

Global Renewables Investment

Renewables Networking Platform, Brussels

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October 17, 2017



**Bloomberg
New Energy Finance**

Contents

Clean energy investment	2
Renewable energy costs	8
Sources of finance	11
EU policy dimension	

Clean energy investment

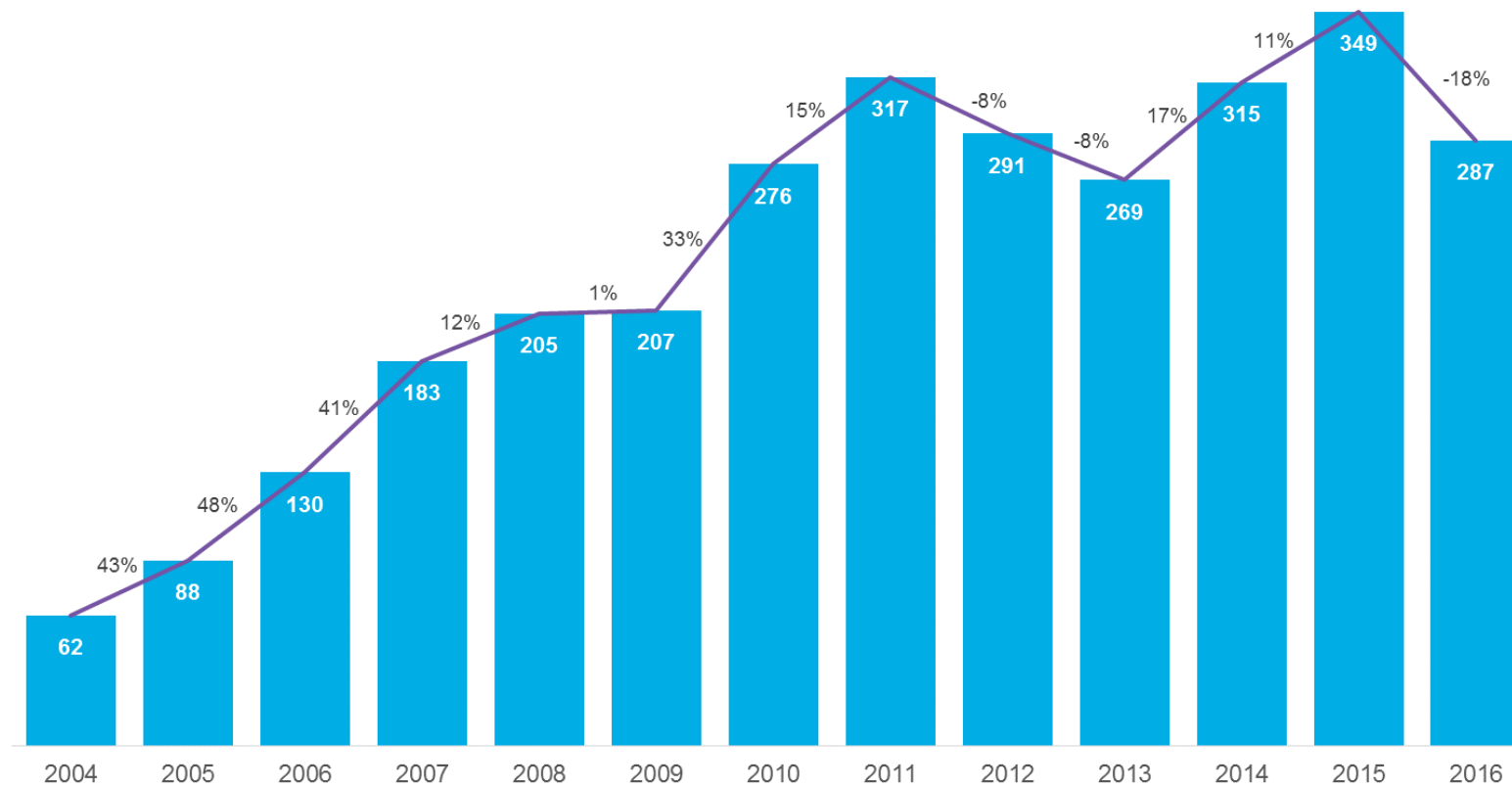


Source: Bloomberg Mediasource

