DATA DISPATCH

European super-majors Shell, BP leading the charge to electrification

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Market Intelligence

An unprecedented transition in the global energy industry is underway, with an increasing appetite for electricity, natural gas and renewables as alternatives to help decarbonize the world's fuel mix. In response, two of Europe's largest integrated oil and natural gas majors, BP PLC and Royal Dutch Shell PLC, are significantly investing in low or no-carbon energy and new technologies to augment their traditional oil businesses.

Anticipating demand for oil and coal to gradually slow heading into the 2030s, the two majors are slowly steering their businesses toward a more balanced and sustainable energy mix in response to investor and consumer demands. Shell is looking to spend billions of dollars a year on its efforts to decarbonize and electrify its business, pushing into not just the solar markets but also wind generation, energy storage and biofuels. BP's efforts to diversify its portfolio have been focused on solar power after the super-major acquired a 43% stake in Lightsource BP Renewable Energy Investments Ltd. in 2018 for $200 million.

"Integrated oil and gas companies have increasingly been touting their clean energy investments as [environmental, social and governance] investing has grown in popularity," Raymond James analyst Muhammed Ghulam said in an interview. "However, when we look at the amounts they have invested in the [clean tech asset] space relative to their overall capital budgets — less than 5% over the past decade for both BP and Shell — it becomes clear that clean energy remains minor in the context of the companies' asset bases."

Historically, the upstream sector has provided the highest returns for oil and gas companies and their shareholders, and it is in this space where the majors have remained most heavily invested. For Shell, 65% of its business is focused on oil production and refining, 25% is focused on natural gas and 10% on chemicals and other operations. The company is looking to change that composition to 30% each for oil, gas and electricity while retaining the 10% share in chemicals.

Shell and BP are not alone in the transition. Equinor ASA is heavily investing in wind energy, and Exxon Mobil Corp. is using wind and solar to power oil operations in the Permian Basin. When Norway's government announced plans to divest from oil and gas producers they forecast that integrated oil companies will be some of the biggest investors in clean energy going forward. "It is anticipated that companies that do not have renewable energy as their main business will account for 90 percent of the growth in listed renewable energy infrastructure towards 2030," Norway's government said at the time.

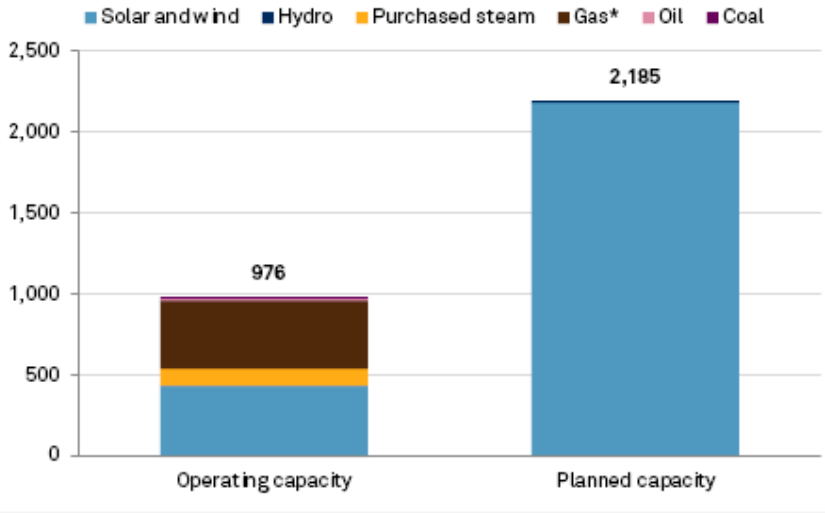
Wind and solar are rapidly gaining share in the global generation mix at a time when oil demand has been sluggish and future demand is in doubt. Leading consulting firm McKinsey & Co. expects oil consumption to slow in the 2030s, while renewables are anticipated to almost double their share in the overall energy mix by 2050, from 19% to 34%. The firm's 2019 Global Energy Outlook forecast renewables will provide more than 50% of the world's electricity by 2035.

"Looking ahead, clean energy's share of the integrateds' capital budgets is likely to continue to grow, but the massive size of each company's asset base means that it will require considerable time before the contribution to revenue and earnings becomes meaningful," Ghulam added.

