Global Renewables Investment

Renewables Networking Platform, Brussels

Angus McCrone

October 17, 2017
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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

- Asset and company mergers, acquisitions, refinancing, buy-outs etc.
- Projects
- Equipment manufacturing / scale-up
- Technology development
Global new investment in clean energy by region

2004 – 2016

$bn

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)**

- **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.

#### Source: Bloomberg New Energy Finance

<table>
<thead>
<tr>
<th>Technology</th>
<th>Capex ($/MWh)</th>
<th>Capacity factor (%)</th>
<th>Fixed O&amp;M ($/MW/year)</th>
<th>Debt ratio (%)</th>
<th>Cost of debt (bps to LIBOR)</th>
<th>Cost of equity (%)</th>
<th>LCOE ($/MWh)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Benchmark</td>
<td>High</td>
<td>Low</td>
<td>Benchmark</td>
<td>High</td>
<td>Benchmark</td>
</tr>
<tr>
<td>Wind - onshore</td>
<td>1.70</td>
<td>1.70</td>
<td>1.70</td>
<td>29%</td>
<td>31%</td>
<td>38%</td>
<td>23,551</td>
</tr>
<tr>
<td>CHP</td>
<td>0.86</td>
<td>1.04</td>
<td>1.24</td>
<td>50%</td>
<td>70%</td>
<td>80%</td>
<td>58,775</td>
</tr>
<tr>
<td>Combined Cycle Gas</td>
<td>0.92</td>
<td>1.11</td>
<td>1.02</td>
<td>50%</td>
<td>60%</td>
<td>80%</td>
<td>28,600</td>
</tr>
<tr>
<td>Coal</td>
<td>1.52</td>
<td>1.66</td>
<td>1.91</td>
<td>40%</td>
<td>60%</td>
<td>70%</td>
<td>39,057</td>
</tr>
<tr>
<td>PV no tracking</td>
<td>0.94</td>
<td>0.99</td>
<td>1.04</td>
<td>10%</td>
<td>11%</td>
<td>12%</td>
<td>12,500</td>
</tr>
<tr>
<td>Biomass</td>
<td>3.6</td>
<td>4.9</td>
<td>8.8</td>
<td>80%</td>
<td>85%</td>
<td>90%</td>
<td>317,700</td>
</tr>
<tr>
<td>Wind - offshore</td>
<td>3.81</td>
<td>4.45</td>
<td>5.45</td>
<td>44%</td>
<td>46%</td>
<td>48%</td>
<td>99,000</td>
</tr>
<tr>
<td>Nuclear</td>
<td>7.15</td>
<td>7.15</td>
<td>7.15</td>
<td>90%</td>
<td>91%</td>
<td>92%</td>
<td>100,063</td>
</tr>
</tbody>
</table>

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

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

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
Gap to 2020 EU renewable electricity targets

Share of electricity consumption

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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