Global new investment in clean energy

2004 – 2016

\$bn

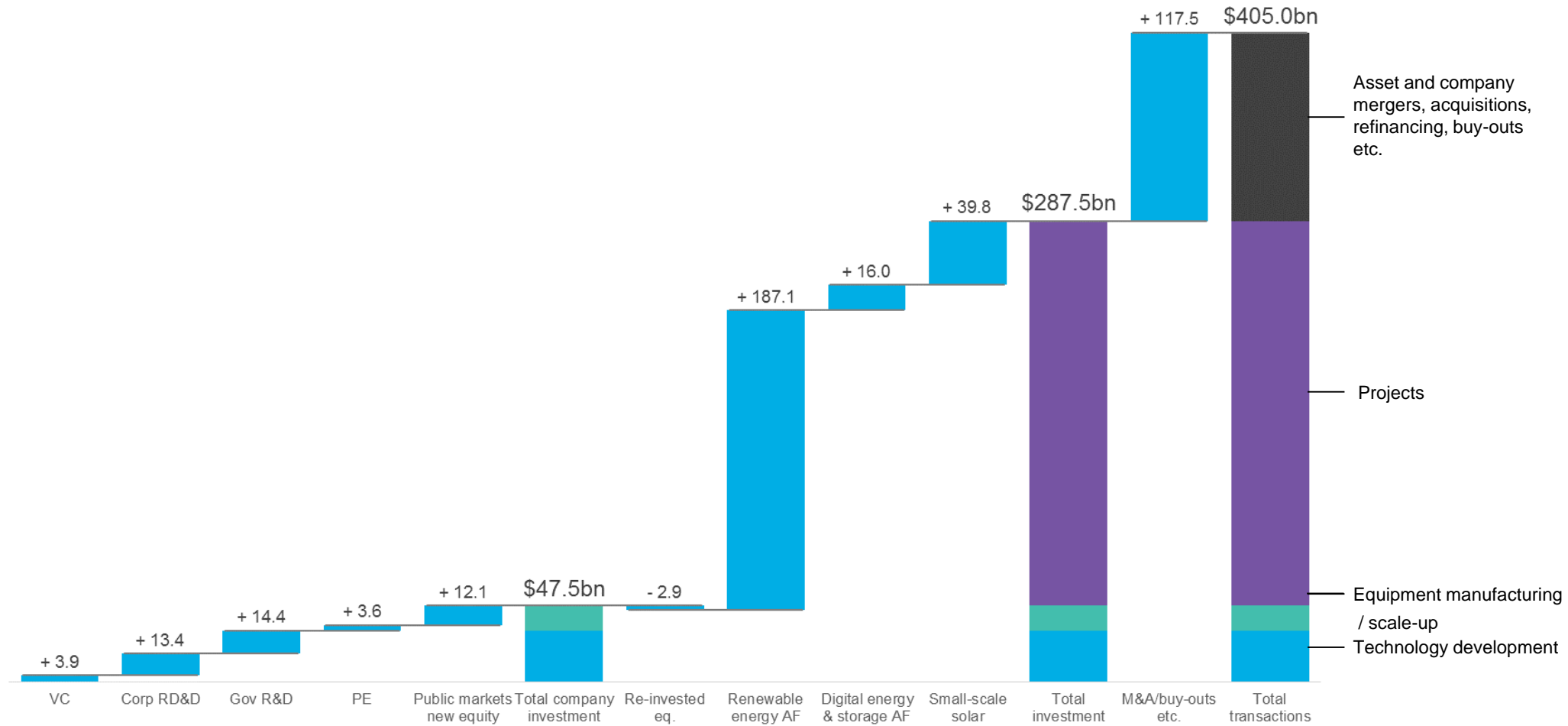


Version WF17.07
All values nominal

Source:
Bloomberg New Energy Finance

2016 clean energy investment types and flows

\$bn



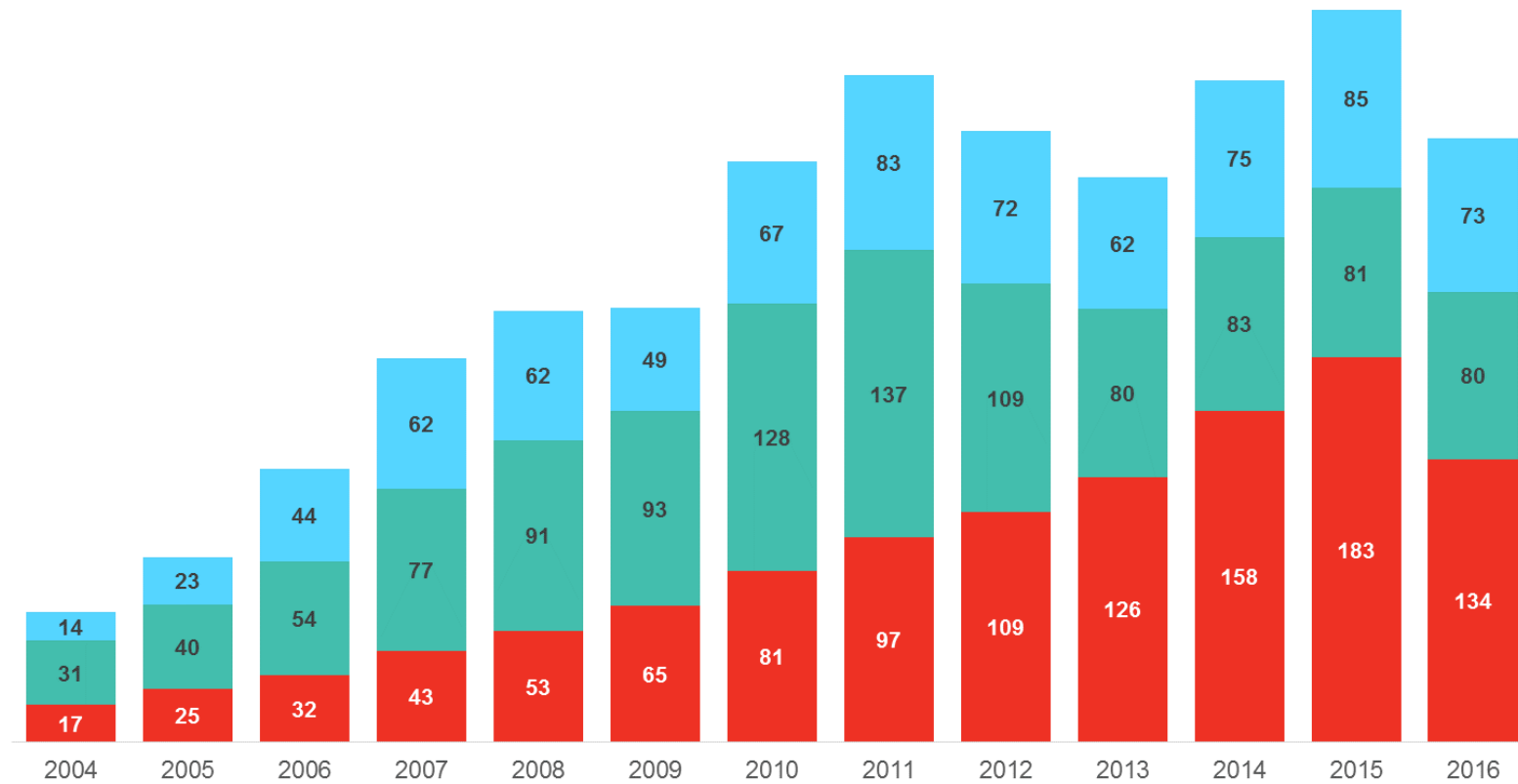
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Global new investment in clean energy by region