Shell taking extensive, expensive approach to electrification

Shell plans to spend $1 billion to $2 billion on new energies starting in 2020. If it maintains recently proposed short-term emissions targets and gradually hikes its investments in non-oil technologies and renewables, the Anglo-Dutch major said it could become the world's largest power company by 2035.

Total owned operating and planned capacity for parent Royal Dutch Shell (MW)



Data compiled April 22, 2019.
* Gas includes natural gas and other gases.
Limited to power plants in the U.S. and Canada.
Source: S&P Global Market Intelligence

Presently, more than one-third of Shell's 976 MW of owned and operated capacity is generated by renewable energy. Planned solar and wind capacity additions for the U.S. and Canada stand at 2,180 MW, according to data from S&P Global Market Intelligence.

Shell expects to raise capex for electrification to $2 billion to $3 billion per year by 2025, executives said during a June 4 strategy call.

Established in 2016, Shell New Energies US LLC has invested about $1.6 billion in power and new transportation fuels, including advanced biofuels and hydrogen. In 2018, Shell New Energies expanded its presence in offshore wind power, with projects under development in the Netherlands as well as the U.S.

Adding 100 MW of new solar in 2019, Shell New Energies has 800 MW of wind capacity and 27 MW of solar capacity planned for 2020, according to internal data.

Shell New Energies moved have included a deal for a 49% interest in Cleantech Solar in 2018, a commercial and industrial solar platform in Southeast Asia and India. This was preceded by an acquisition of a 43.3% stake in Silicon Ranch Corp., which develops, owns and operates utility-scale solar power purchase agreement projects, or PPAs, for Fortune 500 companies.

Shell has contracted to buy 4,435 MW of total wind output in the U.S. and Canada, which will be resold into the wholesale market through PPAs. Shell Energy North America (US) LP is one of the top wholesale power marketers in North America.

Shell and its subsidiaries' M&A activity in power, renewables and energy storage started to accelerate after 2016, with four equity investments in 2017, six in 2018 and four through mid-May of 2019, based on an internal review of deals in which the company was either the buyer or seller.

In December 2018, Shell New Energies and EDF Renewable Energy Inc., a unit of French utility Electricité de France SA, formed a joint

List of active power purchase agreements with Royal Dutch Shell or Shell subsidiaries

Contract start year	Power plant	Fuel type	Contracted capacity (MW)
2001	Larkspur Energy Facility	Gas	100
	Tenaska Gateway	Gas	902
2003	Tenaska Central Alabama	Gas	970
2004	Brighton Beach Power Station	Gas	290
	Tenaska Virginia Generating	Gas	1,009
2007	Lockport	Gas	229
2008	Rensselaer Cogeneration	Gas	89
2015	Harvest Moon Renewable Energy Company	Solar	2
2016	RE Tranquillity 1 Solar Generating Facility	Solar	200
2018	Voyager Wind II Project	Wind	130
2019	La Crete Biomass Power Plant (Mustus Biomass)	Biomass	42
	Phoebe Energy Project	Solar	223
2020	Coachella Hills Wind Project	Wind	100
	Palen Solar Project (Maverick 4 Solar Project) (Almasol)	Solar	100
2021	CE&P Imperial Valley 1 Project	Biomass	50
Total			4,435

Data compiled May 9, 2019.
Limited to contracts with power plants in the U.S. and Canada.
Active contracts were limited to those with reported start years and ending in 2019 and onward.
Source: S&P Global Market Intelligence

