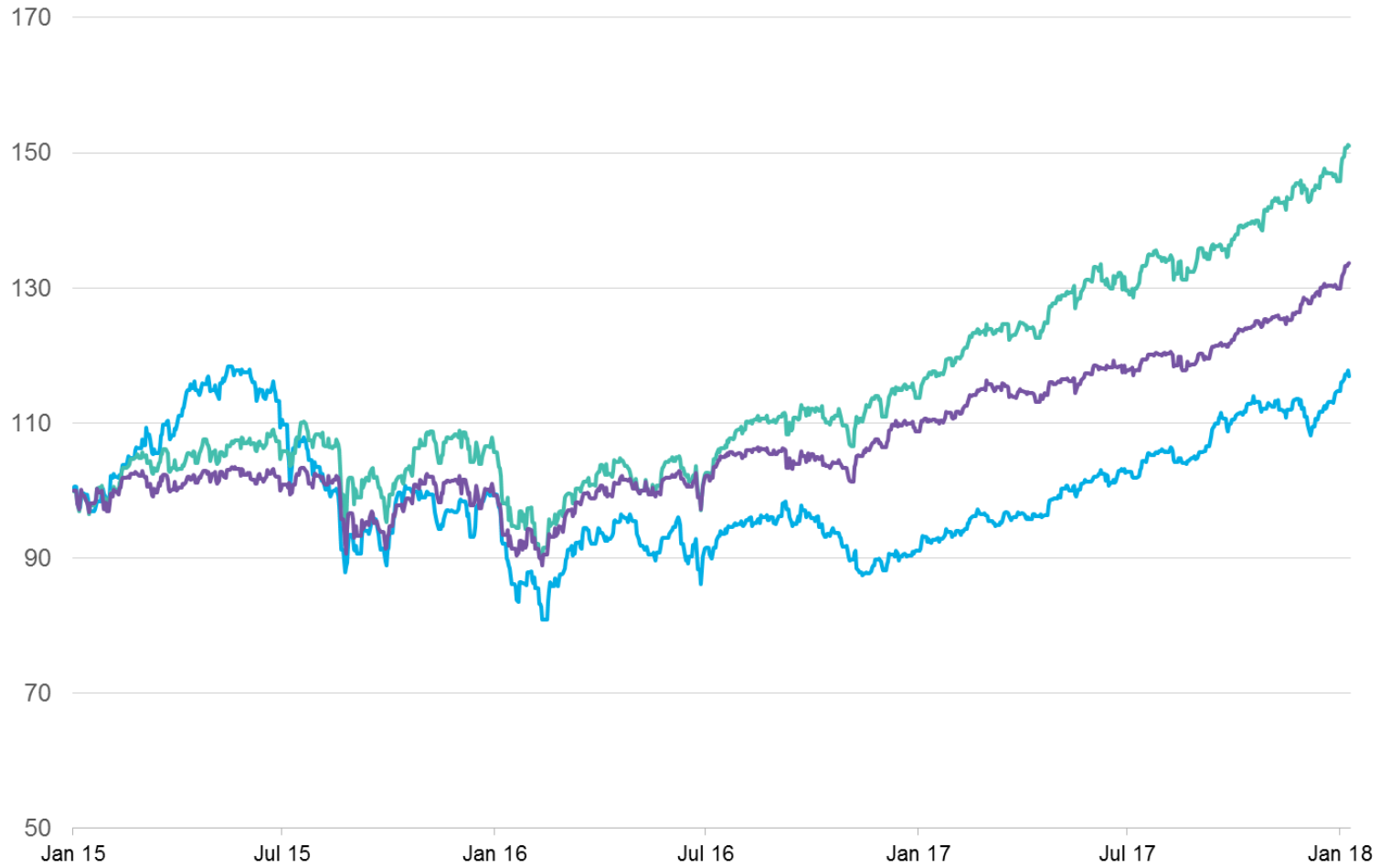
Values as of Jan 9, 2018, all indexes rebased to 100 on Jan 1, 2012