2004 – 2016

\$bn

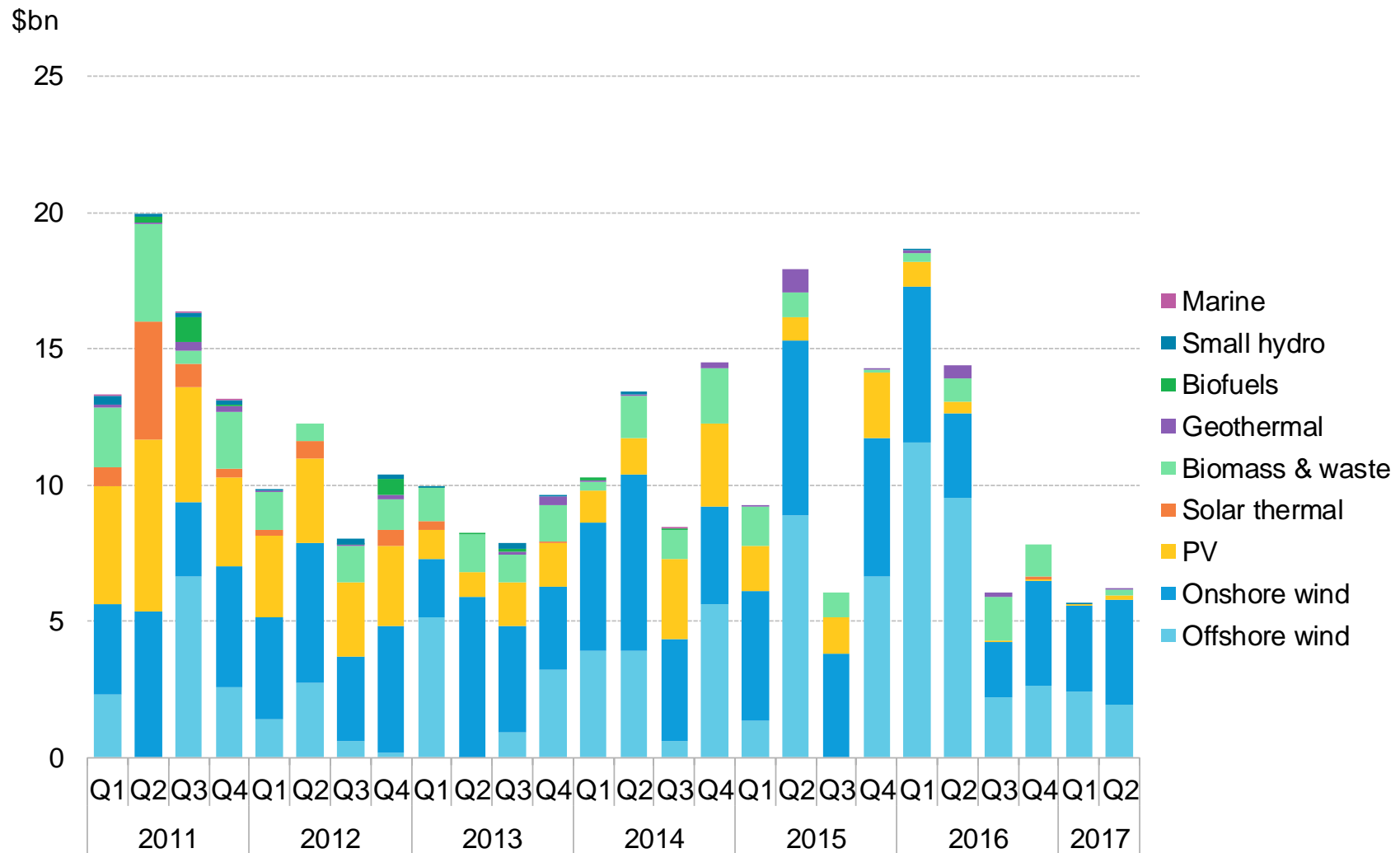


Version WF17.07
All values nominal

■ APAC ■ EMEA ■ AMER

Source:
Bloomberg New Energy Finance

Asset finance of European renewables by sector



Source: Bloomberg New Energy Finance

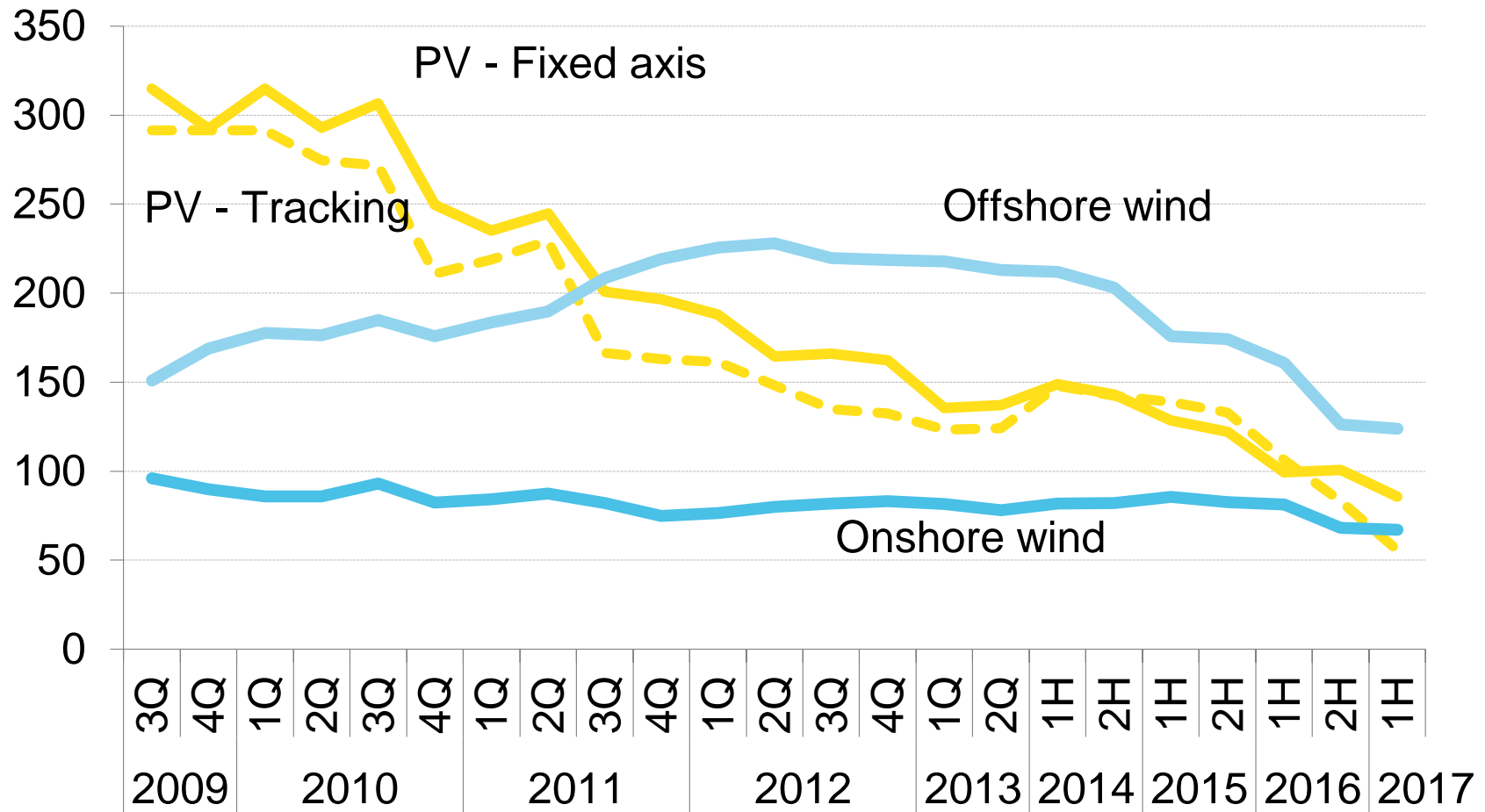
Renewable energy costs



Source: Bloomberg Mediasource

Global benchmark solar and wind LCOE

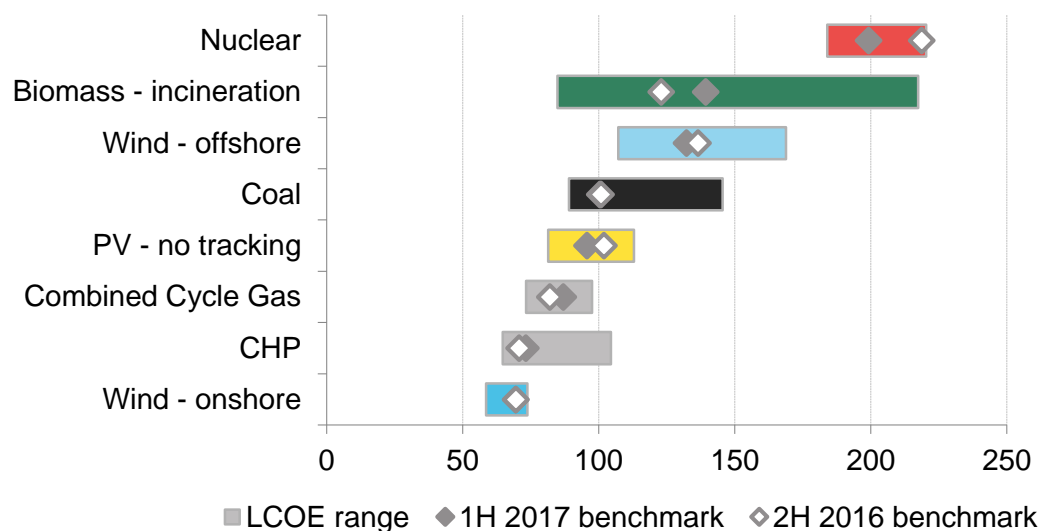
(\$/MWh nominal)



Source: Bloomberg New Energy Finance

1H 2017 LCOE – U.K.

selected technologies (\$/MWh)



Source: Bloomberg New Energy Finance

- **Onshore wind** continues to dominate as the cheapest form of electricity generation in the U.K. at \$70/MWh. CHP follows closely at \$71/MWh.
- **Biomass** incineration has seen an increase, moving up 13% to \$139/MWh.
- In contrast **offshore wind** continues to see its LCOE drop, but the technology still remains more expensive than other major technologies at \$132/MWh.