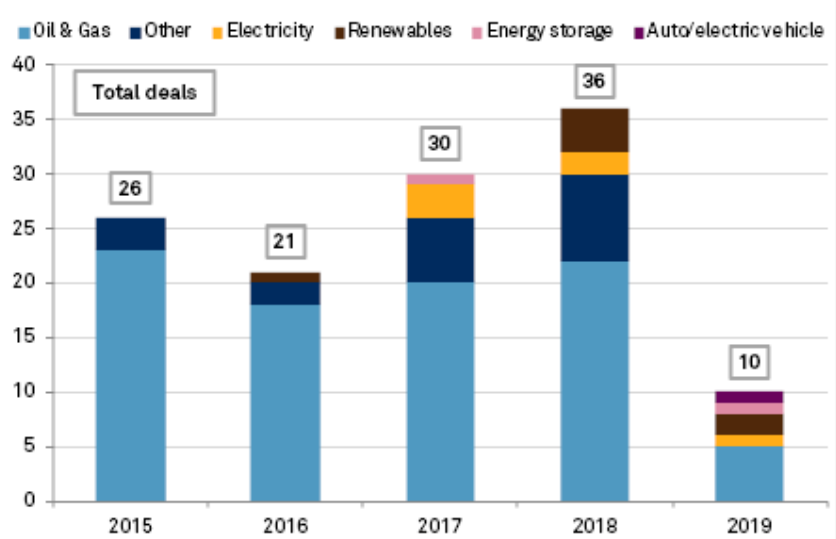
venture to acquire a lease off the New Jersey coast with the potential for 2,500 MW of offshore wind capacity.

Before that, Shell bought European electric vehicle charging station company The New Motion BV; a stake in German battery firm sonnen GmbH; and power supplier First Utility Ltd., which it rebranded as Shell Energy Retail Ltd this March, switching more than 700,000 customers to 100% renewable electricity.

Since 2009, 39% of the equity investments for Shell's subsidiary Shell Ventures were in the oil and gas space, while 21% were in technology, 13% in renewables and 2% in energy storage, according to a Market Intelligence analysis through May 14.