— NEX — NASDAQ — S&P 500

Source: Bloomberg New Energy Finance

# NEX vs NASDAQ & S&P 500

2015 – 2018 YTD



Values as of Jan 9, 2018, all indexes rebased to 100 on Jan 1, 2015

— NEX — NASDAQ — S&P 500

Source: Bloomberg New Energy Finance

# Definitions and FAQs

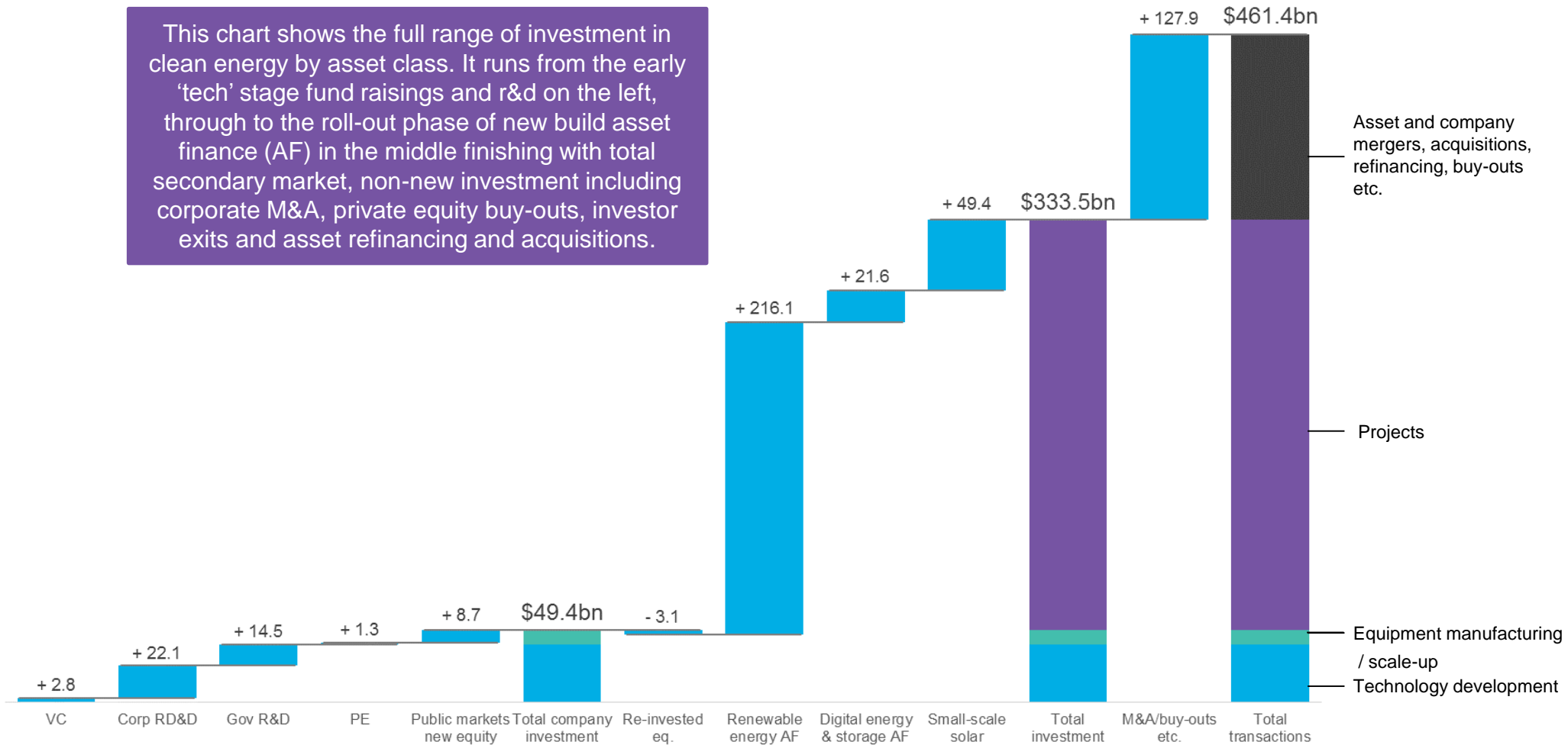
How Bloomberg New Energy Finance  
defines clean energy

# Definitions

## 2017 Clean Energy Investment Types and Flows

\$bn

This chart shows the full range of investment in clean energy by asset class. It runs from the early 'tech' stage fund raisings and r&d on the left, through to the roll-out phase of new build asset finance (AF) in the middle finishing with total secondary market, non-new investment including corporate M&A, private equity buy-outs, investor exits and asset refinancing and acquisitions.