- **PV** continues to get more competitive against **combined-cycle gas** plants on an LCOE basis. The former now has a benchmark cost of \$94/MWh against \$87/MWh for gas.

Technology	Capex (\$m/MW)			Capacity factor (%)			Fixed O&M (\$/MW/year)	Debt ratio (%)	Cost of debt (bps to LIBOR)	Cost of equity (%)	LCOE (\$/MWh)
	Low	Benchmark	High	Low	Benchmark	High	Benchmark	Benchmark	Benchmark	Benchmark	Benchmark
Wind - onshore	1.70	1.70	1.70	29%	31%	38%	23,551	66%	220	8%	70
CHP	0.86	1.04	1.24	50%	70%	80%	58,775	61%	300	10%	73
Combined Cycle Gas	0.92	1.11	1.02	50%	60%	80%	28,600	61%	300	11%	87
Coal	1.52	1.66	1.91	40%	60%	70%	39,057	0%	0	12%	100
PV no tracking	0.94	0.99	1.04	10%	11%	12%	12,500	80%	220	8%	94
Biomass	3.6	4.9	8.8	80%	85%	90%	317,700	70%	250	10%	139
Wind - offshore	3.81	4.45	5.45	44%	46%	48%	99,000	70%	250	10%	132
Nuclear	7.15	7.15	7.15	90%	91%	92%	100,063	0%	0	10%	199

Note: Includes \$26/Mt carbon price for gas and coal and \$20/Mt for CHP (inflated with 2% over the project life time).