Royal Dutch Shell and affiliates increased renewable deal activity after 2016

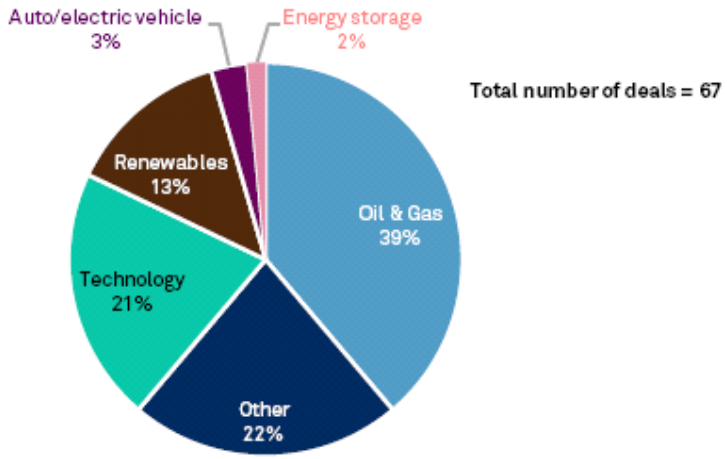
Number of announced deals by industry



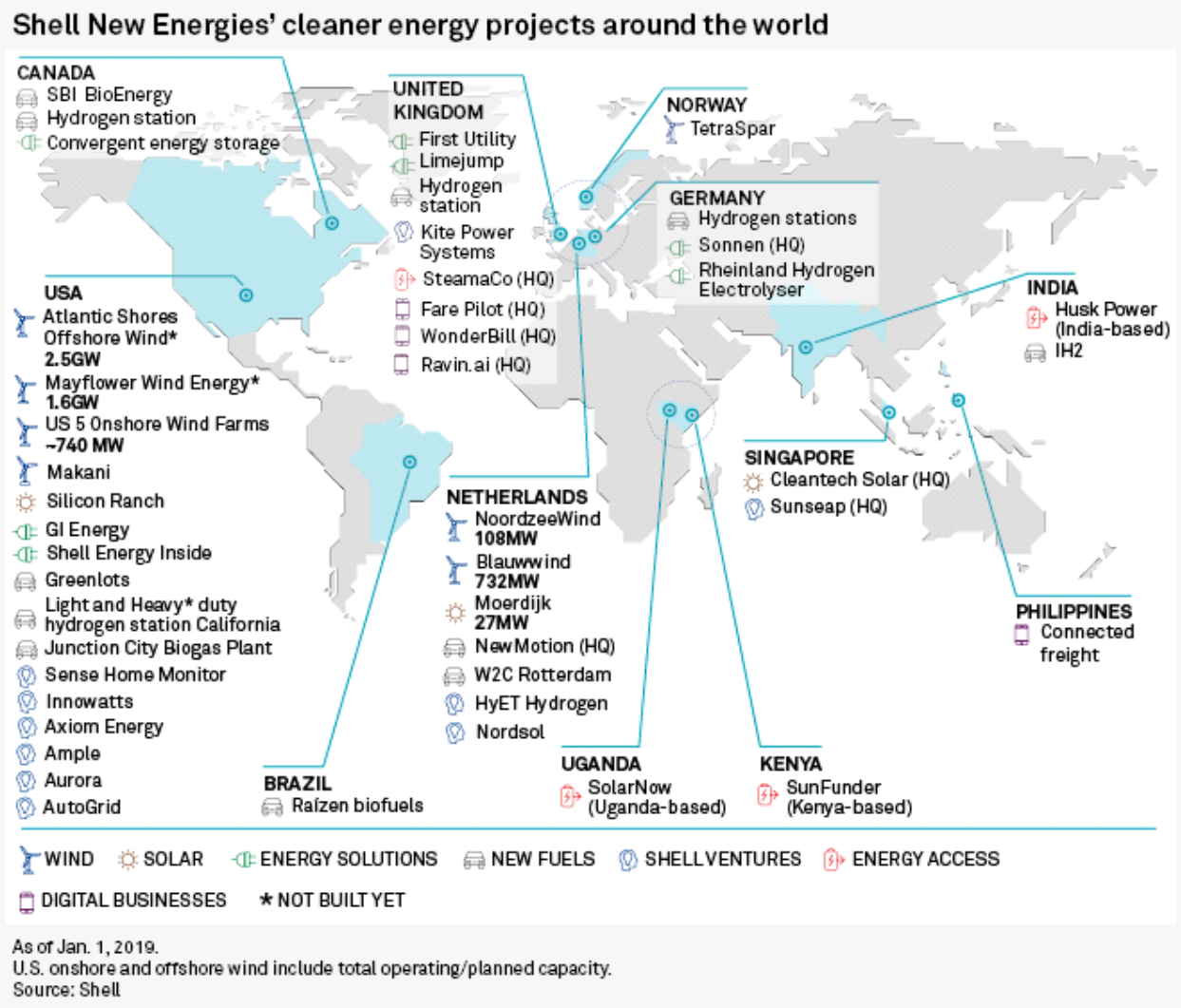
Data compiled May 14, 2019.
Analysis includes M&A transactions announced or completed from Jan. 1, 2009, to April 30, 2019.
The review includes acquisitions or sales of whole company, assets or branches, or minority stakes, but excludes buybacks, shelf registrations, private placements and equity capital market deals. The analysis excludes investments made by Shell Ventures and joint ventures.
* Deal industry determined through a deal-by-deal analysis of the target's area of focus. Software/technology/manufacturing companies were counted under the industry they primarily serve. For instance, a battery manufacturer is grouped under energy storage.
"Oil & Gas" consist of drilling, liquefied natural gas transactions and gasoline stations.
Renewables includes investments in wind and solar plants, renewable plant operators and renewable project financiers.
Electricity includes energy management software, fossil fuel power plants, electric utilities and energy trading firms.
Other includes gas utilities and non-energy-related companies.
Source: S&P Global Market Intelligence

Shell Ventures equity investments between 2009-2019 by industry

Based on number of investments



Data compiled May 14, 2019.
The analysis evaluates investments from Jan. 1, 2009, to April 30, 2019.
Limited to investments in targets located in the U.S., Canada, Asia, and Europe.
Investments categorized based the target's area of focus. Software/technology/manufacturing companies were counted under the industry they primarily serve. For instance, a company providing solutions for energy storage and microgrids is classified as energy storage.
"Oil & Gas" consists of investments in refining and liquefied natural gas.
Renewables includes investments in renewable projects, plant operators and financiers, wind turbine manufacturers, and renewable engineering firms.
Technology includes energy management software, internet and hardware companies.
Auto/electric vehicle includes vehicle manufacturers and software companies.
Other includes gas utilities and non-energy fields.
Source: S&P Global Market Intelligence



As of Jan. 1, 2019.
U.S. onshore and offshore wind include total operating/planned capacity.
Source: Shell