Version WF18.01  
All values nominal

Source:  
Bloomberg New Energy Finance

# Definitions

## Asset classes

### Venture capital and private equity (VCPE)

Early and late stage venture capital funding rounds of pure play clean energy companies as well as funds raised privately for the purposes of expansion.

### Public markets (PM)

Funds raised by publicly quoted or OTC quoted pure play clean energy companies on the capital markets. This may be through IPOs or follow-on offerings like secondary offerings, private investment in public equity or PIPEs, convertibles etc.

### Asset finance

The new build financing of renewable energy generating projects as well as smart metering and energy storage projects - smart metering and energy storage investment are only reported annually. Renewable energy generating projects includes both electricity generating and biofuels producing assets. Projects may be financed off the owner's balance sheet, or through financing mechanisms such as project finance, syndicated equity from institutional investors, or project bonds underwritten by banks.

### Re-invested equity

Isolates values for balance sheet-financed project investments by companies who have raised money privately or publicly over the past 12 months. The purpose of this category is to prevent double counting of money raised publicly or privately that has been invested in clean energy assets.

### Small scale solar

Given the technical limitations in tracking small-scale solar projects, BNEF's asset finance database excludes projects below roughly 1MW. Unlike utility scale asset investment, small-scale solar investment is based on top-down analyst estimates.

### Government r&d

Government r&d figures are sourced from the IEA, IMF, OECD, and various government agencies.

### Corporate r&d

The Bloomberg Terminal is used to source corporate r&d figures for key quoted companies in all clean energy sectors.

# Definitions

## Sectors

### Wind

Electricity generation using wind turbines. Included in this sector, are players across the entire value chain of both onshore and offshore developments. From manufacturers of turbines, components and subassemblies to developers, generators, utilities and engineering firm.

### Solar

All technologies which capture energy directly from the sun. These include production of electricity using semiconductor-based photovoltaic (pv) materials, use of concentrated sunlight to heat fluids that drive power generation equipment (solar thermal), and passive methods which use sunlight to heat water. Whilst company level investment of passive methods is recorded, investment in passive projects is not.

### Biofuels

Liquid transportation fuels including biodiesel and bioethanol. These can be derived from a range of biomass sources, including sugar cane, rape seed, soybean oil or non-food cellulosic feedstock. Our database excludes producers of base biomass, but includes suppliers of everything from the processing technologies and equipment, through the logistics of distribution, to manufacturers of energy systems which are specially adapted for the use of biofuels and products, and the services on which they depend.

### Biomass & waste

Electricity and/or heat produced with bio-based feedstocks, typically through incineration but also through more advanced processes like gasification or anaerobic digestion. This sector also includes waste-to-energy which includes energy produced through landfill gas projects and incineration of municipal and industrial waste.

### Energy smart technologies

This sector covers technologies like digital energy, smart grids, power storage, hydrogen and fuel cells, advanced transportation and energy efficiency on both the demand and supply side.

### Other renewables

Includes small hydro - hydro projects with capacities smaller or equal to 50MW; geothermal - extraction of useful power from heat stored in the earth; marine - the extraction of tidal, wave and thermal energy from the ocean.



# Definitions

## Sectors

### Other low carbon tech / services

This sector covers clean energy service companies such as consultants, government agencies and policy makers, NGOs, financial service providers, investors, and clean energy information providers (such as ourselves). It also covers the corporate activity of organizations across the carbon market value chains.

# FAQs



## Q1: Why is there a difference between the sum of the quarterly figures and the annual figures?

Quarterly figures do not include certain asset classes which we only produce annually. These asset classes are corporate and government r&d and asset finance for energy smart technologies, in other words, smart meters and energy storage investment

## Q2: Which countries are included in Europe?

Europe includes all 28 EU countries, and non-EU countries like Switzerland, Norway, Turkey and Russia. The majority of clean energy investment stems from the EU though

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[sales.bnef@bloomberg.net](mailto:sales.bnef@bloomberg.net)

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