Source: Bloomberg New Energy Finance

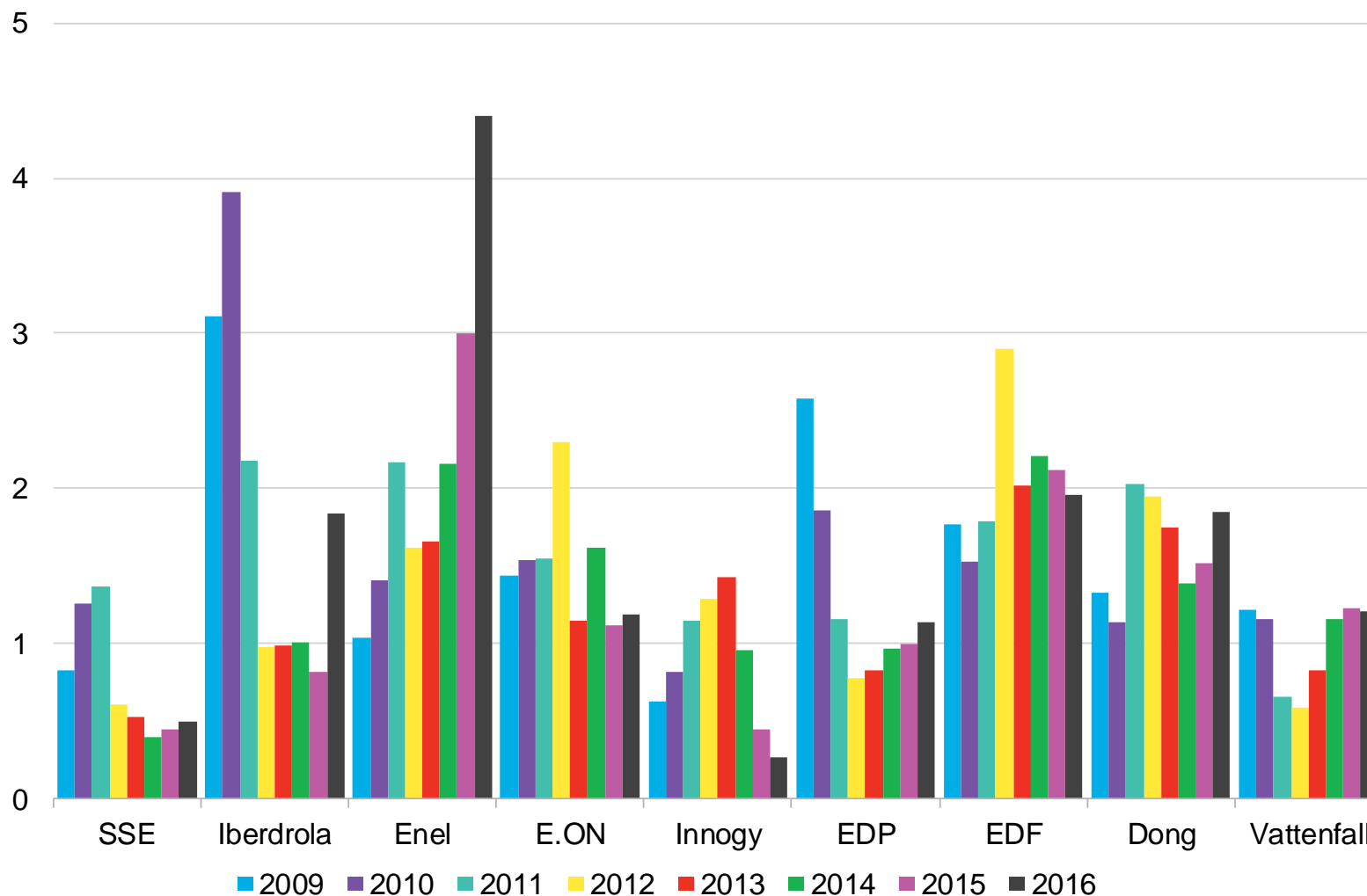
Sources of finance



Source: Bloomberg Mediasource

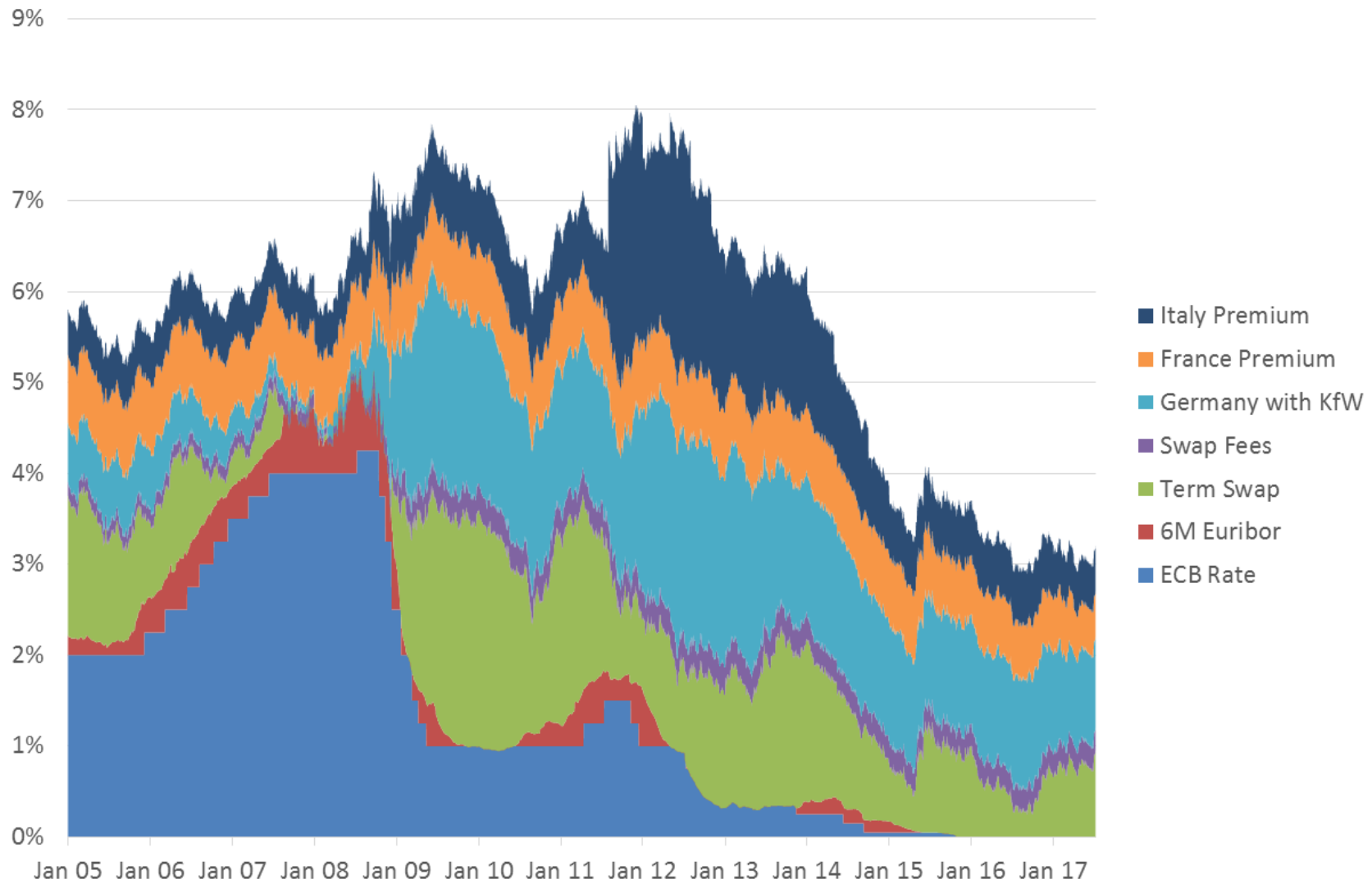
Capex on renewables by nine European utilities, by year