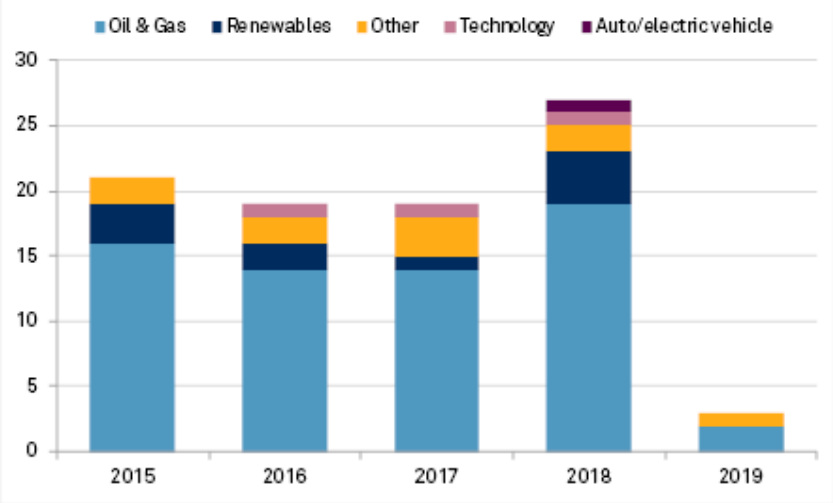
BP making up for lost time, reenters solar space

To aid its own transition toward cleaner energy, BP has been increasing its equity investments in non-oil businesses.

After divesting a 51% interest in a solar venture with India's Tata Power Co Ltd. in 2011, BP reentered the solar space in 2018 by acquiring a 43% stake in Lightsource BP for $200 million.

Its efforts to expand in the U.S. are ongoing; so far Lightsource BP has bolstered its portfolio with the purchase of 135 MW of solar projects in the PJM Interconnection markets in August 2018.

Number of announced deals by industry involving BP PLC and/or subsidiaries

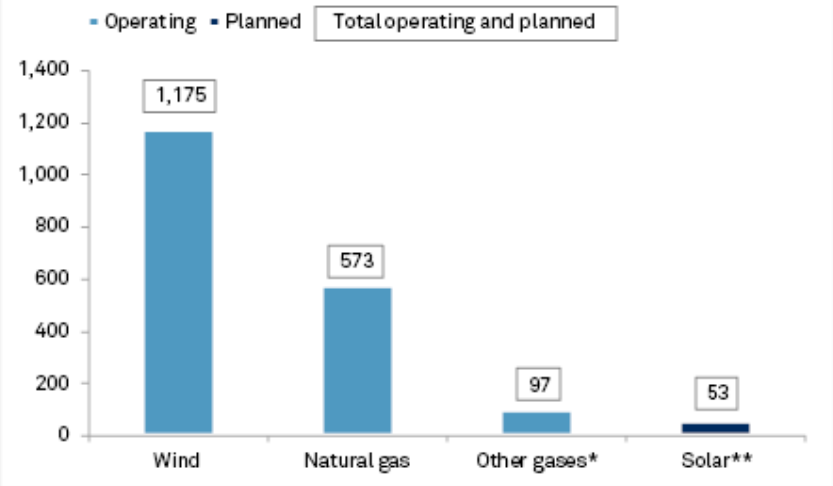


Data compiled May 14, 2019.
Analysis excludes investments made by BP Technology Ventures and joint ventures. The review includes M&A transactions announced or completed between Jan 1, 2009, and April 30, 2019. The analysis compiles acquisitions or sales of whole company, assets or branches, or minority stakes, but excludes buybacks, shelf registrations, private placements, and equity capital market deals.
Deal industry determined through a deal-by-deal analysis of the target's area of focus. Software/technology/manufacturing companies were counted under the industry they primarily serve.

- Oil & Gas consists of drilling, LNG transactions and gasoline stations.
- Renewables includes investments in wind and solar plants, renewable plant operators and renewable project financiers.
- Auto/electric vehicle includes charging companies and equipment manufacturers.
- Technology refers to software and data firms.
- Other includes gas utilities and non-energy-related companies.