\$bn



Source: Bloomberg New Energy Finance, utility annual reports

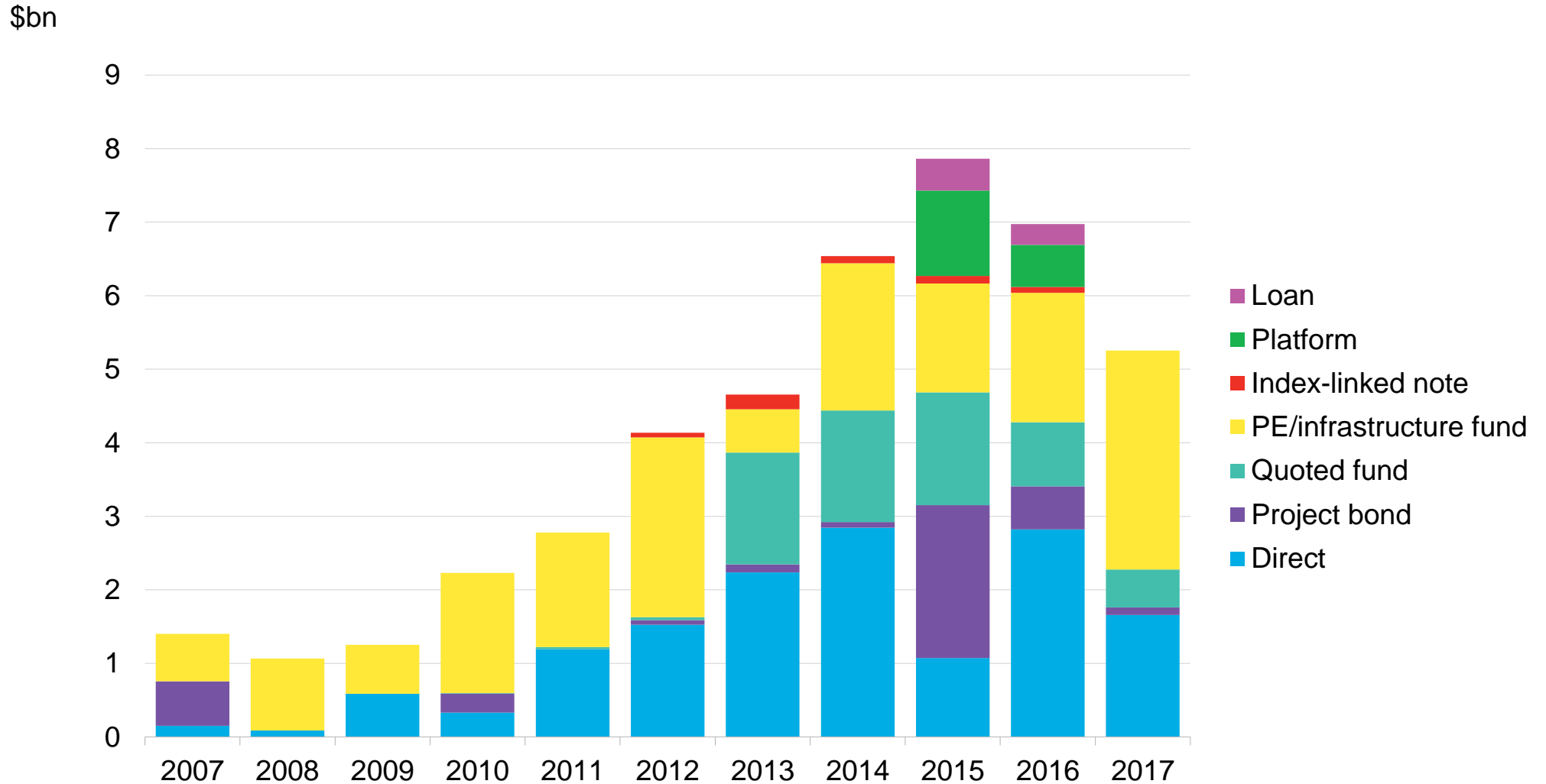
Initial cost of debt for onshore wind farm in euro area



Source: Bloomberg New Energy Finance

Institutional commitments to European renewables projects

2007 – 2017 YTD



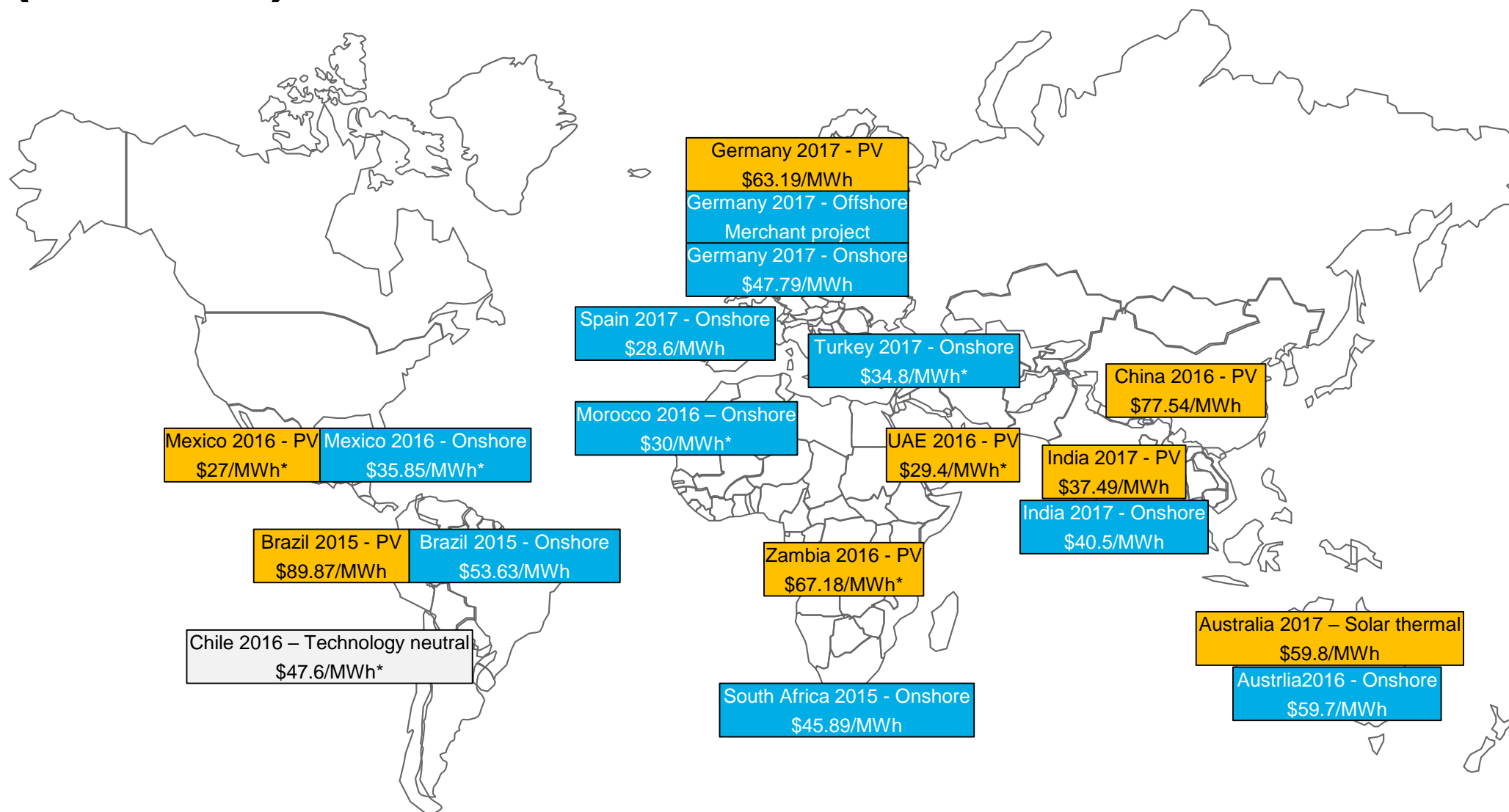
Source: Bloomberg New Energy Finance

EU policy dimension



Source: Bloomberg Mediasource

Selection of record winning bids (nominal)



Source: Bloomberg New Energy Finance. Note: bids with "*" are auctions where tariffs are paid out in dollars. Note that most tariffs will include adjustments for inflation and other factors that will influence the final bid. For a full explanation on comparing nominal versus levelized bids, see pp6 in 1H 2017 EMEA LCOE Update ([web](#) | [terminal](#)).

UK offshore wind auction, September 2017

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Offshore Wind Costs Fall Below New Nuclear Plants in U.K. (2)

- All bids to supply power from wind farms below Hinkley Point
- Renewable technology is now among cheapest ways to supply grid

By Anna Hirtenstein

(Bloomberg) -- The cost of generating electricity from offshore wind farms fell sharply in the U.K. to below the price the next nuclear reactors will charge, making the form of clean energy one of the cheapest ways to supply the grid.

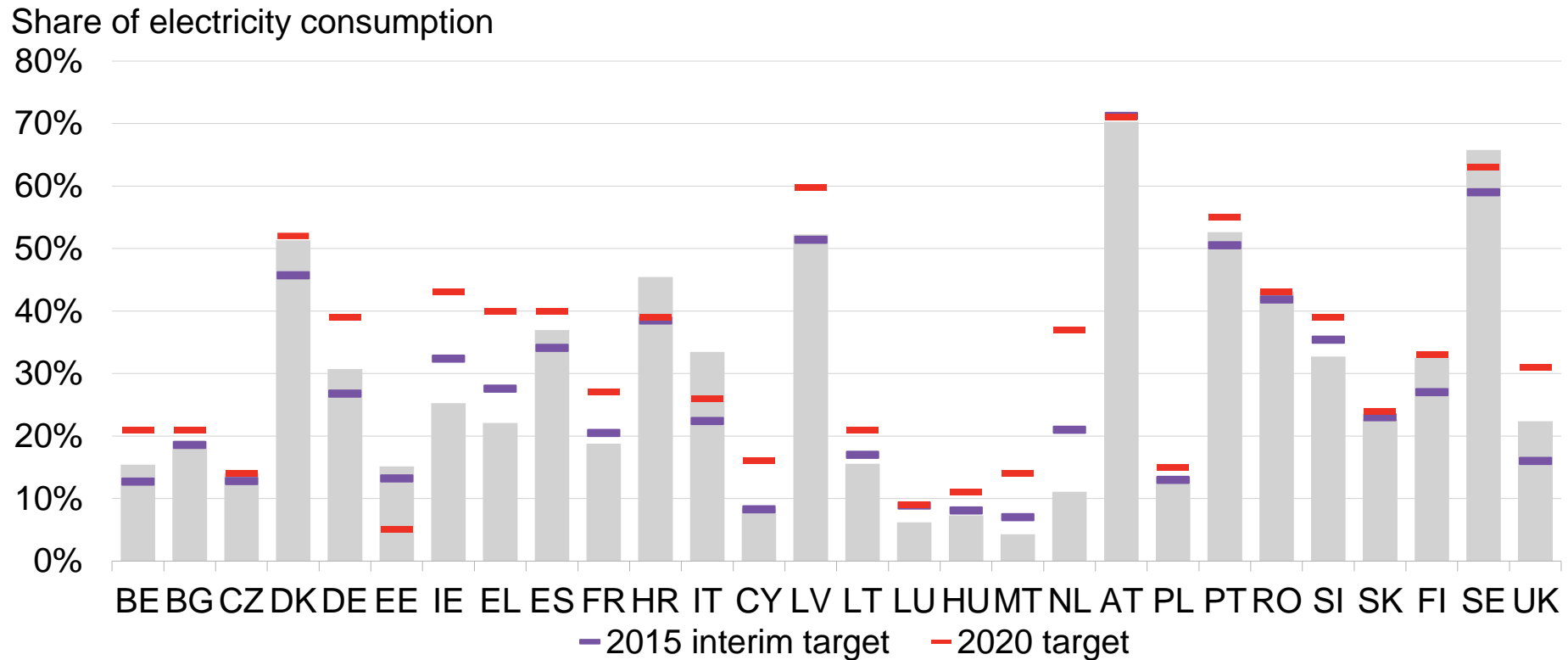
In a government auction that handed out power-purchase contracts worth 176 million pounds (\$232 million) a year, all of the bids to build offshore wind farms and other renewable technologies were below the 92.50 pounds per megawatt-hour price awarded to the controversial Hinkley Point atomic plant due to be complete in the next decade.