Source: S&P Global Market Intelligence

BP PLC owned operating and planned capacity (MW)



Data compiled May 1, 2019.
* Other gases refers to the Whiting and Mandan refineries that use waste heat for power generation.
** The 53-MW total includes 5 MW of existing solar and 48 MW of planned solar.
Source: S&P Global Market Intelligence

Lightsource BP is developing several other new solar assets in the U.S., including a 70-MW offsite facility for Pennsylvania State University and the Wildflower Solar 1 Project in California. Lightsource BP will market the power from Wildflower Solar under long-term PPAs.

Lightsource BP's European portfolio includes solar assets in the U.K., Ireland, Italy and the Netherlands. In the past year, Lightsource BP has also entered the Australian, Brazilian and Egyptian markets.

As of mid-May, Market Intelligence data showed parent BP had 5 MW of solar capacity, with plans to add 48 MW of new solar additions in the next few years. This excludes a recent announcement of a planned 100-MW Montgomery solar project in Alabama.

As of mid-May, data also showed BP and its affiliates had 1,175 MW of owned and operated wind capacity in operation, with 53 MW of new solar capacity planned.

In December, BP Wind Energy North America Inc. announced it sold 430 MW of operating wind energy capacity in Texas and would use the proceeds for technology upgrades at its remaining U.S. wind portfolio, which consists of 11 facilities in eight states.

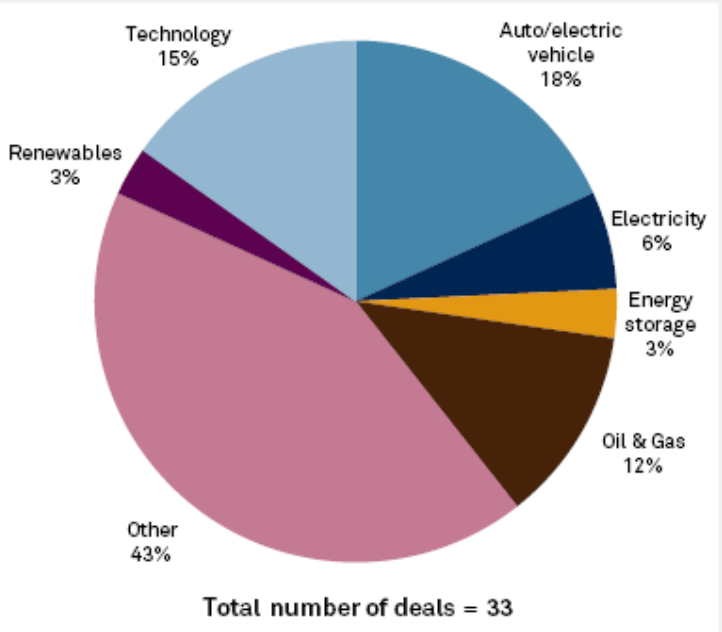
According to a Market Intelligence analysis of BP's M&A deals and BP Technology Ventures' equity investments, renewable deals have increased since 2009.

Since 2009, 43% of BP Technology Venture's 33 equity investments were classified as other, or gas utilities and non-energy fields. About 18% of its investments were in auto/electric vehicles, 15% in technology, 12% in oil and gas, 6% in electricity, 3% in renewables and another 3% in energy storage, according to data from S&P Global Market Intelligence.

"For the handful of companies leading the pack, we would anticipate clean tech to become needle-moving — though still not game-changing — prior to 2025, i.e. within an investable time frame. For everyone else, it will likely take until the second half of the next decade, or even beyond 2030," Raymond James analyst Pavel Molchanov said in a June 24 research report.

BP Technology Ventures equity investments between 2009-2019 by industry

Based on number of investments



Data compiled May 14, 2019.
Analysis looked at investments made between Jan. 1, 2009, and April 30, 2019.
Investments classified based on the target's area of focus. Software/technology/manufacturing companies were counted under the industry they primarily serve.

- Oil & Gas consists of investments in refining, gas stations, and liquefied natural gas.
- Renewables includes investments in renewable projects, plant operators and financiers,
- Technology includes energy management software, internet, and hardware firms.
- Auto/electric vehicle includes vehicle manufacturers and software firms.
- Other includes gas utilities and non-energy fields.

Source: S&P Global Market Intelligence

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