Winners included the Danish utility [Dong Energy A/S](#), with an offer of 57.50 pounds per megawatt-hour for power from its Hornsea 2 offshore wind farm, and [EDP Renovaveis SA](#) and [Engie SA](#), which will receive the same for their Moray Fifth East project. Environmental and renewable-energy groups said the 50 percent plunge in the cost of power from turbines sited in the sea indicates that clean-energy technologies are quickly rivaling traditional forms of generation without heavy subsidies.

"This is a breakthrough moment for offshore wind," Matthew Wright, managing

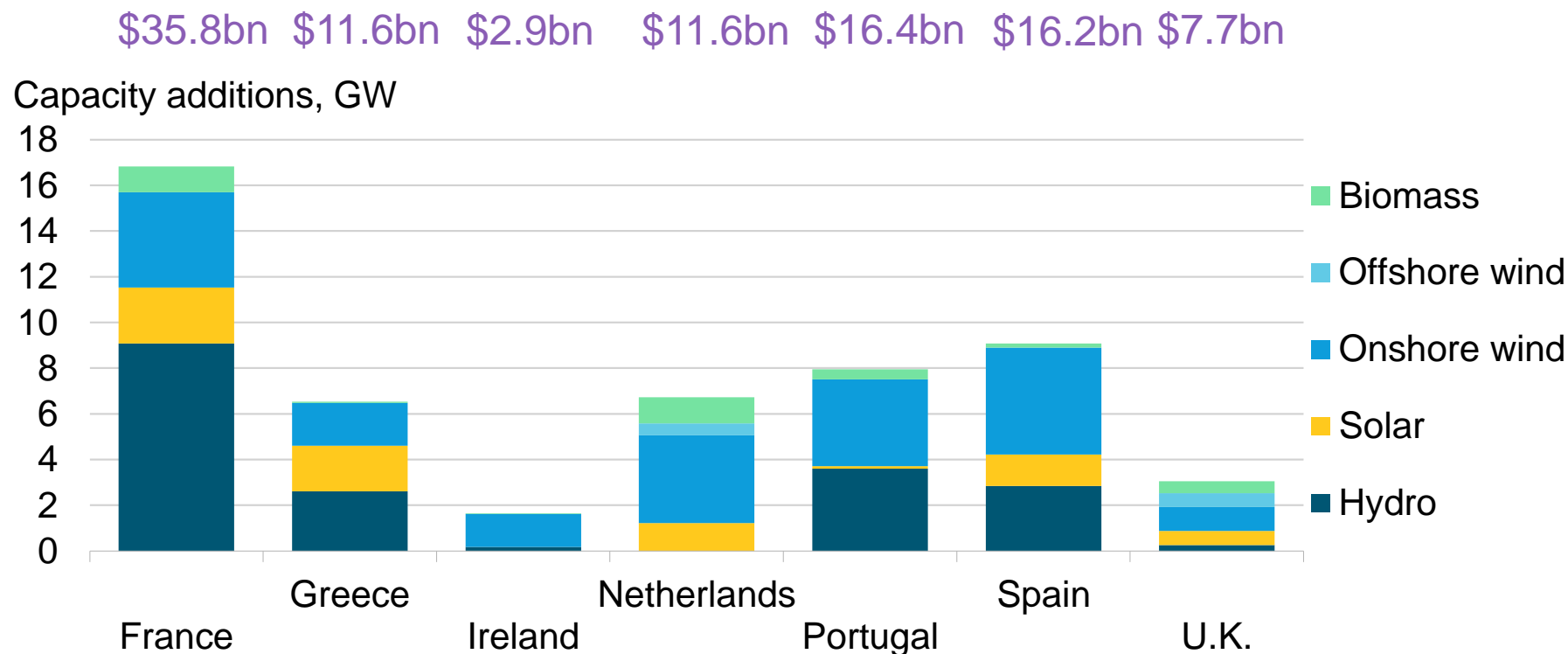
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Gap to 2020 EU renewable electricity targets



Source: Eurostat; Bloomberg New Energy Finance.

Cost of renewables capacity additions required to meet the 2020 targets



Source: Bloomberg New Energy Finance. Note: Assuming capacity mix over last five years and capacity financed today.

Question marks

- There is plenty of money to finance European renewables now.
- But will investors be happy to provide equity and debt for projects backed by very low subsidies, or zero subsidies?
- And will banks be prepared to lend to projects that rely for revenues on merchant power prices or short-term power purchase agreements?
- Which of the balancing technologies (gas, interconnectors, batteries, demand response, chemical storage) will be most economical for different time periods? How will it be financed?

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